Radical changes in design of military equipment are ordered as Army moves to conserve rubber, p. 80

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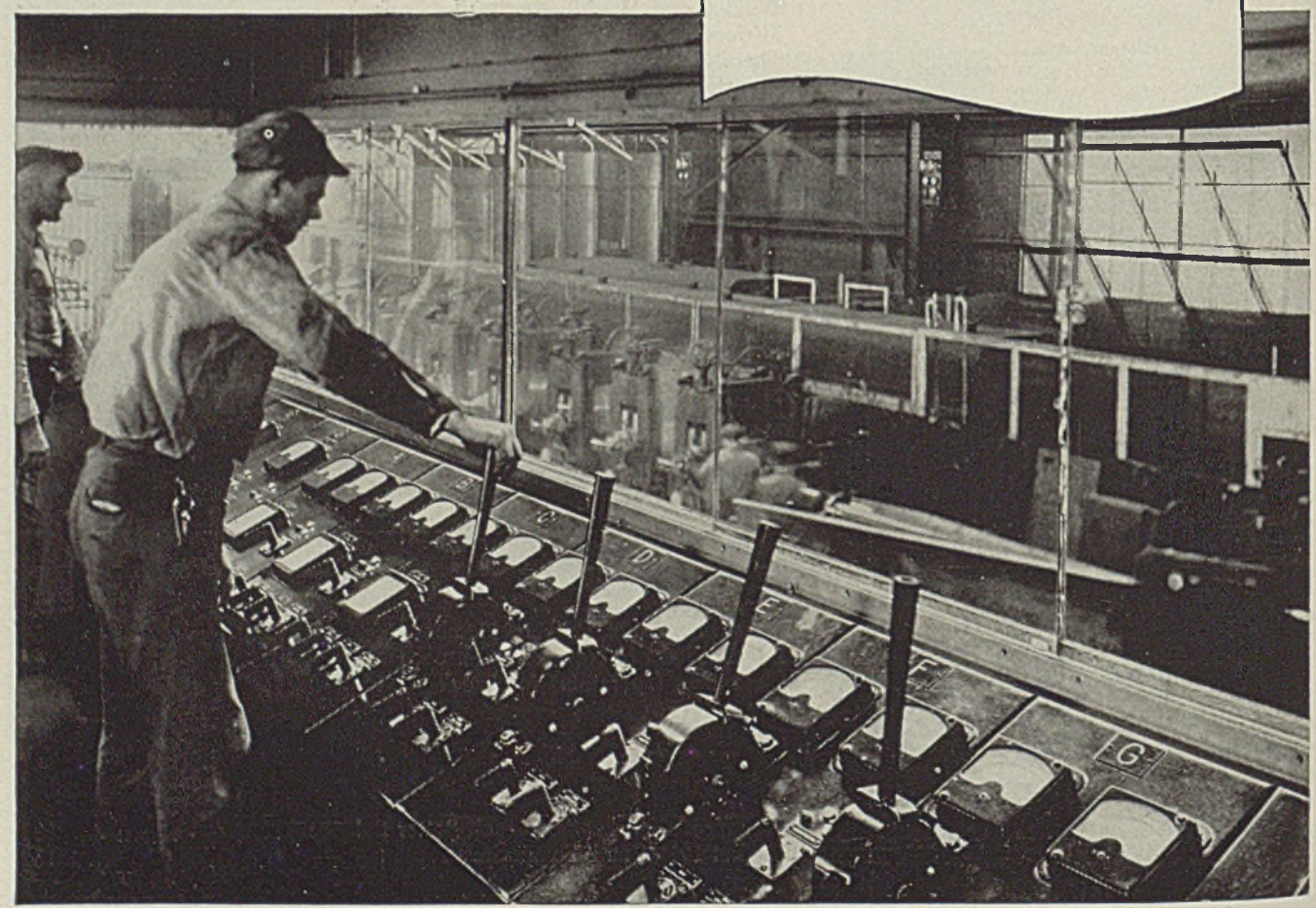
I feel like an Admiral!

"Up here I'm rolling steel that won't stop rolling until it hits the Axis in the Axis!

"Me? I'm just a guy with a lot of levers, but I feel like an Admiral! Why? Because that Morgan Mill down there obeys me like a squadron!

"Sure I like my job . . . we get things done!"

R-107



MORGAN CONSTRUCTION COMPANY • WORCESTER, MASS.

HIGHLIGHTING

this issue of STEEL

SCARCITIES PASSING Developments at Washington prove that the war effort now has graduated from the planning stage and is a "going business". The chiefs of staff now know how, when and where they will fight and what weapons they will need. They and the production chiefs now understand the limitations within which we can produce for war. The resulting balancing of the production program, therefore, has cured most of the problems that arose from scarcity of critical materials. The period of scarcities now is approaching its end (p. 54). Even steel supply now is becoming easier (p. 44).

As a result of this turn in the situation the chiefs of staff and production authorities have agreed that many orders that limit production of civilian goods must be liberalized—and soon, in order to prevent a too-lean civilian economy that otherwise would lie ahead. Among factors entering into this step are simplification and standardization, the extent to which production should be concentrated in one or more plants in an industry, effective use of our transportation facilities, the need for helping smaller manufacturers, the need for preventing "ghost" towns through migration of workers. However, the problems that now remain are simple as compared with those that have been solved.

As an earnest of the new concentration on civilian requirements it is to be noted that the highest priority rating, AA-1, now may be applied to repair and maintenance of housing and consumer goods (p. 46). More steel has been alloted to housing (p. 59).

Other progress has been made in eliminating bottlenecks and scarcities. Small lots of molybdenum may be obtained without allocations (p. 58). Progress in utilizing low-grade manganese ores is reported by the Bureau of Mines (p. 58). A pronounced improvement has been made in replenishing steel warehouse stocks.

SIGNIFICANT NEWS Despite the easier steel situation, as reported in the foregoing, steel ingot output in October broke all records with a new high of 7,584,864 tons (p. 50), operating at 100.1 per cent of rated capacity. The daily average production in November promises to be even greater since the rate of production continues to gain (p. 51).

Net profits of steel consumers declined some 23 per cent in the third quarter as compared with third quarter in 1941 (p. 74).

Although the tooling-up part of the war program has been largely completed, needs of the armed forces make additional facilities necessary and another list of awards involving new plant construction has been announced by the Defense Plants Corp. (p. 69).

War Production Board has set up a research committee to explore production methods. It also has set up additional advisory committees, one of which is seeking to minimize cross-hauling of steel (p. 57).

Seized foreign patents are offered for sale by the Alien Property Custodian (p. 59).

LABOR As part of a reorganization aimed at more efficient war production the War Production Board finally has granted labor's demands for responsibility in the direction of this program. Each industry division now has a labor advisory board (p. 47).

Employers are urged to set up "manning tables" to show to their local draft boards when they request deferment of needed men. These should be prepared carefully so as to define each job and indicate the length of time required to train replacement workers. The War Manpower Commission and the Selective Service System consider them as essential in order that men may be called to service without dislocating production (p. 67).

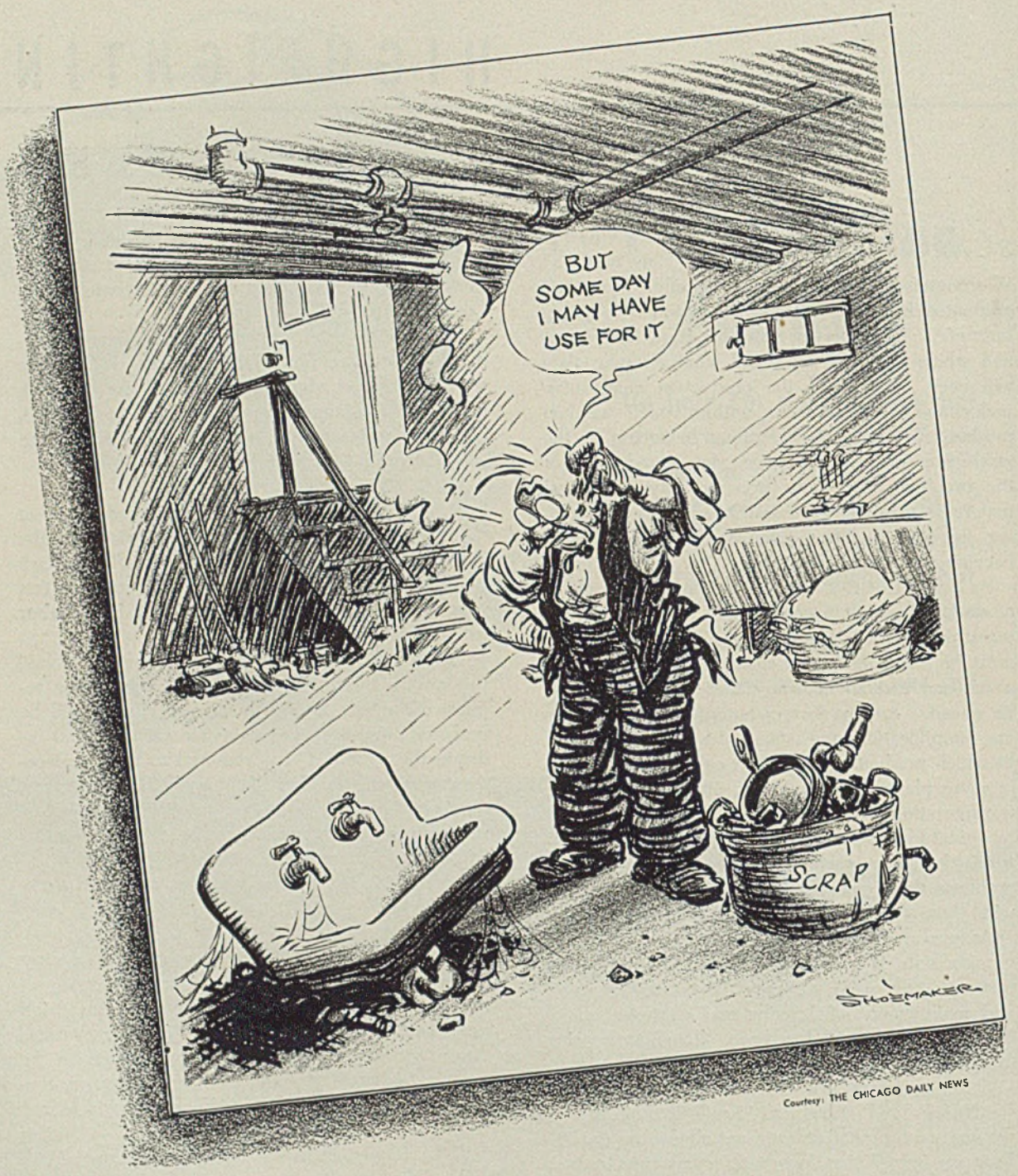
Donald M. Nelson declares that a longer workweek is needed (p. 68).

TECHNICAL L. Bruchiss discusses factors in design and operation of aircraft cannon, effect of gun and shell size, firing rates, control systems, ammunition capacity, various types of mountings (p. 78). An aircraft cannon, he explains, is nothing more than an overgrown machine gun with the problems brought by increased size.

G. W. Curry tells how to lay out welding machines and current supplies for most efficient utilization of available equipment. He describes the system employed at Houston Shipbuilding Corp. in Texas (p. 88).

Management "know-how" leads to improved military equipment, saves critical materials, shortens deliveries of war goods, reduces costs, states Alfred P. Sloan Jr. (p. 93) and he explains how it is done. Typical of conservation activities is the welding of a 3-inch length of common steel rod on the end of every welding electrode before use, eliminating waste of 1 or 2 inches of usable electrode.

E. J. Wellauer describes the sucessful application of NE steels in gears, discussing the various factors involved in using these new steels for this application (p. 106). He shows that high alloy steels are not necessary for gears if the material is treated properly.



If we lose, that day will never come

WE ARE known as a nation of thrifty "string-savers." Around our industrial plants are hoards of obsolete and obsolescing machinery and equipment, saved because "some day we might have use for it."

Today there *is* use for it, as desperately needed scrap, to make steel so that our fighting men will have the guns and tanks and ships they need. There will never be a better time to clear our plants of miscellaneous machines, old boilers, unused structures, unfinished parts, etc. Never will it be needed more.

Someone must be given the responsibility to decide what can be discarded throughout the entire plant, *and see that everything possible is scrapped.* Instead of saying, "But some day I may have use for it," let's remember that, If we lose, that day will never come!

INLAND STEEL CO.
38 South Dearborn Street, Chicago, Illinois

STEEL
November 16, 1942

Now We Can Work to a Plan

When this nation was plunged into war last Dec. 7 the main objective in our war effort was to mobilize our resources as rapidly and in as great volume as possible to meet whatever challenge lay ahead. We had to go on the theory that the best we could do was our only safe objective.

Last week the occupation of Northern Africa by American forces, coupled with the already known objectives of our activities in the Pacific, served to define more clearly the scope of our fighting job. This clearer definition makes it possible for the first time in the war to estimate the requirements in men, materials and equipment intelligently.

This clarification means much to those responsible for production for war. It means that gradually production schedules can be keyed to carefully calculated needs, instead pointing them to the sky on the assumption that the maximum will not be too much. It also means that soon we shall be able to figure manpower requirements more accurately.

Fortunately the possibility of planning more objectively comes at a time when WPB is making great progress in ironing out difficulties in production. Today there is an atmosphere of confidence and of definite purpose in many Washington offices where only a few months ago doubt and confusion prevailed. Better distribution is relieving material shortages. Corrections, such as CMP for certain materials and "manning" tables for manpower, are being introduced. It is not too much to say that WPB is getting on top of its difficult job.

However, these cheering developments on the fighting fronts and on the home front do not mean that the nation is out of the woods in respect to its war program. They mean only that the first faint light of the clearing ahead is discernible. This light—growing brighter—will furnish a powerful incentive for greater effort. Now we can work to more definite objectives.

E. L. Shaner

Editor-in-Chief

"Definitely Easier", as Better Balance Is Achieved

Moderation of limitation rulings covering many products may result. . . Meeting held to redistribute steel intended for Lend-Lease . . . Some cancellation of low-rate orders reported

EVIDENCE is accumulating to the effect that the steel situation is definitely easier, and, as expressed by one WPB official, "the mills will be looking for business by the end of the year."

This report was given further credence last week when it was learned that discussions were being conducted in Washington looking toward the possible easing of steel limitation orders. Barrelmakers, for instance, feel that production of their product has been unduly restricted in view of increasing availability of sheets.

It is indicated that rapid action will be taken in switching steel, as well as copper and aluminum, over to control under the Controlled Materials Plan. Some observers believe the CMP will be in full operation well before the July 1, 1943, deadline. In the changeover process, steel inventories larger than necessary in the hands of manufacturers may be disclosed. WPB has definite evidence that under PRP manufacturers have been inclined to get more material than required.

Pressure already has been taken off steel mills as the result of an abrupt drop in Lend-Lease shipments and it is not expected that such shipments will be resumed on their previous scale. The Steel Division has been holding meetings in Washington to redistribute in this country steel produced for Lend-Lease.

In addition, military equipment production programs in this country already are being rejuggled, coincidental with the transition from the preliminary preparation phase to a "shooting" war.

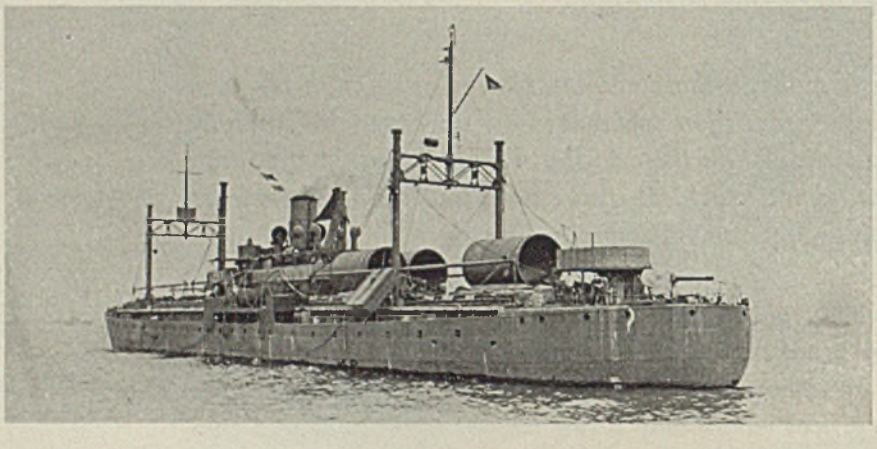
Sheetmakers are encountering less pressure, and in some instances actually have had cancellations of low-rated orders on books which consumers no longer want and which they were afraid might be shipped.

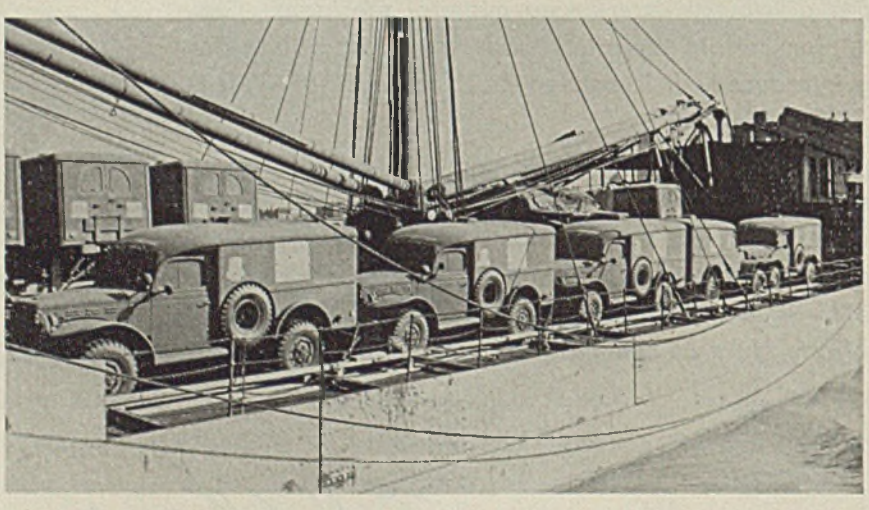
Use of pipe is limited to a few applications, such as ships, but makers figure they may get semifinished sooner than they expected.

Carbon and alloy bars still are tight but may open up somewhat early next year. Structural mills already need business. The sheared plate situation is not easier as yet but effects of improved efficiency in shipbuilding, for example, are being felt. Universal and strip mill plates are substantially easier. Reinforcing bars are freer, and some price weakness actually has been noted.

There is no indication that steel will be released shortly for unessential civilian requirements but it has been reported that civilian supply, as one of seven claimant agencies under CMP, may get as much as 35 per cent of total steel. Indirect military needs, of course, are included. As explained by one WPB expert, only a given amount of raw steel can be channeled into a single outlet such as shell steel, which means that material may become available for less important items.

Less apprehension over the raw materials situation is evidenced by high WPB officials, one being quoted as saying "if we can get these three materials—steel, copper, aluminum—in balance, we will have little to worry about with respect to the others."





Freighters "bridging the Atlantic" with Lend-Lease products. As the strategy of the war has developed, more emphasis has been placed on finished material and equipment, one reason for accumulation of raw steel at times at eastern ports, and an "easier" situation in steel supply. Official U. S. Navy photographs

Alloy Steel Supplies Continue Limited

Substantially the only exception in this easier situation is in alloy steels. Demand for alloy compositions has increased. Only last week a high production official stated in Washington that the size of our war effort will be limited by the amount of alloy steel we can produce. It also was revealed that by modifications in alloy analyses we can

make our supply of alloying elements go around. For this reason no acute problems are expected in connection with the supply of alloys. In many cases high-alloy steels are being replaced successfully with the new NE (National Emergency) steels that contain small quantities of alloying elements.

In addition to an easing of the steel supply many consumers are heartened by the new attitudes among military and production strategists at Washington that in changing over to war production we have swung over too far and now must retrace our steps to a certain extent. It is feared that after present inventories of consumer goods have been exhausted we will have a dangerously lean civilian economy unless remedial action is taken — and soon. Hence some of the recent limitation orders are due for modification. The problem is complicated by a number of factors, one of which is the extent to which civilian production should be concentrated in one or more plants in an industry. Another is the desirability of keeping small plants going as far as possible. Still another is the extent to which civilian goods should be simplified or standardized.

Heartening war news in the past few days inspired many steel consumers who have been adversely affected by limitations on civilian supply to hope that the North African maneuver may mark an important turning point in the war, and that civilian restrictions may be lifted to some extent.

Some companies, particularly various small distributors of steel specialties, have been on the point of closing for the duration. Now they are planning to carry on for a while, even at financial loss to themselves, in the hope that they can keep their names before the trade and maintain some semblance of organization.

Essential Repair, Maintenance Materials Given AA-1 Rating

Pointing up the importance of keeping the nation's civilian economy in a healthy condition, the WPB Requirements Committee has authorized that the high priority rating of AA-1 may be applied to essential repair and maintenance materials.

Included in the scope of the determination, which becomes a basic policy for the first quarter of 1943, are essential repairs and maintenance for productive facilities, utilities, housing and consumers' durable goods.

The action will make it possible for vital plants and factories, mines and refineries and other industrial facilities to continue effective production of both munitions of war and essential civilian goods. Communication and transportation systems, gas, oil and water lines and other services will be assured of materials to keep them performing their essential functions.

Until the Controlled Materials Plan goes into full operation, the existing priorities system will be used to obtain the steel, copper and aluminum needed for such maintenance and repair. Under CMP each agency will break down its material requirements three ways: into that needed for production, construction and facilities, and maintenance and repair.

By including maintenance and repair requirements in the overall materials program, CMP provides a long-range assurance that the nation's essential industries will be kept in operation.

Oil Producers May Be Limited To 50% Normal Requirements

Oil producers probably will receive no more than 50 per cent of their normal material requirements in 1943, Don R. Knowlton, Office of Petroleum Co-ordinator for War, predicted in a speech delivered in Chicago last week at the annual meeting of the American Petroleum Institute.

Determination of the exact amount rests with the WPB.

Mr. Knowlton, who is director of OPC's Production Division, said that as a result of WPB's Conservation Order M-68, under which the use of materials by oil producers is regulated, some 13,000 fewer wells will have been drilled in 1942 than would have been drilled in a normal year. He said:

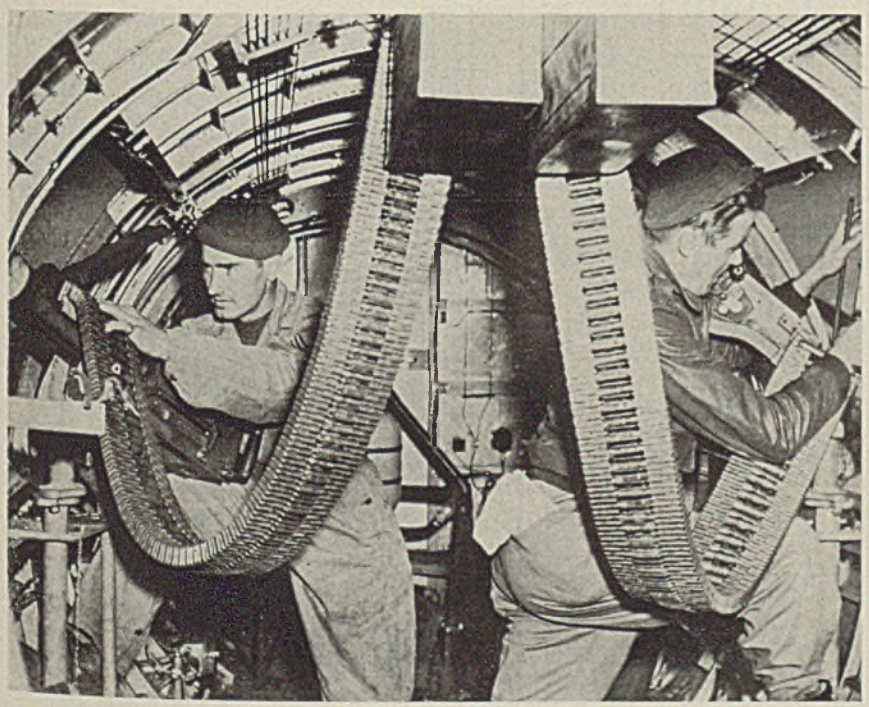
"The result of this reduction in wells is that the industry's use of steel will be within 1 per cent of the quota set by the War Production Board, which was 60 per cent of that used in 1941."

Copper Stocks "Excessive"; WPB Starts Requisitioning

WPB announced last week that recent inventory surveys revealed 200,000,000 pounds of "idle and excessive stocks" of copper and copper-base-alloy products. It stated action is being started against holders negligent in filing reports, or refusing to sell their materials for war use.

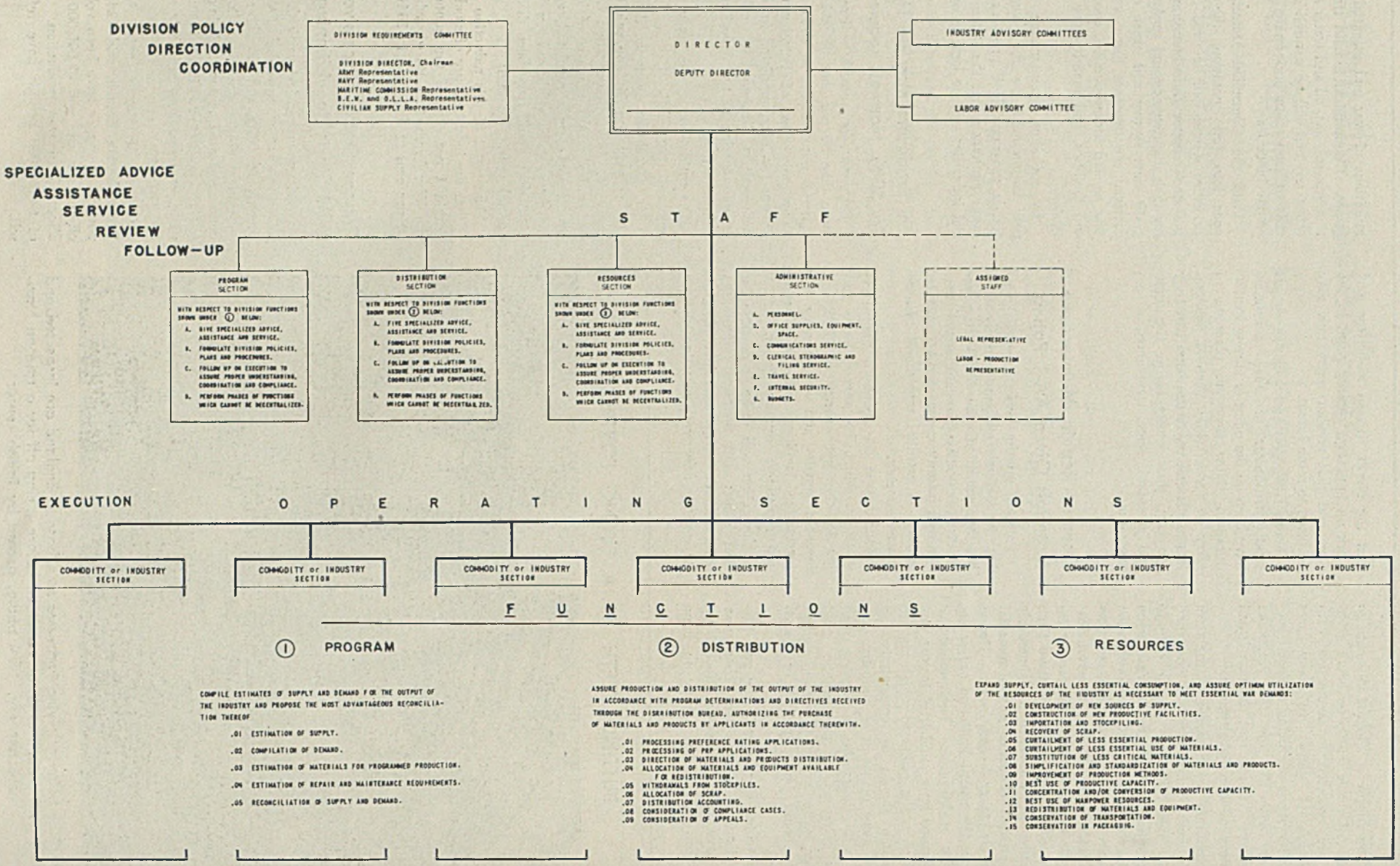
Col. C. H. Baxter, chief, Materials Redistribution Branch, said 125,000,000 pounds of copper have been voluntarily offered for sale and 93,000,000 pounds allocated to war production. Holders of 64,000,000 pounds have refused to sell.

PUTTING TEETH IN A FLYING FORTRESS



CARTRIDGE belts for Flying Fortresses at a base in England are inspected and machine guns placed in tiptop condition before taking off for a raid on Nazi-held territory. NEA photo, passed by British censor

TYPICAL INDUSTRY DIVISION



HOW a typical Industry Division is organized under the realigned War Production Board is illustrated in the above chart, released by WPB

Materials Allocation, Distribution Consolidated Under Eberstadt

Labor gains greater voice on board as advisory committees are provided for 36 industry branches. . . Subrequirement committees to represent claimant agencies in each division

RESPONSIBILITY for the allocation and distribution of raw materials vital to the war program has been concentrated in Ferdinand Eberstadt, former New York investment banker, in a new reorganization of the War Production Board. Mr. Eberstadt will head the consolidated Office of Program Determination and the Office of Operations, and acquires the title of program vice chairman.

A simultaneous move was the creation of labor advisory committees, made up of labor spokesmen from every industry, to advise each of the 36 WPB industry branches. These branches now become "divisions" of WPB. They already have industry advisory committees.

Creation of the labor advisory committees followed the demands for the past several months by labor organizations for more representation on the WPB.

Consolidation of the operations and program determination offices is designed to provide a more closely knit organization to administer the WPB policies, including the recently announced Controlled Materials Plan.

Ernest Kanzler will continue as director of operations.

Under the new office, industry divisions (formerly branches) will be given greater responsibilities for estimating requirements, expanding resources and controlling distribution of materials. At the same time, they will be tied in more closely to the work of the WPB Requirements Committee, of which Mr. Eberstadt is chairman.

Claimant Agencies Represented

Attached to the staff of each director of the 36 divisions will be a subrequirements committee consisting of representatives of the seven government claimant agencies established under the Controlled Materials Plan.

The staff of the program vice chairman will include a Program Bureau, of which Donald D. Davis is director and a Facilities Bureau, Fred Searls, director.

The Program Bureau will act as a staff to the Requirements Committee, bringing together figures on supply of materials, requirements for critical items and labor requirements, and will recommend programs to the vice chairman.

The Facilities Bureau, embodying the former Construction Bureau, will determine the requirements and programs for construction.

Under the director general for operations, H. W. Dodge will be deputy director general for staff; John R. Kimberly, deputy director general for industry divisions; and Wade Childress, deputy director general for field operations. T. Spencer Shore will be director of industry advisory committees.

The staff of the director general for operations will include a Distribution Bureau, of which J. A. King is director, and Resources Agencies, with a director to be named later.

The Distribution Bureau will take over the functions of the Bureau of Priorities Control and will administer the distribution of materials through priorities, the Production Requirements Plan and the Controlled Materials Plan. It will also handle compliance, appeals and the auditing of materials accounts.

CMP Reports to Director General

The Resources Agencies will handle scrap and salvage programs, simplification and substitution, redistribution of materials and equipment, requisitioning, concentration of industry, stock piling and transportation, resources protection, and programs for increasing production and better use of manpower resources.

The three Controlled Materials Divisions—steel (including the former Iron and Steel and Ferroalloys Branches), copper, and aluminum-magnesium—will report directly to the director general. The Rubber Division will report to Rubber Director William N. Jeffers, and the Aircraft and Radio and Radar Divisions to WPB Production Vice Chairman Charles E. Wilson.

The other industry divisions have been grouped under five operating bureaus, as follows:

Minerals Bureau, Joseph M. Scribner, director: Mining; mica-graphite; tin-lead; zinc; miscellaneous minerals.

Commodities Bureau, Ernest Reid, director: Chemicals; printing and publishing; pulp and paper; cork and asbestos; containers.

Consumers Goods Bureau, Lewis S. Greenleaf, director: Food; beverages and tobacco; consumers durable goods; textile, clothing and leather; service equipment; distributors (formerly distributors branch of the bureau of priorities control).

Construction and Utilities Bureau, John Hall, director: Plumbing and heating; building materials; lumber and lumber products; power; transportation equipment; communications equipment; governmental (formerly bureau of governmental requirements).

Equipment Bureau, Harry A. Rapalye, director: General industrial equipment; automotive; tools; farm machinery; construction machinery; safety and technical supplies (formerly health, safety and technical equipment branch).

Executives in New Setup

The present and former positions of officials of the new office are as follows:

Wade T. Childress is president of the Columbia Terminals Co., St. Louis, and chairman of the executive committee, Trailer Co. of America, Cincinnati. In May, 1942, he became regional director of the WPB, supervising the activities of all field offices in Nebraska, Kansas, Missouri and Arkansas. Since July, 1942, Mr. Childress has been deputy director general for field operations.

Donald D. Davis, Wayzata, Minn., is president of General Mills Co., Minneapolis. He was recently appointed director of the program co-ordination division.

H. W. Dodge, Bronxville, N. Y., was general sales manager of the Texas Co. He was appointed as a general assistant to the director of the materials division in December, 1941, and he became assistant deputy director of the Materials Division in April, 1942. He was made a member of the Transportation Committee in May, 1942, representing the Materials Division.

Lewis S. Greenleaf, Loudenville, N. Y., was industrial sales manager of the Behr Manning Corp., Troy, N. Y. He was appointed chief of the Special Industrial Machinery Branch of WPB in March, 1942. Since September, 1942, he has been assistant deputy director general for industry operations.

John Hall, Pittsburgh, is on leave from the American Radiator & Standard Sanitary Corp., Pittsburgh, where he was vice president, general sales. He came to OPM in November, 1941, as special assistant to the deputy director of priorities. He later became special assistant to the director of industry opera-

tions, and then assistant to vice chairman Knowlson.

Ernest Kanzler, Detroit, was the founder of the Universal Credit Corp. and served as its president from 1928 until he joined the staff of WPB. He became chief of the Automotive Branch with headquarters in Detroit in January, 1942. In March, he was appointed regional director of the WPB in Detroit. Since September, 1942, he has been director general for operations.

John R. Kimberly was formerly president of the Kimberly-Clark Corp., Neenah, Wis. He came to OPM in November, 1941, as consultant in the Industrial and Office Machinery Branch. In January, 1942, he was appointed assistant chief in the Bureau of Industry Branches.

J. A. Krug, Madison, Wis., was manager of power for the Tennessee Valley Authority. He joined OPM as advisor to the Materials Branch of the Production Division in June, 1941, and became chief of the Power Branch of WPB in October, 1941. Mr. Krug was appointed deputy director for priorities control in July, 1942.

Harry A. Rapelye, Kansas City, Mo., was business and sales manager of the Continental Can Co. He joined WPB in December, 1941, as chief of the Nickel Branch.

Dr. Ernest W. Reid, Pittsburgh, was a senior industrial fellow in Mellon Institute, Pittsburgh. He came to Washington in June, 1940, as a member of the Advisory Commission to the Council of National Defense, and was assistant chief of the Chemicals Section. Dr. Reid was appointed chief of the Chemicals Branch of WPB in February, 1942.

Joseph M. Scribner, Pittsburgh, was a partner of the firm of Singer, Deane & Scribner. He joined WPB in February, 1942, as special assistant to the deputy director of the Materials Division. He recently became assistant deputy director general for industry operations.

Fred Searls was formerly executive assistant to the deputy administrator of the War Shipping Administration. In October, 1942, he was appointed chief of the Facilities and Construction Program Branch.

Francis Sette, Blacksburg, Va., was deputy administrator of Rural Electrification Administration. He came to WPB in December, 1941, as administrative officer of the Materials Division. He later worked with Mr. Kanzler in Detroit. T. Spencer Shore, Akron, was vice president and treasurer of the General Tire & Rubber Co. He came to OPM in August, 1941, as assistant chief of the Bureau of Industry Advisory Committees, and he was appointed chief in January.

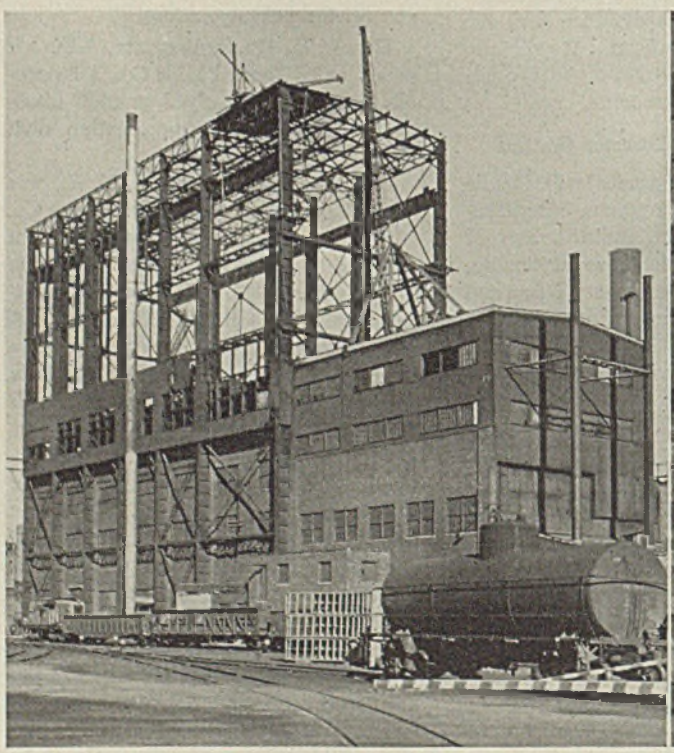
Livingston Short, New York, was formerly connected with the General Exchange Insurance Co. He came to WPB in August, 1942, as assistant deputy chairman in the Office of Program Progress.

Scrap Yards Granted Ratings For Maintenance Materials

Scrap dealers' yards and automobile graveyards are aided in obtaining repair and maintenance material by order P-136, which assigns the following preference ratings:

1. AA-2X for essential and immediately needed repair materials and parts to remedy a breakdown or suspension of operations.
2. AA-3 for repair materials and parts up to the minimum required to guard against breakdown of operations.
3. A-1-a for repair materials, spare parts and operating supplies to a total value not in excess of $500 per quarter.

WORLD WAR 1 BUILDING AND OBSOLETE DIES, HEADED FOR SCRAP PILE



UPPER half of a World War 1 shop at Allis-Chalmers Mfg. Co. is being razed to obtain steel to further the present war effort. The building, left, is expected to yield 500,000 tons of salvaged steel and scrap. Right, more than 2000 dies and jigs have been released from storage by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., to feed scrap-hungry open hearths. Allis-Chalmers and NEA photos

Substitute Bessemer Steel for Open-Hearth, Batcheller Urges

STEEL consumers were urged last week by H. G. Batcheller, chief, Iron and Steel Branch, to use, wherever possible, steel made by the bessemer process.

Mr. Batcheller pointed out that in recent years, steel consumers have become accustomed to buying open-hearth steel because of the close controls obtainable over the properties of the steel.

"This practice is being continued today," Mr. Batcheller said, "despite the fact that bessemer steel or rail steel would in many cases serve equally well.

"The supply of both bessemer steel and re-rolled rail steel is not being used to the best possible advantage. Increased use of this supply would relieve the pressure on open-hearth steel and be a substantial contribution to the war effort."

Bessemer steel is available in many products, including bars, plates, shapes, sheets, strip, pipe, wire products and track accessories. Rail steel bars, which are rolled from old railroad rails, also are adaptable for purposes for which open-hearth steel now is being used. Such uses include reinforcement of concrete, and agricultural implements.

"All buyers should scrutinize their requirements to determine whether bessemer steel or re-rolled rail steel will adequately satisfy their needs," Mr. Batcheller said. "Buyers who can use those grades should contact bessemer and rail steel producers for full information."

The Iron and Steel Branch staff, Mr. Batcheller added, will be glad to co-operate with any buyers in helping them to find sources of supply for either bessemer or rail steel.

Celebrate Half-Century of Mesabi Iron Ore Mining

Marking the fiftieth anniversary of the arrival of the first cargo of iron ore from the Mesabi range, the Cleveland Chamber of Commerce Nov. 10 held a civic luncheon, attended by 400 Cleveland business leaders.

Raymond Moley, formerly of the Roosevelt circle of advisers, spoke on "American Industry Today and Tomorrow". He cited the recovery of about a billion tons of ore from the Mesabi and another billion still there, with much lower grade ore, as proof that there will be no shortage for war needs, no matter how long the struggle lasts.

Special guests were members of the Lake Carriers' Association and the Lake Superior Iron Ore Association. The framed bill of lading for the first shipment was on display at the speakers' table. James F. Lincoln, president of the chamber, was toastmaster. He introduced M. D. Harbaugh, vice president and secretary of the ore association; A. T. Wood, director, Great Lakes Carriers' Division, Office of Defense Transportation; Crispin Oglebay, president, Oglebay, Norton & Co., which shipped the first ore to Cleveland.

Ickes Commends National Tube For Fast Work on 24-Inch Pipe

The last piece of 24-inch pipe for the 550-mile oil pipe line between Long View, Texas and Norris City, Ill., was shipped from National Tube Co.'s Lorain, O., works Nov. 10, four months to the day from the time the work was begun.

Petroleum Co-ordinator Harold L. Ickes, in an address prepared for delivery before the American Petroleum Institute, meeting in Chicago, said with reference to the pipe contract:

"The accomplishment meant that 137,500 tons of steel was transferred from ingots to tubes—4600 gondola carloads of it. That was an average of five and one-half miles a day. I think that there can be no dispute that the steel mill has earned our thanks and applause for this record. I hope that as excellent a job can be done on the pipe for the extension of the line."

Galvanized Ware Production Limited to Six Articles

Galvanized ware has been made subject to strict simplification and limitation restrictions by WPB. Net effect will be reduction by Jan. 1 from 150 of all sizes and kinds of zinc-coated ware now produced to six articles of only a few sizes, and the saving of 44,000 tons of steel and 10,000 tons of zinc for war production.

Effective Nov. 12, the order cuts off the production of watering pots, radiator and tractor filling cans, foot baths, liquid and dry measures, dippers, ash sifters, coal hods and scuttles, utility baskets and all rubbish and ash receptacles except cans and pails of specified sizes. Dippers and dry and liquid measures, however, may be made for the military and other essential purposes.

Approximately 270 manufacturers are affected.

30 DAYS AHEAD OF SCHEDULE

FIRST coke ovens are lighted at the Kaiser steel mill at Fontana, Calif., by Mrs. Henry J. Kaiser Jr., center. Handing the torch to Mrs. Kaiser is J. H. Getters, left, whose company built the ovens, and George Ramsey, a Kaiser mill official. Construction of the West coast plant is 30 days ahead of the original schedule. NEA photo

Inland Blows in New Blast Furnace

First new blast furnace built in the Chicago district since the war started, Inland Steel Co.'s No. 6 stack at Indiana Harbor, was scheduled to be blown in Nov. 16.

The furnace has daily capacity of 1200 tons and was privately financed.

James H. Walsh, vice president in charge of operations, said company's five stacks have been operating at capacity since August, 1940, with each producing about 1000 tons a day. No. 3 furnace, built in 1917, soon will require complete rebuilding, a five-month job, and two other stacks will need relining, a two-month delay.

Rather than rebuild No. 3 furnace and deprive the war program of 150,000 tons of iron, Inland decided to build the new furnace and have it ready before No. 3 or any of the others failed.

With No. 6 furnace ready for operation not only has the race been won but the doubtful furnaces continue to pour out 1000 tons of iron every day. Rather than shut the latter down, every effort will be made to keep them in operation as long as possible.

Inland's coke ovens can produce coke for only five furnaces, so a temporary source of coke for the sixth furnace has been arranged through the WPB Iron and Steel Branch.

Steel Corp. Shipments for Ten Months All-Time High

Finished steel shipments by the United States Steel Corp. in October were 1,787,501 net tons, an increase of 83,931 tons over September and a decrease of 63,788 tons from the peak monthly record of 1,851,279 tons attained in October, 1941.

Shipments for ten months ended Oct. 31 totaled 17,548,977 tons, a record high for that period, compared with 16,988,715 tons in the comparable period in 1941.

Ship Again in Service

Pittsburgh Steamship Co.'s EUGENE J. BUFFINGTON left repair yards at South Chicago Nov. 8, to transport iron ore. The ship went on Boulder reef in Lake Michigan, June 21, broken in two places down to the turn of the bilge. An entire new mid-section, with other repairs, was necessary. Recommissioning restores Pittsburgh Steamship's ore fleet to 100 per cent operation.

U. S. STEEL CORP.'S FINISHED STEEL SHIPMENTS

(Inter-company shipments not included)

Net Tons

	1942	1941	1940	1939
Jan.	1,738,893	1,682,454	1,145,592	870,866
Feb.	1,616,587	1,548,451	1,009,256	747,427
Mar.	1,780,938	1,720,366	931,905	845,108
Apr.	1,758,894	1,687,674	907,904	771,752
May	1,834,127	1,745,295	1,084,057	795,689
June	1,774,068	1,668,637	1,209,684	807,562
July	1,765,749	1,666,667	1,296,887	745,364
Aug.	1,788,650	1,753,665	1,455,604	885,636
Sept.	1,703,570	1,664,227	1,392,838	1,086,683
Oct.	1,787,501	1,851,279	1,572,408	1,345,855
10mo.	17,548,977	16,988,715	12,006,135	8,901,942
Nov.	.....	1,624,186	1,425,352	1,406,205
Dec.	.....	1,846,036	1,544,623	1,443,969
Total, by Mos.	.....	20,458,937	14,976,110	11,752,116
Adjustment	.....	.....	†37,639	*44,865
Total	.....	.....	15,013,749	11,707,251

†Increase. *Decrease.

New Steel Ingot Peak in October

Steel production in the United States in October broke all prior records by a substantial margin, with a total of 7,584,864 net tons, according to figures of the American Iron and Steel Institute. This tonnage represented 100.1 per cent of rated capacity of the industry for ingots and castings and was 191,953 tons greater than the all-time high of March, when production was 7,392,911 tons.

The October total was 517,780 tons, 7 per cent, above September production and exceeded by nearly 349,000 tons

STEEL INGOT STATISTICS

Estimated Production—All Companies

	—Open Hearth— Net tons	Per cent of capacity	—Bessemer— Net tons	Per cent of capacity	—Electric— Net tons	Per cent of capacity	—Total— Net tons	Per cent of capacity	Calculated weekly production, all companies Net tons	Number of weeks in month
Based on Reports by Companies which in 1941 made 98.5% of the Open Hearth, 100% of the Bessemer and 87.8% of the Electric Ingot and Steel for Castings Production										
1942										
Jan.	6,328,128	95.4	490,864	86.0	305,930	96.3	7,124,922	94.7	1,608,335	4.43
Feb.	5,791,813	96.7	453,543	88.0	275,700	96.2	6,521,056	96.0	1,630,264	4.00
Mar.	6,574,701	99.1	493,294	86.4	324,916	102.3	7,392,911	98.2	1,668,829	4.43
1st quar	18,694,642	97.0	1,437,701	86.7	906,546	98.3	21,038,889	96.3	1,635,994	12.86
April	6,346,707	98.8	454,583	82.2	321,023	104.4	7,122,313	97.7	1,660,213	4.29
May	6,600,376	99.5	454,054	79.5	332,460	104.7	7,386,890	98.2	1,667,470	4.43
June	6,247,302	97.2	452,518	81.8	322,335	104.8	7,022,155	96.4	1,636,866	4.29
2nd qtr	19,194,385	98.5	1,361,155	81.2	975,818	104.6	21,531,358	97.4	1,654,985	13.01
1st half	37,889,027	97.8	2,798,856	83.9	1,882,364	101.5	42,570,247	96.9	1,645,545	25.87
July	6,350,047	95.7	453,684	79.6	345,093	96.3	7,148,824	94.5	1,617,381	4.42
Aug.	6,420,496	96.6	467,313	81.8	345,642	96.3	7,233,451	95.4	1,632,833	4.43
Sept.	6,297,201	98.0	437,950	79.4	331,933	95.7	7,067,084	96.5	1,651,188	4.28
3rd qtr.	19,067,744	96.8	1,358,947	80.3	1,022,688	96.1	21,449,359	95.5	1,633,615	13.13
9 mos.	56,956,771	97.4	4,157,803	82.7	2,905,032	99.5	64,019,606	96.4	1,641,528	39.00
Oct.	6,757,696	101.6	461,895	80.9	365,273	101.7	7,584,864	100.1	1,712,159	4.43
Based on Reports by Companies which in 1941 made 98.5% of the Open Hearth, 100% of the Bessemer and 87.8% of the Electric Ingot and Steel for Castings Production										
1941										
Jan.	6,274,780	99.0	451,806	76.0	195,766	89.1	6,922,352	96.8	1,562,608	4.43
Feb.	5,669,425	99.1	378,536	70.5	182,393	91.9	6,230,354	96.5	1,557,589	4.00
Mar.	6,457,641	101.9	460,225	77.4	206,137	93.8	7,124,003	99.6	1,608,127	4.43
1st quar	18,401,846	100.1	1,290,567	74.8	584,296	91.6	20,276,709	97.7	1,576,727	12.86
April	6,137,613	100.0	395,056	68.6	221,510	104.1	6,754,179	97.6	1,574,401	4.29
May	6,362,245	100.4	444,079	74.7	238,241	108.4	7,044,565	98.5	1,590,195	4.43
June	6,098,171	99.4	458,848	79.7	235,732	110.8	6,792,751	98.1	1,583,392	4.29
2nd qtr	18,598,029	100.0	1,297,983	74.3	695,483	107.8	20,591,495	98.1	1,582,744	13.01
1st half	36,999,875	100.0	2,588,550	74.6	1,279,779	99.7	40,868,204	97.9	1,579,753	25.87
July	6,085,100	94.4	489,297	85.0	237,827	85.7	6,812,224	93.3	1,541,227	4.42
Aug.	6,244,353	96.6	495,761	85.9	257,382	92.6	6,997,496	95.6	1,579,570	4.43
Sept.	6,054,418	96.9	500,768	89.8	256,568	95.5	6,811,754	96.3	1,591,531	4.28
3rd qtr	18,383,871	96.0	1,485,826	56.9	751,777	91.2	20,621,474	95.1	1,570,562	13.13
9 mos.	55,383,746	98.6	4,074,376	78.6	2,031,556	96.4	61,489,678	96.9	1,576,658	39.00
Oct.	6,423,329	99.4	533,060	92.4	279,679	100.6	7,236,068	98.9	1,633,424	4.43
Nov.	6,194,679	99.0	488,822	87.5	277,384	103.0	6,960,885	98.2	1,622,584	4.29
Dec.	6,387,865	99.0	481,813	83.7	280,637	101.2	7,150,315	97.9	1,617,718	4.42
4th qtr.	19,005,873	99.1	1,503,695	87.8	837,700	101.6	21,347,268	98.3	1,624,602	13.14
Total	74,389,619	98.8	5,578,071	80.9	2,869,256	97.9	82,836,946	97.3	1,588,741	52.14

The percentages of capacity operated in the first six months of 1941 are calculated on weekly capacities of 1,430,102 net tons open hearth, 134,187 net tons bessemer and 49,603 net tons electric ingots and steel for castings, total 1,613,892 net tons; based on annual capacities as of Dec. 31, 1940 as follows: Open hearth 74,565,510 net tons, bessemer 6,996,520 net tons, electric 2,586,320 net tons. Beginning July 1, 1941, the percentages of capacity operated are calculated on weekly capacities of 1,459,132 net tons open hearth, 130,292 net tons bessemer and 62,761 net tons electric ingots and steel for castings, total 1,652,185 net tons; based on annual capacities as of June 30, 1941 as follows: Open hearth, 76,079,130 net tons, bessemer 6,793,400 net tons, electric 3,272,370 net tons.

The percentages of capacity operated in the first six months of 1942 are calculated on weekly capacities of 1,498,029 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942 as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons. Beginning July 1, 1942, the percentages of capacity operated are calculated on weekly capacities of 1,500,714 net tons open hearth, 128,911 net tons bessemer and 81,049 net tons electric ingots and steel for castings, total 1,710,674 net tons; based on annual capacities as follows: Open hearth 78,247,230 net tons, bessemer 6,721,400 net tons, electric 4,225,890 net tons.

the output in October, 1941. The operating rate of 100.1 per cent of capacity compares with 96.5 per cent in September and 98.9 per cent in October, last year. Average weekly production in October was 1,712,159 tons, against 1,651,188 tons per week in September and 1,633,424 tons per week in October, 1941.

A further comparison reveals that October output exceeded by about 385,000 tons the estimated yearly output of the entire steel industry of Japan.

October Plate Shipments Second Highest on Record

October steel plate shipments of 1,101,382 net tons were the second largest on record, H. G. Batcheller, chief, WPB Iron and Steel Branch, reports. Approximately 80 per cent of this tonnage was for direct use by the Army, Navy and Maritime Commission, with the remainder being for export and essential civilian needs.

Tonnage shipped last month was the largest since July, when a record of 1,124,118 net tons was established. Of October shipments, 536,981 net tons were produced on converted strip mills, 449,895 net tons on sheared plate mills and 114,506 net tons on universal plate mills.

Total shipments of plates during the first ten months of the year have reached 9,736,000 net tons, which compares with shipments of approximately 6,000,000 net tons during the entire 12 months of 1941.

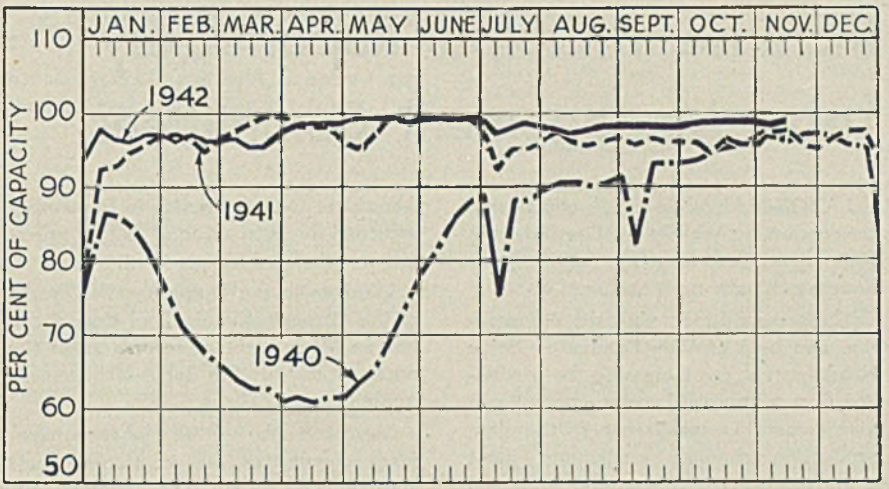
Mr. Batcheller said that plate production is being scheduled for November and December at approximately the same level as October, but that increased production is anticipated for January.

Canada's Steel, Iron Output

Steel and iron production in Canada rose to all-time records in the first nine months this year, although September production was lower than that of August, because of the shorter month and labor troubles. For the nine months pig iron output was 38.3 per cent above the same period in 1941 and 55 per cent over the 1940 period, while the increase over nine months of 1939 was 268 per cent. Steel ingot and casting output in nine months was 17.5 per cent over the 1941 period, 40 per cent over 1940 and 121 per cent over nine months of 1939.

Further comparisons are as follows:

	Steel ingots, castings	Pig iron	Ferro-alloys
Sept., 1942	244,922	155,900	18,548
Aug., 1942	248,868	162,578	15,961
Sept., 1941	224,626	125,168	18,941
9 mos., 1942	2,308,588	1,464,651	159,070
9 mos., 1941	1,958,940	1,058,520	155,279
9 mos., 1940	1,640,293	940,191	101,292



STEEL . . . . . UP

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week rose ½-point to 99 per cent. Four districts advanced, two declined and six were unchanged. A year ago the rate was 97 per cent; two years ago it was 96 per cent, both computed on the basis of capacity as of those dates.

Chicago — Receded 1 point to 101½ per cent, because of furnace repairs, scrap supply not being a factor.

Central eastern seaboard — Continued production at 96 per cent, a rate which has held steadily since the end of September.

Wheeling — Advanced 2 points to 83 per cent.

Detroit — Steelmaking reached the highest level since May, advancing 5 points to 96 per cent. Only one open hearth is down for repairs.

Cincinnati — Advanced 3 points to 91 per cent as a repaired open hearth was relighted.

Pittsburgh — Held at 98 per cent, only inactivity of open hearths under repairs preventing capacity production.

Buffalo — With four open hearths out of commission during repairs the production rate held constant at 90½ per cent.

Cleveland — Declined 4½ points to 93 per cent, all three producers curtailing moderately for repairing furnaces.

St. Louis — Restoration of an open hearth raised the rate 1 point to 94 per cent.

Birmingham, Ala. — Unchanged at 89 per cent, with a rise to 95 per cent expected this week when Republic Steel Corp. relights its idle open hearth.

Youngstown, O. — With seven open hearths and three bessemers in production the operating rate remained at 97 per cent.

New England — Minor repairs held the operating rate at 90 per cent, with an increase probable this week.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Nov. 14	Change	Same week 1941	Same week 1940
Pittsburgh	98	None	99	94
Chicago	101.5	—1	102.5	99
Eastern Pa.	96	None	91	94
Youngstown	97	None	94	93
Wheeling	83	+2	91	98.5
Cleveland	93	—4.5	94.5	88
Buffalo	90.5	None	79	90.5
Birmingham	89	None	90	100
New England	90	None	92	85
Cincinnati	91	+3	88	88
St. Louis	94	+1	98	85
Detroit	96	+5	96	93
Average	99	+0.5	*97	*96

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

Bethlehem Tops Own World Record for Blast Furnace

Bethlehem Steel Co. in October made a new world record for pig iron production by a single stack, its "H" stack at Lackawanna Works producing 46,246 tons, bettering its previous world record, made in August, of 44,065 tons.

This is the fifth time a new mark has been set this year. The old record was made by No. 10 furnace of Carnegie-Illinois Steel Corp. at Gary, Ind., in July, 1931, at 41,701 tons. In January, 1942, Carrie No. 2 furnace at Rankin, Pa., made a new mark with 41,782 tons, followed in March by Zug Island furnace of Great Lakes Steel Corp., at Detroit, with 43,478 tons. In May Lorain No. 3 stack of National Tube Co. produced 43,866 tons and this was followed in August by the Bethlehem high mark.

Increase in Output Reported by Labor-Management Committees

LABOR-MANAGEMENT committees are conducting War Production Drives in 1600 American factories, mines, collieries, railroads, mills and war plants.

These committees, with the co-operation and help of War Production Drive Headquarters, are increasing the production of war material by uniting labor and management in campaigns to stimulate production through exchanging ideas and giving awards of honor for increased output of war weapons.

The ideas which win these awards are "ploughed back" into industry constantly. Brief descriptions of the ideas are circulated among labor-management committees and fuller details are available to those committees that can use them.

These ideas, together with the activities of the local committees to crystallize the determination to increase the war output, have definitely stepped production. War Production Drive Headquarters is unable to estimate percentage, tonnage or dollar value of the increase because individual increases are not always measureable and because Drive Headquarters has not called for reports. However, Drive Headquarters has received more than 200 unsolicited reports of production increases after the drive was inaugurated in the plants reporting. These reports noted increases as high as 35 per cent. In addition, there have been hundreds of other reports on successful salvage drives; on the elimination of waste; on the speeding up of operations; on the elimination of the combination of operations; on the substitution of more readily available materials; on improvement of production and on the reduction of absenteeism.

Many War Plants Benefited

The headquarters cited the following recent reports as typical:

A survey of the die casting industry showed that there were labor-management committees in plants having 23 per cent of the industry's capacity, and those plants produced 38.1 per cent of the industry's output.

Reynolds Metals Co., Louisville, Ky., reported an increase in the production of alloy aluminum ingots from 1,450,000 pounds to 2,091,042 pounds within six months with no additional furnaces.

Bethlehem Steel Co.'s Lackawanna, N. Y., plant topped all previous production records by averaging 1440 tons a day output from its "H" furnace.

The Massena, N. Y., works of the Aluminum Co. of America in September exceeded the production of its best previous month by 10.3 per cent.

Workers in the Duquesne, Pa., works of the Carnegie-Illinois Steel Corp. have broken 79 production records since the organization of the labor-management committee.

Most of the 1600 labor-management committees are in single plants with an average of 1950 workers, but some large committees represent up to 45,000 workers, while approximately 7 per cent have less than 100 workers. There are large multiple plant corporations that have labor-management committees in each plant. Examples are: United States Steel Corp. with 65 plant committees; E. I. du Pont de Nemours & Co. with 56; Westinghouse Electric & Mfg. Co. with 28; Bethlehem Steel Co. with 27; Anaconda Copper Mining Co. with 19; General Electric Co. with 13.

211 Committees in Steel

The iron and steel industry has 211 committees representing 455,000 workers. Aircraft and aircraft parts, with 84 committees, represents 291,000 workers. Ships, with 86 committees, represent 561,000 workers. Guns and ordnance, with 290 committees, represent 553,000 workers. Synthetics, comprised of rubber, chemicals, glass, paper, etc., with 100 committees, represent 141,000 workers. Nonferrous metals, including mining and smelting with 43 committees, represent 54,000 workers. Machinery, with 92, represents 133,000, and anthracite coal mines with 185 committees, represent 80,000 workers. The remainder, machine tools, engines, communication equipment, scientific instruments, bituminous coal, and miscellaneous classifications with 509 committees, represents approximately 850,000 workers.

Army Moves War Materials as Dispute Halts Railroad

When a labor dispute interrupted transportation of war materials over the Fairport, Painesville & Eastern railroad, the War Department ordered Army personnel to operate part of the road's equipment to insure continued movement of the materials.

Most of the employes involved in the dispute are members of District 50 of John L. Lewis' United Mine Workers of America.

In taking the action, the War Department emphasized that Army control would last only until the dispute was settled.

WORKERS' IDEAS CONSERVE TIME AND MATERIAL

SUGGESTIONS by these four workers at General Electric's Schenectady, N. Y., plant have resulted in the saving of 8000 man-hours and over 62½ tons of steel, winning for them combined awards of $2850 out of $100,000 distributed by the company this year for ideas to step-up war production. Standing, left to right, are A. Campriello, welding foreman, who has won over $1200; Spencer Frederick, lay-out man, $1025; Howard Wildman, set-up man, $500; and David Bellott, punch press operator, $125. Seated is B. G. Tang, general superintendent

PRIORITIES–ALLOCATIONS–PRICES

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

E ORDERS

E-1-h (Amendment): Machine Tools, effective Nov. 5. Apportions each producer's monthly output for each type of tool, 75 per cent to the armed services and 25 per cent to others. Increases deliveries to the air services, their prime contractors, sub-contractors and other companies upon which the air services depend.

L ORDERS

L-72 (Amendment): Razors and Blades, effective Nov. 3. Prohibits production of safety razors except for the armed forces, Lend-Lease and for export. Use of copper limited to plating only, not over .0004 inch. Straight razor output limited to 8½ per cent of 1940 output during November and December; Banned completely on and after Jan. 1, 1943. Manufacturers must submit quarterly reports to WPB showing production and delivery schedules. Safety razor blade quarterly output (excluding orders for Army and Navy) is limited to greater of these quantities: 21 per cent of total number produced in 1940 or 15½ per cent of total for 1941. Of total produced, up to 18 per cent may be sold for Lend-Lease and export purposes, and up to 84 per cent for civilians. Use of low carbon steel backing in single-edged blade limited to 0.018 inch thickness.

L-17-a: Farm Machinery, effective Nov. 7. Bans use of copper and copper base alloy products in manufacture of farm tractors, engine power units, or repair parts other than for specified purposes.

L-187: Low Pressure Cast Iron Boilers, effective Nov. 6. Bans production of boilers built to use exclusively oil or exclusively gas for fuel; limits production of other types for specified military purposes or for use in hospitals, subject to authorization by WPB on PD-704. Manufacturers must file PD-639 by 10th of each month.

L-192: Construction Machinery, Nov. 7, 1942. Halts production for civilian use of critical types needed for armed services; restricts output of all other types to approved schedules. Civilian purchase and use of new equipment on Schedule A for private account permitted only under specific WPB authorization. Private owners must register 30 days prior to sale, lease or use of any other project any unit listed in Schedule A on WPB form 1159. Application to purchase made on PD-356. Production and inventory reports and shipping schedules filed on PD-697 by 15th of each month.

M ORDERS

M-81 (Amendment): Tin Plate, Terne Plate, effective Nov. 4. Prohibits after Nov. 30 use of terne plate containers for packing varnish removers, liquid lacquers, lacquer thinners, lacquer stains and shellac. Use for these products in 1942 limited to 90 per cent of 1940 total. Prohibits packing of edible liquid oils in tin plate or terne plate containers of less than 5 gallon capacity and sets November and December quota at 10 per cent of 1940 pack in 5 gallon size cans.

M-110-a: Molybdenum, effective Nov. 6. Permits delivery of 500 pounds or less of contained molybdenum in any one month without applying for an allocation under M-110, if purchaser has filed PD-359 by 20th of preceding month. Melters, other than large producers of iron and steel products, may use up to 500 pounds monthly without submitting melting schedules to WPB.

M-136 (Amendment): Blackplate, effective Nov. 30. Prohibits packing of varnishes and drying oils in blackplate metal containers. Requires, from Dec. 15 to Dec. 31, oil paints, [illegible] and resin emulsion water paints be packed in one-gallon fiber-bodied containers with only ends of blackplate. Blackplate quotas for baking powder containers held at 25 per cent of 1941 pack.

M-255: Steel Drums, effective Nov. 16. Provides complete allocation. Prohibits sales, use and deliveries of new steel drums and parts (except flanges, plugs, cap seals) without specific authorization by WPB.

M-126: Iron and Steel Use, effective May 5, 1942; Revised Nov. 5, 1942. Prohibits delivery of iron and steel and manufacture of items on List A with any type of iron and steel after 30 days and assembly after 60 days. During former period, manufacturers of products carrying Nov. 5 governing date may use, out of inventories, up to 75% of average monthly iron and steel use for such products in 1941. Prohibits delivery of stainless steel for products on List S. For 30 days ending Dec. 5, manufacturers may use out of inventory, up to 50% of average monthly use of stainless steel for such products in 1941. Use prohibited after Dec. 5, except assembly is permitted for an additional 15 days. If Army Navy and Maritime Commission orders are not exempted, restrictive provisions relating to items carrying Nov. 5 governing date will not apply until Jan. 5, 1943. Use of stainless steels for Army, Navy, Maritime orders prohibited after Dec. 31 for List C products, unless expressly permitted. Delivery of roofing and siding in BEW and Lend-Lease orders, and for maintenance and repair of railroad freight cars, street cars, and busses exempted. Appeals filed on PD-500 with WPB field offices.

P ORDERS

P-43 (Revision): Laboratory Supplies, Equipment, effective Nov. 5. Assigns production control and research laboratories, holding a serial number, a rating of AA-2X for purchase of equipment, reagent chemicals and other materials. Specific WPB authorization required for purchase of material, except reagent chemicals, costing more than $50. Application for authorization made on PD-620. Serial number holders must file PD-93 by 15th of each month.

P-135: Reagent Chemicals, effective Nov. 5. Enables laboratories not holding serial numbers under P-43 to use rating of AA-2X for chemicals used for analytical, testing, control, educational or research purposes. Rating must not be applied to material used in manufacturing operations, other than reagents and purchases may not exceed in any quarter the buyer's average quarterly purchases in year ended Sept. 30, 1942.

P-115 (Amendment): Canning Plant Maintenance and Expansion, effective Oct. 27. Assigns fruit, vegatable and fish canners and processors ratings of: AA-2X for emergency maintenance or repair supplies to prevent spoilage of commodities; AA-5 for normal repair, maintenance or operating supplies; AA-3 for materials required for replacement or for more efficient operation. After applying AA-2X rating, packer must telegraph immediately a report to WPB, describing breakdown material required and other specified details.

PRICE REGULATIONS

Export Price Regulation (Amendment): Sets a maximum export premium of $6 per gross ton on export sales of chrome ores and concentrates of 38 to 44 per cent chromic oxide content.

No. 258: Chrome Ores, effective Nov. 9. Establishes base prices per ton as follow: $43.50, 48% metallurgical-chemical, f.o.b. railroad cars at N. Y., Philadelphia, Baltimore, Charleston, Portland, Tacoma, with special price for Montana ores; $31, lump refractory ore in bulk, f.o.b. Baltimore, Philadelphia, Chester, San Francisco; $35.55, lump refractory, packed in single cloth sacks, $40.80 in barrels, f.o.b. Baltimore, Chester, Plymouth Meeting; $36.50, ground refractory, 24 mesh or coarser, f.o.b. Baltimore, Chester or Plymouth Meeting, Pa.

No. 261: Finishing Builders' Hardware, effective Nov. 13. Establishes maximum prices at highest levels received by manufacturer for delivery between Oct. 1, 1941, and March 31, 1942. Establishes percentage mark-ups which may be added to actual cost of materials under each contract held by persons other than manufacturers.

PRIORITIES REGULATIONS

No. 10: Revocation. Revokes effective Nov. 6, regulation which provided Allocation Classification System, consisting of symbols designating type of purchaser and end use of products included in orders on which symbols were indicated.

18 Information Offices Established Under ODT

Eighteen joint information offices have been established in various parts of the country to assist motor truck carriers in complying with conservation measures of the Office of Defense Transportation.

The latest information office is at 716 Twelfth street, Greeley, Colo.

Similar offices have been established at Baltimore; Detroit; Kansas City, Mo.; Buffalo; Providence, R. I.; Charlotte, N. C.; South Bend, Ind.; Houston, Tex.; Columbus, O.; Wausau, Wis.; Phoenix, Ariz.; Cincinnati; Chicago; Des Moines, Iowa; Washington; Louisville, Ky.; and Cleveland.

Only applications for Certificates of War Necessity made on blanks obtained at regional or district offices of the ODT should be submitted to these offices.

All other applications must be sent to ODT's central mailing office, Detroit, in the self-addressed envelopes provided.

Sizes, Types of Wire, Fencing Limited by WPB

To aid production of barbed wire, wire fencing, and poultry netting needed to protect farm properties, crops and livestock, WPB has prohibited manufacture of nonessential types and styles of such wire products.

Permitted will be the manufacture of only one type of barbed wire, compared with eight styles usually obtainable, and reduce more than 100 to a very few the permitted types of fencing, netting and flooring.

The action is expected to result in a direct saving of steel by enabling a greater amount of wire to be made per ton of metal. During the last five years, an average of 496,000 tons of steel was used annually for the production of barbed wire, wire fencing, and netting.

WINDOWS of WASHINGTON

Balance being achieved in war production program. Less heard about scarcities of critical materials. Manpower shortage to become problem, but officials are confident of solution

THERE have been numerous indications during the past two or three weeks that the stage of planning the strategy of war and the strategy of war production has been practically completed. We now have reached the point where the war is a going business which can be conducted on sound principles of management.

In no way is this demonstrated to a greater degree than in the changed atmosphere among those responsible for our war and war production strategy. Worried and strained expressions no longer are so much in evidence and there is a jaunty air of confidence.

The combined chiefs of staff now know fairly well when, where and how they are going to fight the war. They have a pretty clear knowledge as to what weapons they will need. They and our production experts have a better understanding as to the potential size of our maximum war effort. They have been able to replace the former unbalanced production program with a program of balanced schedules by which the different weapons are produced in balanced proportion to the program as a whole.

The phase of scarcities of critical materials is substantially over. There is little more talk about scarcity of rubber, nickel, and so on. Through expansion of production capacity, through conservation and salvage, through various controls, also through new metallurgical specifications, the supply of materials to support our war production program no longer is the serious problem it was.

Other Problems Studied

Now there are other questions to be decided and while they are not easy they seem simple as compared with the complex problems already solved.

One of the problems now being studied is that of manpower. In talking about manpower the officials in Washington who have it in charge point out that nobody should get excited about this problem. There is no present emergency as to manpower and what is under discussion now is a plan to prevent a manpower emergency next year.

There is divided opinion here as to what sort of a "draft-labor" law is needed to prevent a manpower emergency. Some hold that men and women cannot be shifted around without a law. They hold that when you deal with people it is not like dealing with materials. People not only do not think alike but they require sanitation, shelter and various other services.

On the other hand, there is a feeling that the problem of finding manpower can be simplified by moving the work to the worker rather than by moving the worker to the work. In fact, President Roosevelt himself has expressed the opinion that moving men from New York City to the Pacific Coast is not the way to solve the problem. There also is the feeling that more can be done for "smaller" business in this country than heretofore has been the case in pushing war production and that this is an important potential in planning for the maximum use of our manpower. The feeling is growing that we must not encourage labor migration to the point of creating a lot of "ghost towns".

Size of Army Still in Doubt

The number of men to be enrolled in the armed forces has not yet been decided—and this will be an important factor in determining the size of our total labor force. Although recent statements have been to the effect that some 7,500,000 men will constitute our armed forces, the old figure of 12,000,000 still is mentioned. However, there is very little fear about our ability to make up for labor deficiencies. In addition to our older men, we have a pool of available women workers estimated as in the neighborhood of 17,000,000 and this supply should be sufficient.

In the meantime remedial action is being taken to cure or prevent dislocations. Since gold mining was terminated so as to make the gold miners available for work in other metal mines, the Army has started to discharge men who will go back to their former jobs in the mines and in the lumber industry.

Now under discussion is an overall study to determine shifts that should be made in the agricultural field. Certain types of crop production may be discontinued or limited to accelerate production of more essential crops. The question is asked as to whether it is essential that lettuce continue to be produced in Southern California and canteloupes in Arizona or whether it would not be better to expend the effort in the form of more dairy products. These questions are quite difficult since they involve considerations other than manpower, as transportation.

The new system of Manning tables promulgated by the War Manpower Commission, with the endorsement of General Hershey (see p. 67) should be studied by all employers. When employers ask local draft boards to defer employes on the basis of the length of time it takes to train replacements, they will get a lot more consideration than if they do not have such evidence of careful analyses.

As a part of the general attention to manpower thought is being given as to the length of the workweek. In addition to knowing the British experience reliable information also has come out of Germany. In April of this year, as part of the campaign to drive Russia out of the war this year, working schedules in German plants were jumped to a minimum of 60 hours per week while in quite a few plants producing the more critical weapons they went up to 70 and even to 100 in some cases. By June German production had been pushed to a peak and since then it has leveled out. Although the hours continue unchanged German production at present is estimated as the equivalent of a 56-hour week.

It is believed here that 48 hours is a maximum work week for this country and that 56 hours would be the absolute maximum.

Banned Wage Increases

Another important factor in connection with the manpower problem is the wage policy that has been formulated by the War Labor Board. On Oct. 3 the board took action aimed at preventing one employer from pirating at the expense of another by offering higher pay. On that date it placed a ban on voluntary wage increases. Since then the board has received—and declined—between 5000 and 6000 requests from employers who wanted to increase wages in order to keep their men on the payrolls. The board does not believe that mere wage increases will solve the pirating problem.

In connection with the manpower problem another aspect of the War Labor Board's policy is of interest. The board does not propose to correct inequalities in wages excepting where they are discriminatory in effect. It does not propose to iron out conventional inequalities between industries and between the North and the South. Too, the board will not set wages to establish living conditions. Incidentally, the board's attitude is that when it formulated the Little Steel rule it was actually setting a terminal to wage increases; at that time some two-thirds of industry had had a 15 per cent wage increase, so that the board's rule was intended to decelerate the trend toward higher pay.

The board's attitude on miner's pay seems to be about as follows: "We will

first get the miners where we want them. Then we will step in and examine their wage structure and make sure the miners are getting what they should have."

Another problem now under study is the future plane of civilian life. Our chiefs of staff now have come over to the opinion that our civilian economy has been stripped to an unwarranted extent and that we must swing back from the present extreme if we are to have a healthy civilian economy after the existing inventories of civilian goods run out. As one general puts it, in addition to fighting the war and producing for war, "we must also maintain the structure of our national life".

Thought is being given to the possibilities of simplification and standardization as means of getting on a better civilian basis. To prevent regimentation of our people as far as possible there is a disposition to favor simplification rather than standardization. As one official puts it, "a blue denim suit is the ultimate in standardization".

Must Maintain Civilian Economy

In studying the problem of maintaining an adequate civilian economy, the military and production authorities have very much in mind the problem of keeping small plants going. This is a difficult problem and associated with it are such questions as to what extent production of civilian goods shall be concentrated in one or more plants in an industry.

A third problem now being worked on, and which is important both for military and civilian activities, is transportation. This is particularly important to manufacturers who customarily ship their products all over the country. This year the railroads are hauling 37 per cent more ton-miles than in 1941 and a further increase of about 10 per cent is expected in 1943. Our trucks are working on a maximum schedule so that the railroads must work out this increased load by themselves. It may be stated parenthetically that a study now is under way as to whether trucks and buses will be permitted to travel in excess of 35 miles an hour; this has not yet been decided.

Railroads Need Equipment

Railroad equipment now is being worn out at a prodigious rate. For example 22 per cent of the tank cars need repairs. As a result, the railroads have asked for a substantial amount of new equipment to be delivered in 1943; request is being studied by the War Production Board.

But, and this is where national shippers come in, an attempt is being made to cut the load by eliminating cross-hauling as far as possible. This problem is being worked out largely with industry branches in the War Production Board and so far notable results have been achieved in reducing cross-hauling of paper and pulp. The same result has been accomplished in sugar under the zoning directive of the Office of Price Administration. The salt, glass container and the beer and beverage industries now are studying cross-hauling.

Many of the manufacturers involved are not too happy. A St. Louis manufacturer, for example, has spent millions of dollars in advertising a certain brand of beer and ships all over the country. Another brand of beer, made in Baltimore, sells largely in the Chicago area. Idaho potatoes, similarly, are shipped to distant markets. Under the cross-hauling ban all these and many other marketing customs are slated for a radical change.

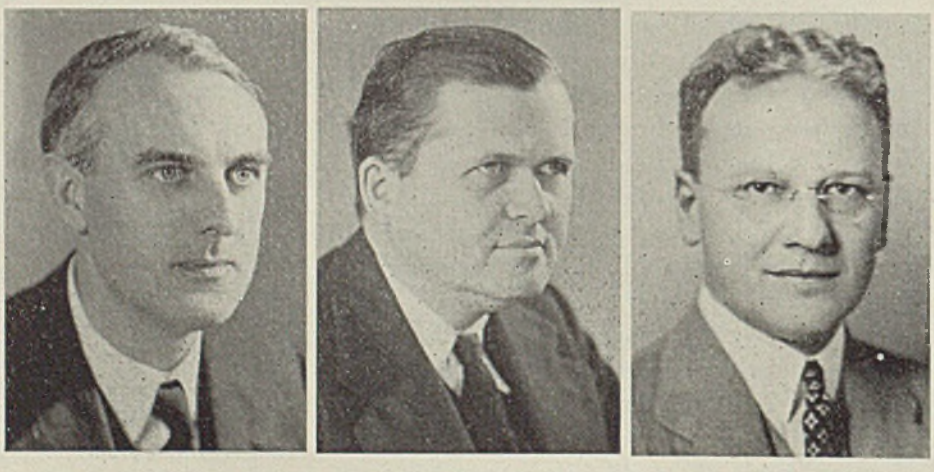
In general, it is the carload shippers who are in danger under this cross-hauling ban. In informed quarters it is stated that it will take a long time before this area of shipping has been reviewed. In the meantime no attention now is being paid to cross-hauling involving less-than-carload lots. In one informed quarter it is the opinion that there is unlikely to be any interference with present shipments of twist drills, milling cutters and many other items that come under the head of small tools and mill supplies.

Steel Hauling Studied

The problem of cutting down cross-hauling of steel is being studied in the Steel Division of the War Production Board, in conjunction with the Office of Defense Transportation. Just how much headway will be made is not yet clear because when steel of a certain analysis and in a certain section is wanted it has to be obtained from the mill making it.

In the making are a number of directives which will have the effect of conserving transportation. The tendency is to go slow so as not to interfere with normal shipping customs any more than is necessary. The present attitude toward conventions, for example, is "if the convention is not necessary for the war it should be eliminated; certainly the ladies should be left at home; just because a government speaker is scheduled is no proof of essentiality". Circus travel already is out. Race horses soon may be stalled for the duration.

FIGURE IN LEND-LEASE OPERATIONS



DOUGLAS CAMPBELL NELSON F. CALDWELL A. B. VAN BUSKIRK

HEAD of the division in charge of iron and steel, alloy materials, mica and graphite of the British staff of the Combined Raw Materials Board is Mr. Campbell. Mr. Caldwell is director of supply, Machine Tools Division, British Ministry of Supply Mission. Mr. Van Buskirk is deputy administrator, Office of Lend-Lease Administration. For other information on Lend-Lease operations, see STEEL, Nov. 9, p. 52

Wood, Coal Cooking Stove Output Banned Until Jan. 1

WPB acted last week to meet the acute shortage of coal and wood-burning domestic heating stoves by permitting increased production of these products between now and Jan. 1. The increased production will be accomplished without stepping up consumption of raw materials in the stove industry.

This was assured by prohibiting manufacture of wood and coal-burning cooking stoves until Jan. 1 and permitting the raw materials thus made available to be put into the production of heating stoves.

WPB Sets Up Research Office To Explore Production Methods

ESTABLISHMENT in the WPB of an Office of Production Research and Development, and appointment of Dr. Harvey N. Davis, president, Stevens Institute of Technology, as its director, were announced last week by Chairman Donald M. Nelson.

The office is being set up to insure rapid appraisal and the quick and effective utilization of processes, materials, mechanisms and inventions in the production of war goods.

Mr. Nelson pointed out that the office will parallel in the production field the work already being done in regard to instruments of war by the Office of Scientific Research and Development, and that it was set up after consultations with Dr. Vannevar Bush, head of the Office of Scientific Research and Development.

In general terms, the Office of Production Research and Development will have four principal functions:

1. To provide the chairman with technical information on problems with which he is directly concerned and on research and development work in progress in WPB. The office is also to provide the WPB divisions and branches with research information and findings on work which they have in progress.
2. To initiate evaluation and analysis of specific scientific or technological proposals, through the establishment of export committees or through reference to existing research groups in government, education or industry.
3. To get needed research accomplished, by contracting with outside laboratories or agencies for experimental work.
4. To bring about development of such projects or processes as are found to merit it, through contracting for the construction of prototypes or the erection of pilot plants.

Additional Industry Advisory Committees Appointed in WPB

Industry advisory committees were announced last week by WPB for Iron and Steel Transportation, Stoker Manufacturers, Brass Mill Products Distributors, and Fork, Hoe and Rake Manufacturers.

H. G. Batcheller, chief, Iron and Steel Branch, is the government presiding officer for the Iron and Steel Transportation Committee. Members are: H. C. Crawford, traffic manager, Bethlehem Steel Co., Bethlehem, Pa.; E. H. Dorenbusch, traffic manager, American Rolling Mill Co., Middletown, O.; R. R. Flynn, traffic manager, Inland Steel Co., Chicago;

DR. HARVEY N. DAVIS

Appointed director, Office of Production Research

W. E. Fowler, traffic manager, Youngstown Sheet & Tube Co., Youngstown, O.; Clem W. Gottschalk, traffic manager, Jones & Laughlin Steel Corp., Pittsburgh; Edwin C. Jepson, traffic manager, Wheeling Steel Corp., Wheeling, W. Va.; R. K. Keas, traffic manager, Laclede Steel Co., St. Louis; W. F. Morris Jr., traffic manager, Weirton Steel Co., Weirton, W. Va.; E. C. Plowman,

ALEXANDER C. BROWN

Alexander C. Brown, vice president, Cleveland Cliffs Iron Co., Cleveland, has been appointed deputy chief of the WPB Iron and Steel Branch. During the first World War, Mr. Brown served as head of the crane section of the War Industries Board.

traffic manager, Colorado Fuel & Iron Corp., Denver; C. W. Trust, traffic manager, United States Steel Corp., New York.

Serving as government presiding officer for the Stoker Manufacturers' Industry Advisory Committee is Henry S. Norris, Plumbing and Heating Branch. Committee members are: H. L. Bilsborough, manager, Fairbanks-Morse Co., Chicago; K. C. Ellsworth, manager, Stoker Division, Link-Belt Co., Chicago; R. C. Goddard, vice president, Steel Products Engineering Co., Springfield; J. M. McClintock, manager, Illinois Iron & Belt Co., Carpenterville, Ill.; Oscar F. Osthy, vice president, Electric Furnace-Man, Inc., New York; Claude A. Potts, vice president, United States Machine Corp., Lebanon, Ind.; E. C. Sammens, vice president, Iron Fireman Mfg. Co., Portland, Oreg.; H. E. Sill, vice president, Muncie Gear Works Inc., Muncie, Ind.; J. H. Simpson, vice president, Hershey Machine & Foundry Co., Manheim, Pa.; and Walter Sormane, sales manager, Schweitser-Cummins Co., Indianapolis.

Government presiding officer for the Brass Mill Products Distributors' committee will be John W. Douglas, chief, Industrial and Civilian Unit Copper Branch.

Committee members are: T. N. Hohen, Whitehead Metal Products Co., New York; H. V. Douglas, Central Steel & Wire Co., Chicago; Robert H. Croto, Metal Goods Corp., St. Louis; J. H. King, Seaboard Brass & Copper Co., Baltimore; Walter Schroeder, Pacific Metals Co., San Francisco; and J. M. Tull Metal & Supply Co., Atlanta, Ga.

Roy Halquist, chief, Hardware and Small Tools Section, Building and Materials Branch, is the government presiding officer of the Fork, Hoe and Rake group.

Committee members: W. D. Cashner, Geyer Mfg. Co., Rock Falls, Ill.; Harold Cunningham, Ames Baldwin Wyoming Co., Parkersburg, W. Va.; L. P. Finley, Union Fork & Hoe Co., Columbus, O.; L. D. Miller, Miller Mfg. Co., Hicksville, O.; Charles E. Norcross, C. S. Norcross & Sons, Bushnell, Ill.; J. S. Porter, B. & H. Scovil Inc., Higgamum, Conn.; Walter W. Rector, American Fork & Hoe Co., Cleveland; G. C. Ruhmann, G. E. Ruhmann Mfg. Co., Schulenberg, Tex.; A. E. Skinner, Boyle Mfg. Co., Los Angeles; F. J. Wolf, Gardex Inc., Michigan City, Ind.; and W. F. Yeoman, Yeoman Hoag Co., Monticello, Iowa.

American Arbitration Association, New York, has issued a revised edition of its Voluntary Labor Arbitration Rules of Procedure to meet war regulations and conditions.

Warehouses Expected To Receive More Steel To Build Up Stocks

STEEL warehouses may fare better over the next few months with respect to replenishment of inventories, J. R. Stuart, chief of the warehouse unit of the WPB Iron and Steel Branch, predicted last week.

Warehouses received 58 per cent of their quota of Class A products in third quarter, Mr. Stuart said, and the percentage should be considerably higher in fourth period, as well as in first quarter next year.

Mr. Stuart said that the warehouses now are receiving increasing recognition from the armed services from the standpoint of their importance as a materials reservoir for vital war plants.

The entire warehouse program will be re-written in terms of the Controlled Materials Plan. This program, of course, still is in its formative stage.

The allotment number system provided under the CMP system will encompass warehouses as well as direct consumers. It means that consumers can extend allotment numbers to warehouses to obtain required steel. In turn, warehouses can extend these numbers to producers for the purpose of replenishing stocks.

As explained by Mr. Stuart, CMP involves the issuance of allotment numbers or "tickets" equivalent to the amount of steel available in a given period. Only the available tonnage of steel will be distributed. It is likely that some allowance will be made under the CMP for materials which the warehouses sell for maintenance and repair.

Procurement Agencies Agree to Wider War Contract Distribution

LOU E. HOLLAND, deputy chairman, War Production Board on Smaller War Plants, and chairman of the board of the Smaller War Plants Corp., has just announced conclusion of far-reaching agreements with the chief procurement agencies in respect to wider distribution of war orders to small manufacturers.

Although the agreements differ slightly in phraseology, the salient points are almost identical and may be summarized as follows:

(1) The department, or agency, will inform the Smaller War Plants Division of requirements of suitable items for which the assistance of the division is desired in finding sources of supply, and will furnish this information far enough in advance of required delivery dates to permit the division to search for suitable production facilities among the smaller plants.

(2) Maximum possible subcontracting will be used in the production of items which, because of their complexity or for any other reason, must be awarded to large organizations.

(3) The Smaller War Plants Division agrees to maintain a list of small plants adaptable for the production of specific items and to co-operate with the procurement agencies in the placement of prime or subcontracts by proving the suitability and competence of the proposed small plant and certifying as to its credit.

(4) The department, or agency, will work with the division in examining existing prime and subcontracts with a view to obtaining further subcontracting, and the procurement agencies will attempt to obtain the agreement of contractors to further subcontracting wherever practicable.

(5) The Smaller War Plants Division will provide planning, engineering and production assistance to small plants, so that they may execute in a proper and satisfactory manner any contracts undertaken.

Bureau of Mines Issues Report On Low-Grade Manganese Ores

Continuing its wartime program to develop methods for utilizing low-grade domestic manganese ores in the manufacture of steel, the Bureau of Mines has just issued a metallurgical report explaining the results of pyrometallurgical studies in the matte smelting of manganese oxide, carbonate or silicate ores with copper and iron sulfides, Dr. R. R. Sayers, director, announced last week.

"These low-grade ores, smelted with either iron or copper sulfides and the resulting matte refined and sintered to a 60 per cent manganese product, have yielded a manganese that meets all specifications of ferroalloy furnace feed," Dr. Sayers said.

Several of the low-grade manganese ores are not amenable to ordinary ore-dressing treatment, and the bureau for a number of years has been engaged in experiments to determine the most feasible ways of beneficiating such ores.

In the case of the matte smelting method as applied to manganese, the bureau explains that the manganese ores are smelted with the sulfide of iron or copper to recover these metals as crude metal and the manganese as the sulfide in a high-grade matte. By sintering, the sulphur then can be largely eliminated from the matte, leaving a high-grade oxide product.

The newly-developed matte-smelting method is a modification of a previously suggested process which was tested by the bureau. Among the low-grade domestic manganese ores treated during the investigations were those from the Battle Mountain, Nev., area, the Leadville, Colo., and Golconda, Nev., districts, the Batesville, Ark., deposits, and the Chamberlain, S. D., manganiferous material.

Allocations Order Unnecessary To Obtain Small Lot Molybdenum

Permission to deliver small amounts of molybdenum without applying for an allocation under Order M-110 has been formalized by Supplementary Order M-110-a.

Under certain conditions, deliveries up to 500 pounds of contained molybdenum may be made in any one month without applying for an allocation. Melters, other than large producers of iron and steel products, may use up to 500 pounds monthly without submitting melting schedules to WPB.

OPA Protests Proposed Fuel Oil Rail Rate Increase

Formal protest against proposed higher rail rates for crude oil and petroleum products shipped to the East Coast was made by Price Administrator Leon Henderson to the ICC.

Mr. Henderson said that "the carriers involved . . . are in financially better condition than they have been in many years . . . and do not need additional revenue." The industry cannot bear further increases, he continued, and the only alternative is a federal subsidy or higher price.

Heavier transportation costs, the Price Administrator warned, also would tend to restrict movement of crude oil into the vital industrial East, now almost entirely dependent on rail shipments.

Tool Builders Instructed To Emphasize Aircraft Requirements

MACHINE tool manufacturers have been instructed to give special emphasis to aircraft requirements by Amendment No. 3 to General Preference Order E-1-B, issued Nov. 5 by the WPB. The amendment gives new directions for scheduling machine tool deliveries for the armed services, but does not change the existing division of new machine tools between the armed services and other buyers.

In a letter to builders of machine tools, George C. Brainard, director, Tools Division, said: "We are fully aware that problems will arise and that additional work in rescheduling your order boards for the next several months will be required." He added that it is essential that "these instructions be executed to the very limit, and we are counting on your patriotism and wholehearted cooperation to make this demand effective at once."

Order E-1-B now apportions each producer's monthly deliveries for each type of tool, 75 per cent to the services and 25 per cent to others. Without affecting this division, Amendment 3 increases deliveries of machine tools to the air services, their prime contractors, sub-contractors and other companies upon which the air services depend.

Under the amended order, the air services are to be given preference over the other services up to 75 per cent of the output of any machine tool. Where aircraft requirements exceed 75 per cent of the total supply, 75 per cent of the production is to be prorated among the services having aircraft orders on a percentage basis.

Navy Appeals for Utilization Of Idle Machine Tools

Appeal that all idle machine tools be put to work in war production was issued last week by the Cleveland Office of Inspector of Naval Material. The office asked that all such unused tools be put to work either by owners obtaining subcontracting work or by selling or leasing the tools.

Listed as tools critically needed by the Navy were automatics, boring mills, drills, radials, grinders, gear machinery, lathes, millers, planers, turret lathes, presses, shears, shapers and slotters.

More Steel Allocated for War Housing Projects

Allotment of 15,000 additional ingot tons of steel and companion materials to build approximately 20,000 units of the war housing program already authorized by the National Housing Agency has been made by the War Production Board.

This enables WPB field offices to resume processing applications for war housing projects in the approved program which comply with new requirements established by WPB and NHA. The allotment brings to 46,000 ingot tons the total amount of steel approved to date for war housing in the fourth quarter of 1942, providing 60,000 units.

Foreign Patents Seized by U. S. Made Available to Industry

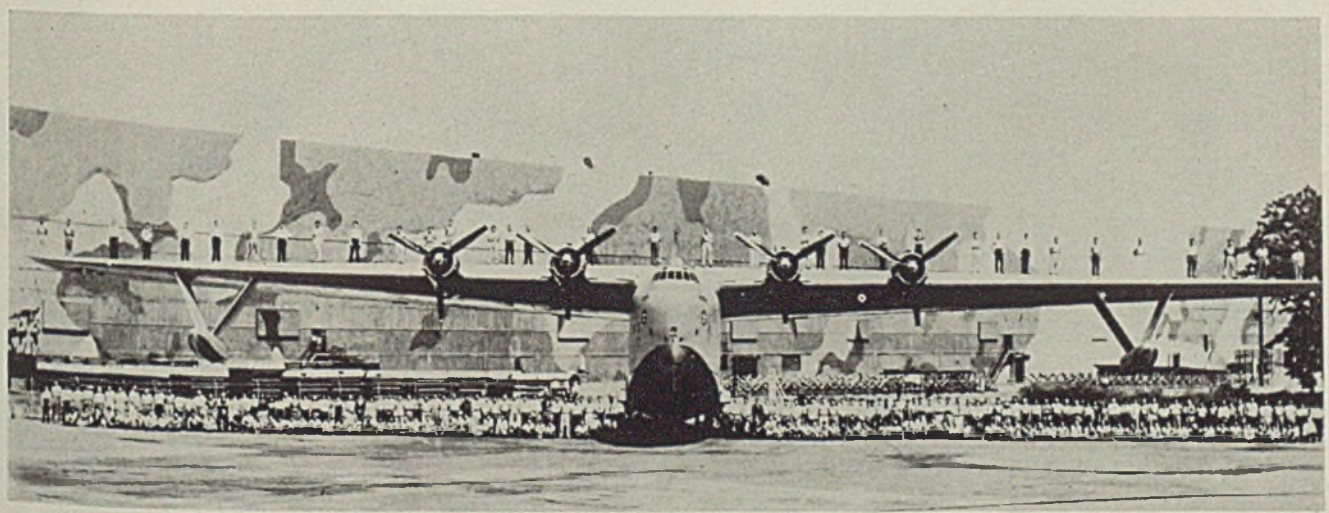
Drawings and specifications of foreign-owned patent applications seized by his office will be made available to American industry at a nominal price, Leo T. Crowley, Alien Property Custodian has just announced. These applications ordinarily cover latest developments in patentable fields and many can improve American processes and devices.

Publication of the printed copies of patent applications will begin in December. Applications will be listed in classified order, in the Official Gazette of the United States Patent Office.

Meanwhile, the Alien Property Custodian will make the information contained in the files of these applications available to persons having a legitimate interest therein.

Any registered patent attorney may obtain permission to inspect (and make copies of) the file of a vested application (other than an application which stands under secrecy order) upon filing with the Patent Prosecution Section, Office of the Alien Property Custodian, Washington, D. C., a request upon a form, "Petition to Inspect," which will be furnished upon request by the Custodian's Washington, Chicago, or New York Offices.

WORKMEN ILLUSTRATE SIZE OF NEW CARGO FLYING BOAT



THIRTY-FIVE MEN, spaced about 6 feet apart, stand along the 200-foot wing of the Mars, 70-ton flying boat and largest cargo plane to date. Part of the experimental crew that built it, 215 persons, form a double line beneath the ship, which was completed recently by Glenn L. Martin Co., Baltimore

TYPE "D" MULT-AU-MATIC

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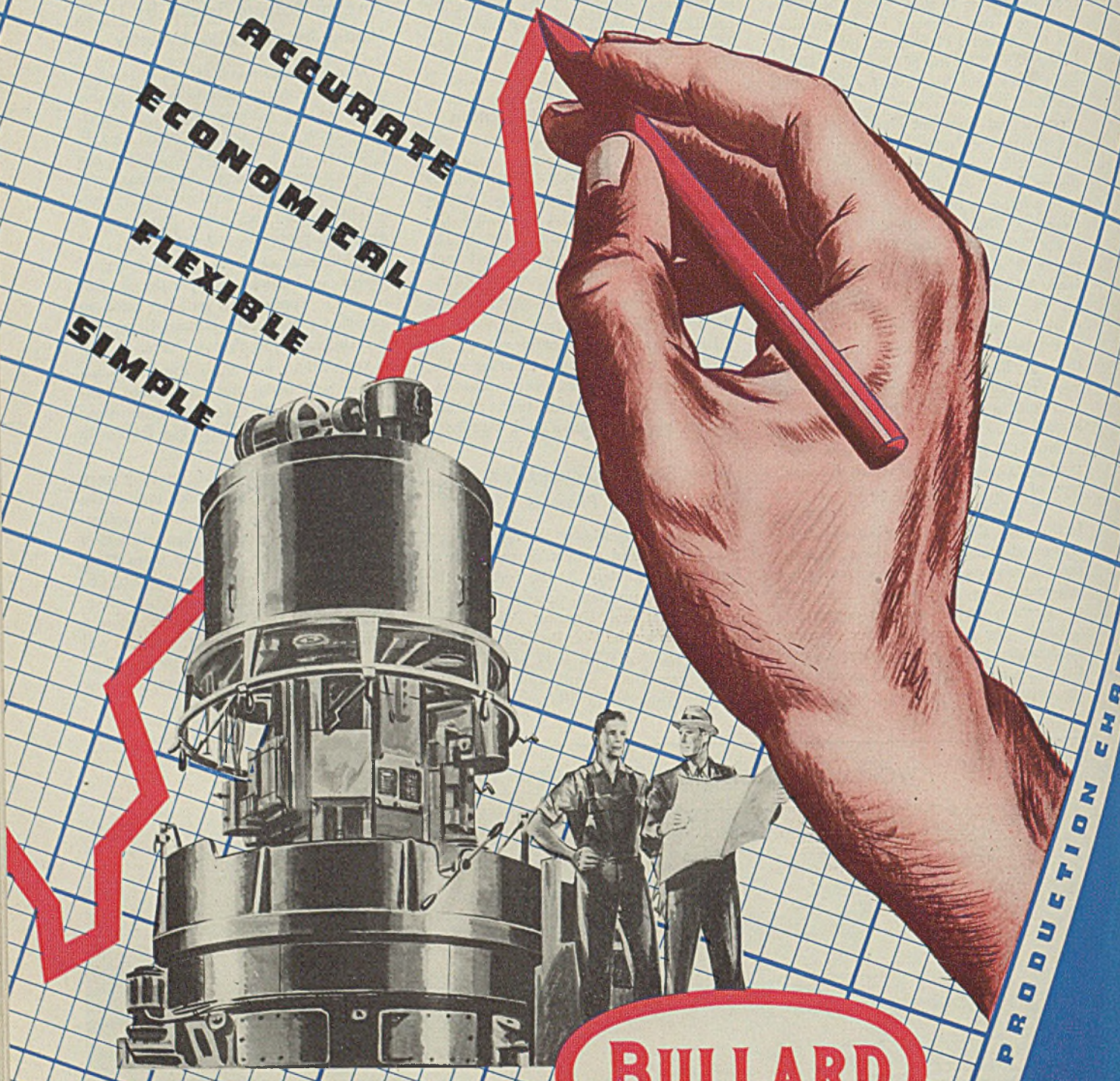
FLEXIBLE

SIMPLE



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By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Tanks rumble from old Ford assembly line in Highland Park plant. . . Switch to metallic treads is complicating factor at the moment. . . Detroit area militant against gasoline rationing

DETROIT

AFTER several weeks of delay in clearing the news through official channels, Ford was permitted to announce last week that M-4 medium tanks are rolling from assembly lines operated by the company. The 32-ton land battleships are armored with plate produced by Ford and presumably are powered with the new Ford tank engine. No information is released on the extent of production, but a guess would be eight or ten units a day.

The Ford M-4 tank is similar in exterior lines to the same model as produced by Fisher Body and Chrysler, but has a number of design innovations. One is increased accessibility of vital parts, permitting quick removal and servicing of the power plant. Another is a redesigned gun mount, previously constructed of 27 separately fabricated parts, but now comprising three castings. Assembly time is reduced by two-thirds.

For the manufacture of tanks, the company completely re-equipped four buildings (not all necessarily in the Detroit area). The final assembly line is housed, according to a press release, in the plant structure "which housed the original Ford assembly line many years ago". How this disguised statement prevents anyone from knowing it is the old Highland Park plant in Detroit remains a mystery, particularly when passersby can observe a large new tank test track being operated close by.

Equipped With Old-Type Treads

Accompanying illustration of the Ford M-4 is of interest because it shows the tank tracks still equipped with rubber treads, and of an old style at that. Other tank builders are now in process of changing over to steel treads, a switch which is causing more than a little confusion. Each tank must have about 360 separate treads "pinned" together in its two tracks. If the combined output of tanks of this type in the Detroit area is, say, 50 per day, this means a supply of 18,000 treads daily. Somewhere there must be the facilities for casting, rolling or forging these pieces, and somewhere must be set up the machine equipment to finish the pieces before assembly. Apparently when the decision was made to change to metallic treads, not too much attention was paid to establishing sources of supply, and as a result another bottleneck has appeared.

Life expectancy of metallic tank treads in combat operations, particularly in desert or sandy country, is not too high. Estimates are heard as low as 36 miles of service. On this score, a Canadian engineer states in a letter to this writer, "Admittedly the service in desert operation is tough but . . . in many cases very poor track performance is due more to lousy design than to operating under hazardous conditions . . . To put the metallurgist to work trying to develop a material to overcome both bad design and difficult operating conditions is somewhat similar to erecting the flagpole on top of a building before the building foundation has been constructed."

Thinks Delay Aided Republicans

Speaking of tanks, one of the Washington dopesters has figured out an interesting thesis: Delay in getting the M-4 tanks fully equipped and manned for action supposedly forced a postponement of the American offensive in North Africa by a week or two. If this delay had not been encountered, the offensive would have been well under way by Election day, in which case the New Deal might have fared much better at the ballot boxes than was the case. Thus the Republicans can thank Detroit-built tanks for their Nov. 3 victories at the polls.

Approach of gasoline rationing in this highly mobile and industrialized area was building up to a mighty headache until the postponement announced last week. In the first place, there were insufficient forms for even a complete registration for basic "A" rations. In the second place, estimates indicated 70-90 per cent of all car drivers here would have to have "B" or "C" rations to avoid a complete breakdown in transportation. Public facilities now are carrying a load 50 per cent beyond the peak peacetime level and are within a few per cent of maximum capacity. In the third place, the volunteers enlisted to handle applications for extra gas rationing were hurriedly recruited, with no time as yet for instructions. Instead of drawing a reasonably experienced corps from civilian defense organizations or from manpower surveys, a general call for volunteers was issued, and a barely sufficient number enlisted.

Further complicating factors were that forms for supplemental rationing were not available in any quantity, and the four-page form 535 for "B" rationing so detailed and complicated as to defy the ability of the average workmen to fill it out. All of these were supposed to have been filled out and "processed" this week so that rationing could start on Nov. 22. Furthermore thousands of extra tires had not been turned in by owners, thus preventing them from applying even for basic rationing. Letters and wires of protests by the thousands were dispatched to Washington, none of which drew any official reply. Until the postponement, the outlook was hopeless.

But more important to the eventual

First picture released of assembly line on which 32-ton M-4 medium tanks are being built by Ford Motor Co., Detroit. Ford engineers have pioneered a number of innovations in design and construction

success or failure of gasoline rationing in any form was the militant attitude of nearly everyone in this area, whether a workman in a war plant, an engineer in a plant or a salesman handling war production requirements. A cross section of their reasoning would run about as follows: Let them go ahead and ration gasoline. I feel that my job is important to the war effort and my driving is essential to my job. I will make application for extra gasoline supplies, and if it is denied I will drive as long as I have gasoline and then I will stay home.

Admittedly this is a defeatist slant, but it is prevalent, in fact rampant, throughout Detroit; so much so that it is doubtful if gasoline rationing in the form now in effect in eastern states will ever become an actuality here.

Conceivably the turn of the election might have made Washington officials more determined than ever to enforce rationing in the midwest as it has been done in the East. But a tidal wave of public resentment, including churches, unions, chambers of commerce, boards of trade, automobile clubs and practically all civic groups, certainly looks like it would force a change.

Here is the expressed viewpoint of the sales manager of one of the largest motor companies in this area on gasoline rationing: "My idea on this thing may be a little different from our government people, but I think if a man is a darn fool enough to wear out his tires these days, when he knows he will be able to get no more for some time, then let him go ahead and wear them out, and after that walk or take a bus. I resent the regimentation of individual car drivers and their treatment as children who don't know how to take care of their own property."

Hunters Another Headache

With the opening of the hunting season, more problems confront operating staffs of the war production plants in this territory, as if gasoline rationing, materials shortages and labor union troubles were not enough. The exodus of hunters to the north woods in search of deer is always large, but this year a record turnout seems in store. Many of the men in plants have foregone summer vacations, have been working overtime and on Sundays, and now feel that they have earned a few days off to go hunting. So they have announced their plans to take time off, and despite pleas of superintendents and foremen, many of whom would like to do a little deer-popping themselves, remain firm in their intentions.

The problem is critical particularly in tool and die departments where the pressure in recent months for production has been terrific. Men in these classifications have been earning undreamed-of wages, many drawing weekly pay checks of $150 to $200. Naturally they have had to work hard for this money. They are tired, and probably have earned a few days' vacation; but the demands on their time still are pressing and it is not feasible to grant leaves for hunting. The suggestion has been made that the state suspend the open season this fall, but this plan was turned down. Another proposal was that "front offices" issue instructions forbidding men to leave their jobs to go hunting. Anyone who has had much dealing with union labor knows how futile such a gesture would be. So the result will probably be that the men will go hunting. A few of them will be shot up accidentally. The war effort will have to lag for a few days.

The labor problem continues to be as much of a headache as ever. Only a week ago, six smaller plants here lost the equivalent of a hundred thousand man-hours or so because 6000 men be-

(*Concluded on Page* 150)

FISHER BODY INCREASES PRODUCTION OF BREECH MECHANISMS

MANUFACTURE of these breech housing mechanisms, left, and housings, right, for antiaircraft guns for the Navy and merchant ships has won Fisher Body Division of General Motors Corp., Detroit, the Navy's two-star burgee. Production rate on one mechanism has been stepped up 400 per cent over the original contract and on another has been increased almost 200 per cent. Largely responsible for the sustained increased production at the plant have been new job methods, ingenious application of available machines to do the work of more critical machines, mass production methods and the design and construction of new tools. These are the first pictures released by the Navy showing manufacture of the housings, technical data not disclosed

THE HAND IN YOUR PLANT THAT STEEL WORKERS WANT TO SHAKE

— is the hand that chalks "scrap this" on every obsolete machine—on every piece of idle equipment, and starts them on their way to the steel furnaces to be made into fighting steel. Appoint some one in your plant—with knowledge and authority—to scrap every old-time machine and every piece of equipment not working for you *now*. This scrap is needed for making high quality steels for shells, bombs, guns, tanks, planes, and ships.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

PARTNER TO INDUSTRY IN WAR PRODUCTION

J&L STEEL

MEN of INDUSTRY

M. L. Carson, acting engineer-in-charge, has been appointed manager of the engine and condenser department, Allis-Chalmers Mfg. Co., Milwaukee. Associated with Allis-Chalmers since 1916, Mr. Carson was made engineer-in-charge of the engine and condenser department last February. Prior to that he served as department correspondent and estimator for 20 years.

—o—

Charles Nelson Jr., associated with Ahlberg Bearing Co., Chicago, 11 years, the past nine as assistant chief engineer, has been promoted to chief engineer, in charge of bearing design and development work. Prior to joining Ahlberg he was associated with Marlin-Rockwell Corp.

—o—

Edward S. Coe Jr. has been appointed manager of the New York office of Farrel-Birmingham Co., Ansonia, Conn., succeeding the late E. H. Thomas. Associated with the company since 1936, Mr. Coe has served in various capacities in the company's Buffalo plant, and the New York, Chicago, and Ansonia offices. The past few months he has been in charge of expediting production of Farrel-Sykes gear generating machines.

—o—

W. L. Davis, since Aug. 1 manager of operations, Scully Steel Products Co., Chicago, has been elected a director. Associated with United States Steel Corp. subsidiaries since 1905, when he began as a shipping clerk at the Donora, Pa., plant of Carnegie Steel Co., he was appointed manager of American Steel & Wire Co.'s Houston, Tex., warehouse, in 1928, and nine years later was made superintendent of the Texas warehouse of Tennessee Coal, Iron & Railroad Co.

—o—

Montague A. Clark, for 12 years director of industrial and public relations,

M. L. CARSON

United States Rubber Co., Detroit, has been named Michigan director of the War Manpower Commission. On leave of absence from United States Rubber, he will direct and co-ordinate the work of all government agencies in the field of manpower and will serve as liaison officer between the government and management and labor.

—o—

Dan C. Hungerford has been elected president and general manager, Aircraft Parts Development Corp., Summit, N. J. Until recently, when he resigned to help organize the corporation which he now heads, he was vice president and a director of the Elastic Stop Nut Corp., Union, N. J. Before that he was president, Standard Mfg. Co., Corning, N. Y.

—o—

George M. Stevens, since September, 1940, assistant manager of General Electric Co.'s River works, has been named acting manager there, while **Nicholas M. Du Chemin,** heretofore assistant manager, has been made acting manager of the company's West Lynn works, both located at Lynn, Mass. Mr. Stevens and Mr. Du Chemin succeed the late Nelson J. Darling, who was manager of both plants for several years.

D. L. Beeman has been appointed engineer, industrial power section, General Electric, succeeding **E. G. Merrick,** and **R. S. Sage** has been named engineer, mining section, succeeding **F. L. Stone.** Mr. Merrick and Mr. Stone, associated with the company many years, will continue in their respective sections with specially assigned duties and as engineering consultants.

J. D. Wright, manager of General Electric's Industrial Engineering Department, announces the transfer of petroleum industry application engineering responsibilities from the mining section to the chemical section headed by **T. R. Rhea.** This section will now be called the petroleum and chemical section.

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John W. Hall, Milwaukee district manager for Danly Machine Specialties Co., Chicago, has been commissioned a first lieutenant with an Army Ordnance Division.

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W. N. Thompson has been appointed project manager, H. K. Ferguson Co., industrial engineers and builders of Cleveland and New York, for the design and construction of detinning facilities to be built in approximately 29 metropolitan areas. Mr. Thompson joined the Ferguson organization in 1921, representing the company in the Orient from 1924 to 1927. After an absence of two years he rejoined the firm in 1939. He will make his headquarters in Cleveland.

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J. L. Townsend has been appointed assistant manager of sales, fractional horsepower motor section, Motor Division, General Electric Co., Fort Wayne, Ind. Early in 1926 Mr. Townsend was

N. M. Du CHEMIN

GEORGE M. STEVENS

D. L. BEEMAN

R. S. SAGE

J. L. TOWNSEND

transferred to the fractional horsepower motor sales department, and later that year to the same department in the company's Chicago office. From 1926 to 1937 he was located in the Detroit and Grand Rapids, Mich., offices. He then was reassigned to the fractional horsepower motor sales section.

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D. A. MacKinnon has been appointed hydraulic sales engineer, Hydraulic Machinery Inc., Detroit. The past six years he has been associated with Sundstrand Machine Tool Co., since 1940 as sales engineer, and before that was with Vickers Inc.

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Prof. E. L. Midgette has been appointed consultant, American Engineering Co., Philadelphia. He will, however, continue as professor of machine design at the Polytechnic Institute of Brooklyn.

PROF. E. L. MIDGETTE

Professor Midgette at one time served as an engineer for the United States Rubber Reclaiming Co. Inc., Buffalo; instructor of machine design at Johns Hopkins University, and professor in charge of laboratory sciences at St. Johns College, Annapolis, Md.

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Raymond T. O'Keefe, former Department of Justice investigator, has been appointed personnel manager, Kropp Forge Co., Chicago.

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Dr. O. A. Nelson, former research chemist, United States Department of Agriculture, has been appointed to the technical staff of Battelle Memorial Institute, Columbus, O.

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Albert Bradley and **Ormond E. Hunt** have been elected executive vice presidents, General Motors Corp., Detroit. **E. F. Johnson,** vice president in charge of the Eastern Aircraft Division of the corporation, has been named a member

D. A. MacKINNON

of the war administration committee. Mr. Bradley has been an executive of General Motors since 1919, while Mr. Hunt has been associated with GM since 1929 in official capacities.

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Floyd Todd has joined the laboratory staff of Quaker Chemical Products Corp., Conshohocken, Pa., in a research capacity. His initial work will be in the field of metal corrosion. Mr. Todd formerly was associated with Atlantic Refining Co. and Sharp & Dohme Co.

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R. A. Corvey, heretofore Philadelphia branch manager, Lamp Division, Westinghouse Electric & Mfg. Co., has been appointed assistant manager of the northeastern district, with headquarters in New York.

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Forrest Nagler, chief mechanical engineer, Allis-Chalmers Mfg. Co., Milwaukee, has been placed in charge of the company's engineering and development department, succeeding **Edwin H. Brown,** engineering vice president, who has been granted leave of absence to serve as assistant chief, Iron and Steel Branch, in charge of the plant facilities section, WPB, Washington.

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Clyde L. Schwyhart, the past two years central division service manager, Caterpillar Tractor Co., Peoria, Ill., has been named supervisor of foremen's conferences. He will lead a program of conferences, involving several hundred plant supervisors, in methods outlined by the War Manpower Commission to facilitate the training of new men in war industry.

—o—

Gerard Swope, president, General Electric Co., has been selected as the sixth recipient of the Hoover medal, with the following citation: "Gerard Swope, engineer and distinguished leader of industry, ever deeply interested in the welfare of his fellowmen, whose constructive public service in the field of social, civic and humanitarian effort has earned for him the Hoover medal for 1942." The medal will be presented to Mr. Swope during the winter convention of the American Institute of Electrical Engineers beginning Jan. 25.

—o—

Audrey Winstead, Moore Bros. Co., Elizabeth, N. J., was elected president, New Jersey Foundrymen's Association at a recent meeting. He succeeds **John C. Phelan,** Benjamin Eastwood Co., Paterson, N. J. **Herbert L. Edinger,** Barnett Foundry & Machine Co., Irvington, N. J., was elected vice president, and **J. A. Williamson,** Newark, re-elected treasurer.

—o—

Charles F. Wagner and **Dean Harvey** have been honored by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for outstanding contributions to the electrical industry. Both were awarded the Westinghouse Order of Merit.

Mr. Wagner, manager of central station engineering, was honored for his lightning studies, while Mr. Harvey, materials and standards engineer, was cited for his contribution to the war effort as a member of the Conservation Division, War Production Board.

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Harold P. Wade has been appointed general manager, Adel Precision Products Corp., Burbank, Calif. Since last March Mr. Wade has been manager of Adel's engineering service office in Detroit. Before joining Adel he was production engineering co-ordinator for Lockheed Aircraft Corp.

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John C. Cushing, since last March assistant to the director of industrial relations, Scully Steel Products Co., Chicago, has been appointed assistant manager of industrial relations. He joined the company in 1940 as a clerk in the personnel department.

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John L. Schmeller, formerly executive vice president, National Bronze & Aluminum Foundry Co., Cleveland, was elected president at a special meeting of the board of directors Nov. 10. Also elected were: **W. F. Muth** as vice president and secretary; **George N. Wright,** vice president; and **George C. Hilliard,** comptroller.

In addition to election of new officers, the board approved an increased appropriation of approximately 33 1/3 per cent of the initial cost of the new National Aluminum Cylinder Head plant, division of National Bronze & Aluminum.

Armco Founder a Leader In Steel Nearly Half Century

George Matthew Verity, founder of the American Rolling Mill Co., its president for 30 years and chairman of the board of 12 years, died Nov. 6, at his home in Middletown, O. He had suffered a stroke two days earlier.

In his passing the steel industry lost another of the outstanding leaders who participated in its remarkable development in the past half-century. In little more than four decades American Rolling Mill Co. grew from a small firm of $200,000 capitalization and 350 employes to $100,000,000 in assets and 20,000 employes, with plants in Middletown and Zanesville, O., Ashland, Ky., and Butler, Pa.

Numerous innovations in the industry, in manufacturing and in employe working conditions were pioneered by him. His company was first to introduce the eight-hour shift in continuous operations and among the earliest to provide group insurance for its employes. One of the most significant mile-stones in manufacturing methods was it perfection of the continuous sheet and strip mill, which was licensed to practically the entire industry and revolutionized the production of sheets and strip.

His interest in the welfare of employes resulted in unusual loyalty on their part. The history of the company has been singularly free from labor misunderstandings. He insisted on the best working and social conditions possible for those in his plants, and his influence in this and other respects extended far beyond his own community.

He was born April 22, 1865, in East Liberty, O., a week after the assassination of President Lincoln. His father was an itinerant Methodist preacher, a descendant of the French Huguenots, and his mother was a descendant of the Virginia family of Deatons, prominent in the Revolutionary War. His entire life was spent in Ohio.

After a brief experience as a hotel room clerk he became manager of a wholesale grocery company in Cincinnati. In 1889 he became manager of the Sagendorf Iron Roofing & Corrugating Co., Middletown, O., after working there two years. In 1891 he reorganized the company as the American Steel Roofing Co. and became vice president and general manager. In the next eight years there were expansions and reorganizations, leading up to the founding of the American Rolling Mill Co. in 1899.

In this era when the United States Steel Corp. also was being formed Mr. Verity held that his company's small size was an advantage. It could not hope to compete with the new giant on a quantity basis "and so had to depend on quality".

He held to three general principles to which he attributed success: Get men who will make the business their business; make products no one else makes, and do it economically; borrow money when circumstances justify it.

The 1942-43 edition of "Who's Who" lists him as a director of Westinghouse Electric & Mfg. Co., Pittsburgh; councillor of the National Industrial Conference Board, New York; honorary vice president of the American Iron and Steel Institute, New York; chairman of the

GEORGE MATTHEW VERITY

Minute Men of the Middletown Chamber of Commerce, handling all war fund and Red Cross drives; member of the Ohio Society of New York, and other organizations.

He is survived by his widow, Mrs. Jennie Standish Verity; a son, Calvin Verity, vice president and general manager of the American Rolling Mill Co.; two daughters, Mrs. Charles R. Hook and Mrs. Newman Ebersole.

—o—

Julius Kahn, 68, founder of Truscon Steel Co., Youngstown, O., and its president from 1903 to 1935 when it was merged with Republic Steel Corp., Cleveland, died in Cleveland, Oct. 4. He became a director and vice president of Republic following this company's acquisition of Truscon, and was in charge of product development. He retired from that position in 1939. Mr. Kahn was widely known for the Kahn system of concrete reinforcement in industrial building.

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Thomas Moore, 87, who retired in 1917 as assistant general superintendent, South Works, Illinois Steel Co., Chicago, now Carnegie-Illinois Steel Corp., died in that city, Nov. 8.

—o—

Norbert A. Milhaupt, 57, the past six years superintendent of the milling machinery department, Kearney & Trecker Corp., Milwaukee, died Oct. 31, at Burlington, Wis.

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Fred A. Poole, 65, president, Production Instrument Co., Chicago, died in that city, Nov. 4.

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John Watson Fitzgerald, 65, research engineer, Briggs & Stratton Corp., Milwaukee, died Nov. 2, in that city.

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F. Anton Drolshagen, 83, founder and president, Milwaukee Pattern Mfg. Co., Milwaukee, died in that city, recently.

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Fred C. Chandler Jr., 42, president, Chandler Products Corp., Cleveland, manufacturer of cap screws, died in that city, Nov. 8.

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William K. Bradley, 54, Chicago manager, Detroit Brass & Malleable Works, Detroit, died Nov. 8, in Chicago.

—o—

Louis J. Plumb, 58, president, United States Rubber Reclaiming Co. Inc., Buffalo, died in that city, Nov. 7.

MEETINGS . . .

American Society of Mechanical Engineers—Decisive role of engineers in the war effort and the contributions of engineering and industrial production will dominate the program of the sixty-third annual meeting, Hotel Astor, New York, Nov. 30-Dec. 4.

About 125 papers will be read covering the varied fields of engineering, and panel discussions and symposiums will be held, with leaders in each field presiding.

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American Mining Congress—Stimulation of production of critical metals for the war effort and means of overcoming increasing labor shortages in the mines will be studied by metal mine operators at a war conference sponsored by the western division of the Congress, Salt Lake City, Utah, Nov. 16-17.

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American Zinc Institute Inc.—Galvanizers Committee will hold a 1-day session instead of the usual two days at William Penn hotel, Pittsburgh, Nov. 20. This meeting will be open only to members of the committee and their representatives. Subjects for discussion include testing standards, substitute coatings, and wartime and peacetime practice.

Orderly System for Industrial Deferments Provided in WMC Plan

PITTSBURGH

MANNING Table Plan, announced recently by the War Manpower Commission (STEEL, Nov. 9, p. 48) is based on an arrangement developed by the Carnegie-Illinois Steel Corp., over a period of several months, in an effort to provide for orderly withdrawal of men from industry and to establish a sound basis upon which deferments may be requested.

Gen. Lewis B. Hershey recently declared the plan was successful so far as concerned relations between the corporation and local draft boards.

Major purpose of the plan is to indicate the form in which the employer should keep the records of his labor force so as to provide a basis for planning the withdrawal of workers from industry into the armed forces with the least possible disturbance to production. According to the War Manpower Commission, use of this plan will also bring other benefits to industry.

For one thing it will give the plant a complete inventory of its manpower, showing the number of workers necessary to do each kind of job, the possibility of substituting unskilled for skilled workers on certain jobs with accompanying savings in wages, the amount of training necessary for each job, and the training methods which might be used. The study will also show where women are employed in industry and may supply information necessary to forecast labor requirements in connection with anticipated production.

Under present conditions the plan will be a voluntary co-operative system. Only plants engaged 75 per cent or more in war production and certain other industries such as public utilities and railroads qualify for the plan. It also will be possible for associations to enter into the plan and act for industry as a whole.

The first such action has been taken by the American Iron and Steel Institute, which, through the co-operation of member companies, has prepared a job study which is uniform throughout the industry, describes every known job, and also determines the training time and educational background required to fill each job. Since this work already is done, the steel industry now is in a position to apply the plan immediately and set up uniform draft deferments for various jobs.

Any plant which can qualify under the plan and which wants to participate must fill out WMC Form 500. This form then should be mailed to the office of the regional or area director of War Manpower Commission in whose territory the plant or activity is located.

If the request is granted, the director concerned will forward to the company sufficient material and instructions for compiling the manning tables. The company must then construct its manning table, which is a listing, with appropriate supporting data, of all different kinds of jobs in the plant. The table describes skill, training and experience needed by the worker to fill each job. It also shows essential characteristics needed by each worker for each job and the estimated length of time required to train a replacement for each worker.

Applies to Jobs, Not Men

War Manpower Commission emphasizes the fact that this is not a listing of personnel, but a listing of jobs. This is quite important inasmuch as the correlation of the Manning Table Plan with Selective Service does not provide deferments for individuals, but deferments for jobs, and as a result, for the individual who fills that job. It is suggested that the description of the job may be made easier by the use of the Dictionary of Occupational Titles, compiled by the United States Employment Service. Duplicate jobs are counted and the number indicated.

Certain other information also must be supplied, including number of jobs which are filled by handicapped persons and the probable number of additional employes needed. The manning tables will be kept current by periodical review.

After the manning table has been set up and approved by the regional or area director of War Manpower Commission, it is then presented to the state director of Selective Service of the state in which the plant is located, and if acceptable, is then approved and the table is given a state acceptance number. The employer then is authorized to use this state acceptance number and to place a prescribed state acceptance stamp on the affidavit (Occupational Classification, Form 42-A). This affidavit is to be filed with the draft board for any employe for whom deferment is requested. The form will indicate to the draft board how long it will take the employer to replace the employe and will thus determine the length of the deferment. The

SAYS MARITIME COMMISSION TRAINS REPLACEMENT WORKERS

DOUBT that voluntary methods would be successful in mobilizing the country's manpower was expressed by Admiral Emory S. Land, chairman, Maritime Commission, in testifying before the Senate Military Affairs Committee. The admiral told the committee that the commission has a large scale program for training men and women workers to replace those called into the armed services. NEA

use of this form notifies the local board that the length of deferment indicated has the approval of the War Manpower Commission and the state director of Selective Service; or in other words, relieves them from the position of having to investigate the validity of deferment claims entered by employers for their employes.

While this plan is still on a voluntary basis, Paul V. McNutt, chairman of the War Manpower Commission, has indicated the plan eventually should be made mandatory.

Work-Week Must Be Increased To Raise Army of 9,500,000

IF AN armed force of 9,500,000 men is to be built up by the end of 1943, as is the stated objective, steps must be taken immediately to increase the actual working week from 42.5 to 48 hours and to bring at least 6,400,000 additional workers into the labor force, according to a survey of manpower by the Brookings Institution, Washington. The additions would have to come largely from women, children and older persons. It would also be necessary to reduce the amount of goods and services produced for private use by one-third as compared with the 1942 level.

The study, which was conducted by Harold W. Metz and financed by the Falk Foundation, is concerned with overall requirements, and does not deal with the labor needs of specific types of industry. Against the requirements for equipping and maintaining our own forces at home and abroad, meeting the needs of our allies, and providing the essential minimum of civilian production, are set the labor resources available for the task. The estimates of labor requirements are based on the potential yearly production per worker, rather than on projected government disbursements for war purposes.

The issues involved suggest the need of a co-ordinated national policy, designed not only to provide balance within the war production program itself, but also as between military and industrial manpower requirements. Inasmuch as no department or war agency is vested with authority over more than a limited segment of the war effort, responsibility for such a policy rests upon the President. The analysis of manpower factors gives rise to a broad question in respect to the proposed large Army. Inasmuch as official estimates have placed the maximum number of men required to defend the Western hemisphere at 2,000,000 it is assumed that most of the army which has been contemplated would be sent abroad. According to available figures on requirements per man and availability of ships, it does not appear possible that 5,000,000 men can be transported and supplied abroad while the country maintains the shipping essential for present needs.

Of the 6,400,000 additions to the labor force which would be required for armed forces of 9,500,000, the natural increase in population will produce 1,400,000; labor from Mexico may possibly provide a maximum of 150,000; and the remainder must come from women homemakers and persons in the 14-to-19 and over-65 age groups. Such requirements would take 60 per cent of the 5.6 million nonfarm women who are under 45 years, and have no young children, and 15 per cent of the 11,200,000 persons more than 65 or between 14 and 19. It is assumed that the number of unemployed will be reduced to a practical minimum of 1,000,000.

SHIPYARD GIVES THOUSANDS OF EMPLOYES TO WAR SERVICE

SO MANY employes of Newport News Shipbuilding & Dry Dock Co. have joined the fighting forces that even a service flag as large as this one does not have space enough for the 4295 stars. NEA photo

Longer Work-Week Favored By War Board Chieftain

Lengthening of the work-week in war production plants was endorsed last week by WPB Chairman Donald M. Nelson in testifying before the Senate Military Affairs Committee, studying manpower legislation.

Mr. Nelson also went on record as favoring manpower control by legislative act rather than by administrative fiat.

"We are going to have to do it before we get through," Mr. Nelson told the committee. "I don't think we should dilly-dally with this war. . . . I think the people are going to demand that Congress do something of this kind."

An opposing position was taken by President Roosevelt at his press conference. The Chief Executive said that the experience in England and Germany, as revealed by intelligence reports, showed that production and efficiency did not increase as result of longer work weeks.

Mr. Roosevelt said the fatigue factor generally was not recognized in proposals for abandoning the 40-hour week for the duration. Pointing out that the average work-week in all war production plants was between 46 and 48 hours, he insisted that beyond that point production would not be increased by a longer week.

Defense Corporation Signs More Contracts for Plants, Equipment

NEW war plant facilities and purchases of additional equipment have been authorized for a number of plants by the Defense Plant Corp. The new facilities will be operated by private companies, but title will be retained by Defense Plant Corp.

Authorizations include:

Execution of a contract with Atlas Imperial Diesel Engine Co., Oakland, Calif., to provide machinery and equipment in Illinois, at a cost in excess of $100,000.

Execution of a contract with Tom Moore Distillery Co., Bardstown, Ky., to provide equipment for plant in Kentucky.

Execution of a contract with Sprague Specialties Co., North Adams, Mass., to provide for plant facilities in Massachusetts, at a cost in excess of $750,000.

Execution of a contract with Stetson-Ross Machine Co., Seattle, to provide for construction and equipment of a plant in the State of Washington, at a cost in excess of $250,000.

Execution of a contract with The Commercial Fuel Co., Pittsburg, Kans., to provide machinery and equipment in Kansas, at a cost in excess of $175,000.

Execution of a contract with Universal Television System Inc., Kansas City, Mo., to provide for equipment for a plant in Missouri.

Increase in its contract with Ford Motor Co., Dearborn, Mich., to provide for additional plant facilities in Michigan. The increase will be in excess of $650,000, making a total commitment of more than $33,500,000.

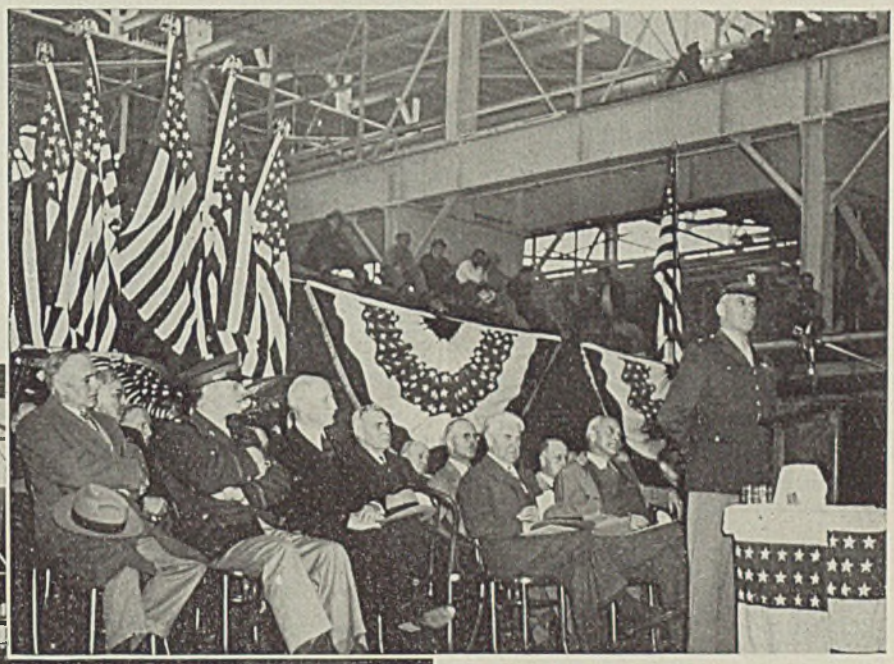
Increase in its contract with General Electric Co., Schenectady, N. Y., to provide for additional equipment in a plant in Connecticut. The increase will be in excess of $250,000, making a total commitment of more than $500,000.

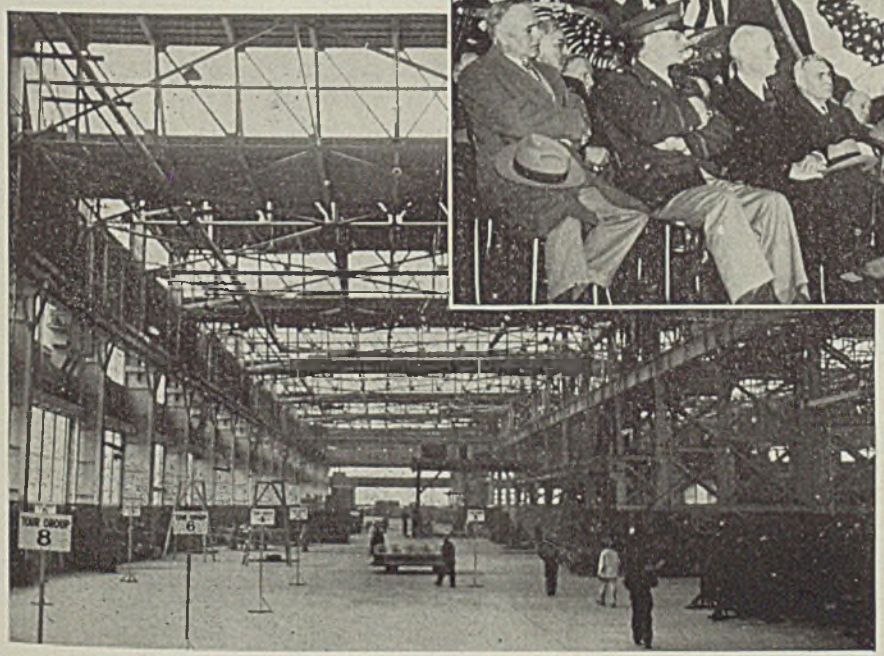
Increase in its contract with General Electric Co., Schenectady, N. Y., to provide additional equipment in plants in Connecticut and Indiana. The increase

NEW CAST ARMOR PLANT NEARLY ONE-THIRD OF A MILE LONG

NEW cast armor plant of the American Steel Foundries at East Chicago, Ind., including six open-hearth furnaces and 41 specially designed heat-treating furnaces, was opened officially Oct. 29.

Construction of the plant, which is nearly one-third mile long, required 22,000 tons of steel. Cost of building and equipment approximated $26,500,000 and was financed by the Defense Plant Corp., which is leasing it to American Steel Foundries. Actually the foundry is so constructed that it is two plants in one, for with the exception of the open hearth furnaces all other facilities are duplicated in each half of the structure. The two-plants-in-one arrangement was decided upon to avoid loss of time in transporting materials.





About 40 per cent of the workers in the 30-acre plant will be women, and the company has under way an intensive training program for job candidates.

The foundry will produce a special type of tank armor which has been developed by the company's research department.

Shown at the opening ceremonies, upper right, are, left to right: R. D. Brizzolara, chief engineer, American Steel Foundries; Col. John Slezak, Chicago Ordnance District; R. P. Lamont, retired president of the company; Thomas Drever, company president; Brig. Gen. Thomas S. Hammond, chief, Chicago Ordnance District. Speaking is Brig. Gen. Donald Armstrong, chief, Army Tank and Automotive Center, Detroit. Below is one of the bays in the new foundry.

will be in excess of $80,000, making a total commitment of more than $300,000.

Increase in its contract with Caterpillar Tractor Co., East Peoria, Ill., to provide additional plant facilities in Illinois, at a cost in excess of $400,000, making a total commitment of more than $1,000,000.

Execution of a contract with Micamold Radio Corp., Brooklyn, N. Y., to provide machinery and equipment in a plant in New York, at a cost in excess of $250,000.

Execution of a contract with National Carbon Co. Inc., New York, to provide for plant facilities in North Carolina, at a cost in excess of $500,000.

Execution of a contract with Wheeling Bronze Casting Co., Wheeling, W. Va., to provide for construction and equipment of a plant in West Virginia. It is estimated that the cost will be in excess of $375,000.

Increase in its contract with Electronic Mechanics Inc., Paterson, N. J., for additional equipment in New Jersey. The increase will be in excess of $140,000, making a total commitment of more than $240,000.

Execution of a contract with Weldon Tool Co., Cleveland, to provide machinery and equipment in a plant in Ohio.

An increase in its contract with the Wellman Bronze & Aluminum Co., Cleveland, for additional plant facilities in Ohio. The increase will be in excess of $175,000, making a total commitment of more than $625,000.

An increase in its contract with Bellanca Aircraft Corp., New Castle, Dela., for additional plant facilities in Delaware, at a cost in excess of $50,000, making a total commitment of more than $1,300,000.

An increase in its contract with Barnes-Duluth Shipbuilding Co., Duluth, for additional plant facilities in Minnesota. The increase will be in excess of $125,000, making a total commitment of more than $400,000.

Higgins Plant Will Expand for Cargo Plane, Engine Program

New Orleans shipyard of Andrew J. Higgins will be expanded into a plant to manufacture cargo planes for the Army, a new-type marine engine, plane parts for other builders and an experimental cargo plane, claimed to be the largest in the world, Mr. Higgins announced recently in Washington.

Mr. Higgins said he had arranged with the Army to construct 1200 cargo planes of a combination of plywood and metal, which he called "wood alloy". Defense Plant Corp. will invest $30,000,000 in new facilities, and the planes will cost $180,000,000.

In addition, he said, he stands ready to build any type of aircraft parts which may prove to be a bottleneck for other manufacturers, and will build for the government $2,000,000 worth of a secret and revolutionary type of gasoline engines intended primarily for boats but adaptable for other uses.

On his own account, he said, he is building an experimental six-engined cargo plane of the new-type plywood, which will be much larger than the Mars (see page 59) and which will have a wing spread of 300 feet. The new plane probably will be given to China.

The new plane building program will get under way as soon as the Maritime Commission completes razing of $11,000,000 of shipbuilding facilities, occasioned by the recent cancellation of an order for 200 Liberty ships necessitated by a shortage of steel.

"Special Purpose Iron" Plant May Be Built in Warren

The plant to be built by Republic Steel Corp. for production of special purpose iron—so-called sponge iron—probably will be located in Warren, O., instead of in Youngstown, if governmental approval is obtained for a switch from the original location. Availability of a plant at Warren for desulphurizing coke oven gas is the reason for the proposed move. Similar equipment is not available at Youngstown, and low-sulphur gas is required in processing the iron ore. Output of the sponge iron plant, expected to be about 100 tons daily, will be used in charging electric furnaces but will represent only a little over 3 per cent of the Canton plant's scrap requirements. The plant is to be completed in five to six months.

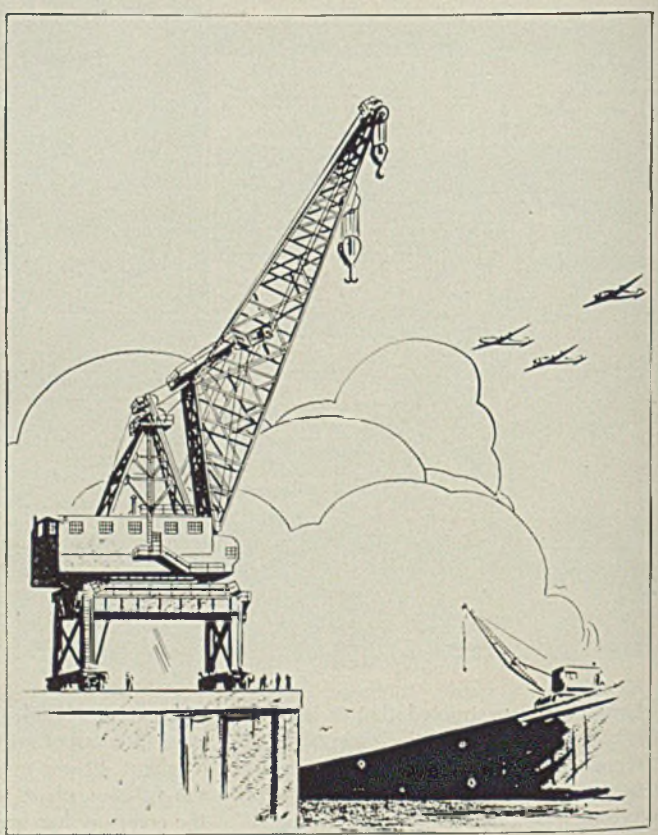
BOOMS OF NAVY CRANES REACH HIGHER THAN 12-STORY BUILDING

Nine huge cranes, booms of which reach higher than a 12-story building, are being constructed in Cleveland for the United States Navy Bureau of Yards and Docks. The cranes are powered with Cooper-Bessemer diesel engines and are being built in the shops of the Wellman Engineering Co., and the R. W. Kaltenbach Corp.

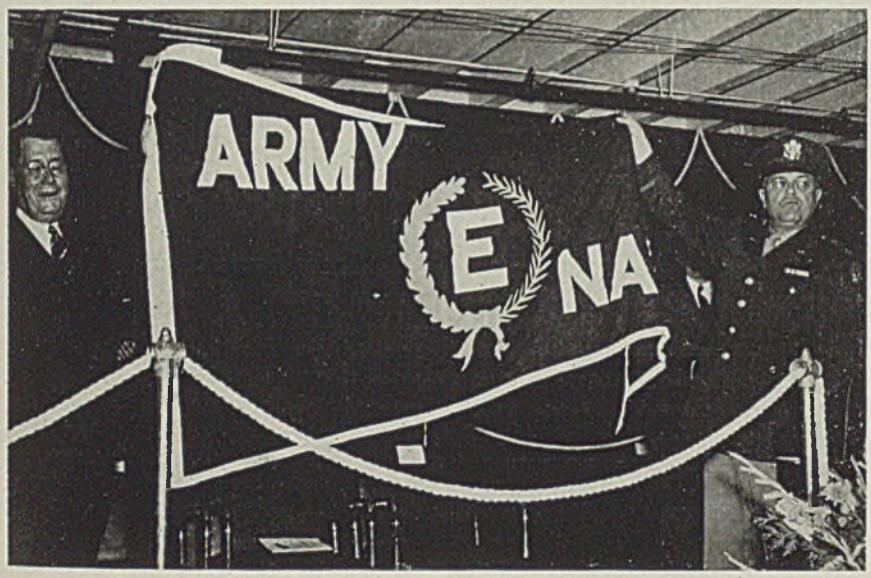
The cranes are of the dry dock type and will run on four rails. They will be completely self-contained and self-powered. Operation will be so simple and so flexible that one man in a glass-enclosed control room may direct it.

On each crane, the machinery house, which is part of the revolving superstructure, situated high above the tracks, will have a floor area larger than that of a large one-story building.

The diesel power plant will make each crane an independent unit, eliminating the necessity for conductors along the tracks, and will enable it to continue in operation in case of emergency.



Lieut. Comm. C. H. Soderstrom, United States Navy, tells employes of the American Forge Division, American Brake Shoe & Foundry Co., New York, that the Army-Navy "E" is a reminder and incentive for still better production in the future



Leece-Neville Co., Cleveland, designers and builders of generators and other electric equipment for automotive vehicles, aircraft and marine use, has been awarded the Army-Navy "E". Presentation was made to President B. M. Leece by Maj. Merle Armitage, Central Procurement District

"E" Banners for Many Manufacturers

ADDITIONAL companies selected to receive the Army-Navy "E" award were announced last week by Undersecretary of War Robert P. Patterson and Undersecretary of Navy James V. Forrestal. They include:

Acushnet Process Co., Rubber Division, New Bedford, Mass.

Armstrong Cork Co., Lancaster, Pa.

Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.

Henry Disston & Sons Inc., Philadelphia.

E. I. du Pont de Nemours & Co., Barksdale plant, Barksdale, Wis., Martinsville plant, Martinsville, Va.; and Seaford plant, Seaford, Del.

Edgewood Chemical Warfare Arsenal, Edgewood, Md.

Emerson Electric Co., booster plant, St. Louis.

Eureka Vacuum Cleaner Co., gas mask division, Detroit.

Federal Products Corp., Providence. R. I.

Ferro Enamel Corp., Cleveland.

General Motors Corp., Plant A, New Departure Division, Bristol, Conn., and Plant D, New Departure Division, Meriden, Conn.

Heintz Mfg. Co., Philadelphia, Pa.

Hilton-Davis Chemical Co., Cincinnati.

Huntsville Chemical Warfare Arsenal, Huntsville, Ala.

Ingersoll-Rand Co., Painted Post, N. Y., plant.

Irving Subway Grating Co. Inc., Long Island City, N. Y.

F. L. Jacobs Co., Detroit.

Representatives of labor and management receive the joint Army-Navy "E" award at the plant of the South Bend Lathe Works, South Bend, Ind. The award is the third the company has received this year, previous ones being the Navy "E" and the All-Navy "E"

Marquette Metal Products Co., Cleveland, receives the Army-Navy "E" award. Shown above is the speaker's platform during the ceremony. In foreground, left to right: Fred Erdman, master of ceremonies; Admiral Bryson Bruce, United States Navy; Marquette President Herbert Gleitz; Major Becker, United States Army; Ray Miller, former Cleveland mayor; and Thomas Herbert, attorney general of Ohio

Jeffersonville Quartermaster Depot, Jeffersonville, Ind.

Lincoln Park Tool & Gage Co., Lincoln Park, Mich.

M. B. Mfg. Co., New Haven, Conn.

W. H. Nichols & Sons, Waltham, Mass.

Philadelphia Quartermaster Depot, Philadelphia.

Pioneer Parachute Co., Manchester, Conn.

Pittsburgh Forgings Co., Coraopolis, Pa.

J. M. Service Corp., Kansas Ordnance Plant, Parsons, Kans.

Transue & Williams Forging Corp., Alliance, O.

United States Rubber Co., Des Moines Ordnance plant, Des Moines, Iowa.

An additional list received at press time included the following:

Aereo Corp., Hollydale, Calif.

Aircraft Accessories Corp., Kansas City, Kans.

Aluminum Co. of America, Niagara Falls, N. Y.

Aluminum Ore Co., Aluminum Co. of America, Mobile, Ala.

Atlantic Mfg. Co., Philadelphia.

Bakewell Mfg. Co., Los Angeles.

Benson Mfg. Co., Kansas City, Mo.

Bliley Electric Company, Erie, Pa.

Carolina Aluminum Co., Aluminum Co. of America, Badin, N. C.

Consolidated Aircraft Corp., Plants 1 and 2, San Diego, Calif.

Edwards Co., Division of Rogers Diesel & Aircraft Corp., Sanford, N. C.

Emerson Electric Mfg. Co., Turret Division, St. Louis.

Grimes Mfg. Co., Urbana, O.

Haines Gauge Co., Philadelphia.

Lempco Products Inc., Bedford, O.

Republic Mining & Mfg. Co., Aluminum Co. of America, Bauxite, Ark.

Singer Mfg. Co., Elizabethport, N. J.

Zenith Radio Corp., Chicago.

Manufacturers Association To Honor "E" Award Winners

Representatives of war plants who have been awarded the Army-Navy "E" awards or the Maritime Commission's "M" for excellence in industrial production will be honored during the War Congress of American Industry in New York, Dec. 2-4, the National Association of Manufacturers announced last week.

William P. Witherow, president of the association, said the more than 500 firms honored by the services had been invited to send an officer of the company and an employe representative to the congress. The employe will be the man who received the lapel button on behalf of the workers when the Army-Navy made their award. The special ceremony honoring the companies whose production record exceeded schedule will be the first of its kind since Pearl Harbor.

Two speakers at the luncheon, to be held on Friday, Dec. 4, the last day of the congress, will be Robert P. Patterson, Undersecretary of War, and James V. Forrestal, Undersecretary of Navy.

Westinghouse Booklet Aids Employes Entering Services

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., has extended to employes joining the Merchant Marine through the Maritime Commission the same leave of absence privileges granted to those entering the armed forces. Leaves of absence will last six months and 40 days after the end of the war or 40 days following the date of honorable discharge, whichever occurs first.

In a booklet issued to help employes wind up civilian affairs before entering the nation's service, company reported leaves of absence are being granted men drafted or those enlisting in the Army, Navy, Coast Guard, Navy Construction Battalion, Maritime Commission Cadet Corps, Army Specialist Corps and Merchant Marine.

The same recognition is accorded women employes enlisting in the Women's Auxiliary Volunteer Emergency Service or the American Red Cross.

In addition to information about Westinghouse jobs, the booklet discusses installment purchases, insurance, allowances for dependents, income taxes, mortgages, rent, voting and the postwar status of the soldier.

Report Manganese Alloy Conserves Scarce Metals

Eighteen tons of scarce metals will be saved in the manufacture of General Electric Co.'s war products this year, because of a new nonmagnetic manganese alloy, company has announced.

The alloy will free 10 tons of nickel, seven tons of chromium and almost one ton of tin for other war uses, replacing a formula which called for 18 per cent chromium, eight per cent nickel and the remainder iron. Either alloy requires a covering to permit soldering, and for the tin coating previously used, a lead coating has been substituted.

According to J. Q. Adams, company's steel specialist, the new formula provides a much stronger alloy and therefore can be expected to remain in general use when the war ends.

Bars, rods and plates made of this material are used in motor-generators for submarines, control equipment for planes and tanks, and in switchgear equipment and motors. Wire made of the alloy has equally wide application, chiefly in electric locomotives.

Use of silvered-glass reflectors in place of aluminum reflectors by General Electric has resulted in a saving of 360,000 pounds of aluminum in the manufacture of street lighting equipment, and another 200,000 pounds in other protective lighting devices such as searchlights and floodlights, according to A. F. Dickerson, manager of the company's lighting division.

Government Takes Over Aircraft Plant To Speed Bomber Output

TORONTO, ONT.

DEPARTMENT of Munitions and supply announced that by expropriation proceedings the Canadian government has taken over ownership and management National Steel Car Corp.'s aircraft plant at Malton, Ont. Production will be continued by a government-owned company, Victoria Aircraft Ltd., under direction of J. P. Bicknell, Toronto, president of Porcupine Gold Mines Ltd. For a long period since the outbreak of the war he was associated with Lord Beaverbrook in British aircraft production.

This action is considered the most drastic and far-reaching of its direct management proceedings under the war production program. The announcement said: "The government is taking over the plant in order to expedite operations and to maintain a community of interest and co-operation between the plant management, the Department of Munitions and Supply and the designers and builders of the Lancaster bomber in Britain."

The Malton plant also is engaged in manufacture, assembly and overhaul of airplanes. The Lancaster, a heavy four-engined bomber, is one of the four important aircraft in Canada's production schedule established for the next year.

Clearance of Canadian applications for certain preference ratings on purchases in the United States of materials costing less than $500 has been accelerated by the delegation of a limited authority in the Washington priorities representative in Ottawa, Ont., the Department of Munitions and Supply announces. Procedure of the Canadian manufacturer has not been changed. He still will submit his application to the priorities branch at Ottawa or one of the regional office, but the application will be dealt with more speedily.

Subcontracting Is Simplified

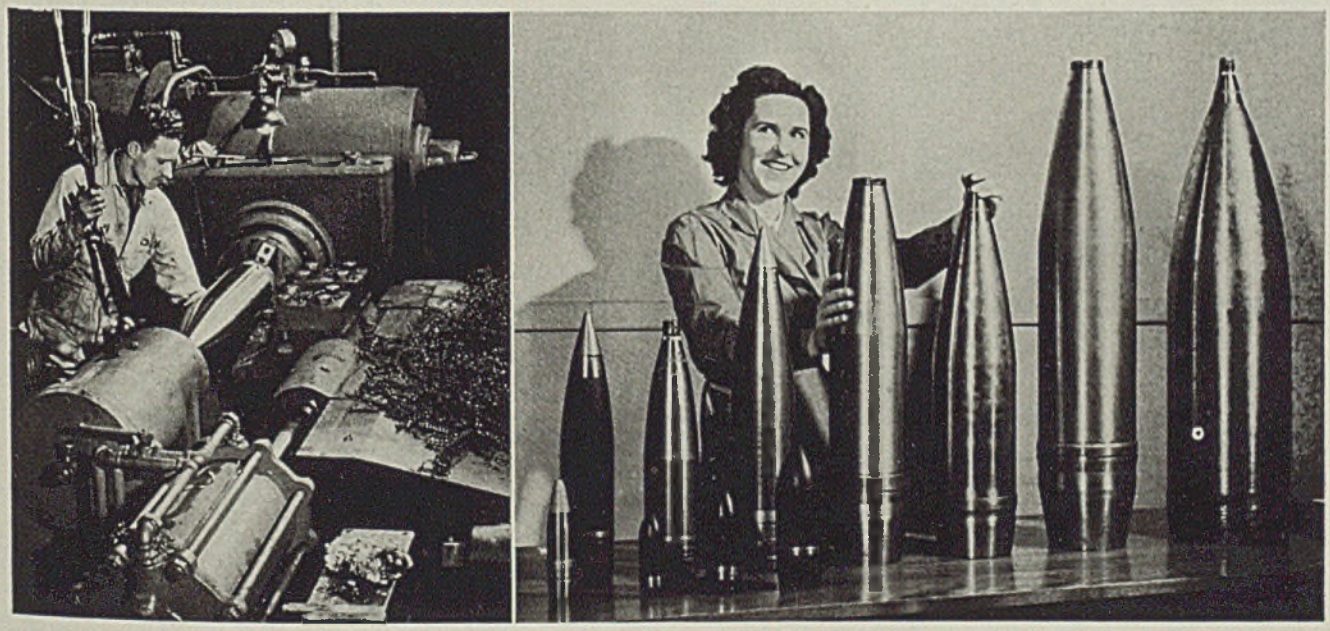
Industry and subcontract co-ordination branch of the Department of Munitions and Supply has been merged with the office of co-ordinator of production and will function as the subcontract division of that office. J. L. Jeckell, formerly director general of the discontinued branch, and Drummond Giles, former associate director general, will be joint directors of the new division. The change was made to prevent confusion between it and the Wartime Prices and Trades Board. Among other duties it will arrange for subletting war contracts among displaced industries.

Segregation of turnings and other scrap from the more critical alloys now is mandatory in Canadian plants, G. C. Bateman, metals controller, appealing to all workers, foremen and managers to co-operate in observing the new regulations. The order includes bronze containing tin, silicon bronze, brass mill and wrought copper base alloys, yellow brass, nickel silver, cupro silver, aluminum, aluminum bronze and manganese bronze.

Metals controller has placed sales of primary lead under direct allocation and sales of secondary lead are under strict control. This is done to maintain control under present increase of use as a substitute for copper, zinc and other critical metals, which may lead to a shortage which is not yet apparent.

Dominion Magnesium Co. is getting into full production at its plant at Haleys Station with five retort units in operation, three ready for lighting and two under construction, all ten to be producing by the end of the year. Plant capacity is estimated at 10 tons per day and current production bears out this estimate. The plant was built by the government and will be operated without profit for the duration with the understanding it will be offered to the company at the war's end.

"MADE IN CANADA"



DOMINION'S ammunition factories now make 18 types of shells in 14 different calibres. They employ 50,000 workers. Illustration at the right shows a few of the shells: Front row, 40-millimeter ack-ack; 37-mm; 6-pounder, and 75-mm anti-tank. Back row, 25-pounder; 3.7-inch anti-aircraft; 4.5-inch; 6-inch howitzer; 7.2-inch howitzer and 9.2-inch howitzer. Workman, in illustration at left, is "shaving" a 7.2-inch shell. Passed by Canadian censor

Iron, Steel Groups' Rate of Return 5.7 Per Cent

Net income of 24 companies classified as "iron and steel" for the first nine months in 1942 totaled $131,709,000, or 39.1 per cent less than in the corresponding period of 1941, according to the National City Bank of New York. Return on investment in the period declined from 9.7 per cent to 5.7 per cent. Net earnings of 184 companies of the total manufacturing group, including iron and steel, declined 33.1 per cent; net return was 8.2 per cent, down 4.4 per cent.

Net income of major steel producers for the nine months of 1942 as tabulated by STEEL, Nov. 2, p. 38, showed a decline of 39.3 per cent from the period in 1941.

Following table was compiled by the bank:

	Annual Rate of Return %	
Industrial Groups	1941	1942
Iron and steel	9.7	5.7
Petroleum products	7.8	5.5
Building equipment	8.1	6.1
Electrical equipment	14.3	9.8
Machinery	16.6	12.7
Automotive	19.6	10.1
Auto equipment	18.3	16.1
Railway equipment	13.4	8.0
Metal products—misc	16.0	11.7
Misc. manufacturing	10.9	7.2
Total manufacturing	12.6	8.2

Wickwire Spencer Steel Co.

Wickwire Spencer Steel Co., New York, reports net income for the nine months ended Sept. 30, and after provision for taxes, as $1,330,147, against $1,011,315 during nine months of 1941. Taxes to Sept. 30, 1942, amounted to $1,330,147, compared with $236,417 in like period last year.

Follansbee Steel Corp.

Nine months' earnings of Follansbee Steel Corp., Pittsburgh, totaled $303,871, after taxes and all charges including depreciation and amortization of war facilities. In the corresponding period of 1941, net profit was $321,138. Provision for federal income taxes was $199,000, against $169,000 in 1941. Net profit for third quarter was $100,895.

Eastern Rolling Mill Co.

Eastern Rolling Mill Co., Baltimore, Md., reports net profit for the quarter ended Sept. 30 as $61,567, after provision of $320,834 for federal income and excess profits taxes, against $58,583 in corresponding 1941 quarter. Net for the year ended Sept. 30 was $403,407; provision for taxes totaled $913,851.

General Refractories Co.

General Refractories Co., Philadelphia, reports net income for third quarter as $243,957, or 52 cents per share. This compares with $173,584, or 37 cents per share, in the preceding three months; and $329,268, or 70 cents per share, in the September quarter a year ago. Net income for the first nine months this year totaled $674,942, or $1.44 per share, against $920,526, or $1.96 per share, for the same period of 1941.

Monarch Machine Tool Co.

Monarch Machine Tool Co. directors last week declared a dividend of 75 cents per share on the company's 210,000 outstanding shares, bringing the total for 1942 to $3, compared with $4 in 1941. The board also authorized payment of the usual cash Christmas bonus to all employes.

Barium Stainless Steel Co.

Barium Stainless Steel Corp., Canton, O., reports net operating revenue of $74,525.73 for third quarter, with net income as $60,331.67 before provision for federal income tax. Cancellation and liquidation of the mortgage lien to the Reconstruction Finance Corp., as of Oct. 24, also was announced.

STEEL CONSUMERS NET PROFIT DECLINES 23 PER CENT

COMBINED net income earned in the first nine months of 1942 by 51 iron and steel consumers totaled $110,944,707, compared with $144,162,430 reported by the same companies in corresponding period of 1941, a decrease of approximately 23 per cent. Aggregate net profit of the group in the third quarter was $44,242,181, or nearly 7 per cent less than the total of $47,598,273 in the comparable quarter last year.

Reports of the companies in the four periods are summarized in the accompanying table:

	Third Quarter 1942	Third Quarter 1941	Nine Months 1942	Nine Months 1941
Allis-Chalmers Mfg. Co., Milwaukee	$1,017,163	$1,781,216	$3,104,649	$4,170,793
American Brake Shoe & Foundry Co., New York	752,079	766,201	2,000,169	2,245,541
American Safety Razor Corp., Brooklyn, N. Y.	301,373	142,404	609,838	233,213
American Stove Co., St. Louis	72.893	411,627	480,161	969.784
Atlas Tack Corp., Fairhaven, Mass.	23,747	51,958	73,336	142,272
Blaw-Knox Co., Pittsburgh	309,496	397,670	711,179	1,282,067†
Briggs Mfg. Co., Detroit	1,111,143	640,147	3,043,962	4,751,949
Budd Mfg. Co., E. G., Philadelphia	940,589	447,361	2,186,825	1,754,832
Budd Wheel Co., Philadelphia	1,017,906	351,617	1,485,766	1,056,490
Central Foundry Co., New York	29,308	129,305	223,818	303,358
Chrysler Corp., Detroit	5,732,585	8,486,005	14,502,590	29,460,848
Clark Equipment Co., Buchanan, Mich.	387,113	541,979	1,231,705	1,523,033
Cleveland Graphite Bronze Co., Cleveland	426,747	327,395	945,352	1,182,710
Crosley Corp., Cincinnati	383,617	181,734	764,698	980,368
Cutler-Hammer Inc., Milwaukee	468,070	303,439	1,020,702	1,242,542
Doehler Die Casting Co., New York	208,746	305,402	643,159	1,004,543
Ex-Cello Corp., Detroit	464,044	765,103	2,523,572	1,853,811
Federal Screw Works, Detroit	109,126	130,675	311,317	312,540
Fruehauf Trailer Co., Detroit	391,031	634,199	1,027,022	1,772,176
General Electric Co., Schenectady, N. Y.	10,029,066	11,468,016	30,710,499	37,471,681
Gillette Safety Razor Co., Boston	666,174	941,547	2,265,037	2,333,337
Hoskins Mfg. Co., Detroit	136,062	151,661	327,440	450,870
Houdaille-Hershey Corp., Detroit	439,601	240,603	1,261,938	1,757,694
International Business Machines Corp., New York	6,764,027†	2,387,881	7,096,433	7,116,217
Intertype Corp., Brooklyn, N. Y.	92,524	114,967	250,253	314,294
Jackson Co., Byron, Huntington Park, Calif.	165,410*	229,114	816,062*	407,260
Le Tourneau Inc., R. G., Peoria, Ill.	617,292	603,139	1,703,892	2,216,887
Link-Belt Co., Chicago	916,870	865,809	1,936,448	2,172,824
Master Electric Co., Dayton, O.	208,845	188,342	545,307	639,152
Minneapolis-Honeywell Regulator Co., Minneapolis	696,742	917,982	1,802,701	2,022,260
Mullins Mfg. Corp., Salem, O.	145,939	154,883	436,317	691,813
National Acme Co., Cleveland	1,318,534	858,193	2,226,371	2,430,660
National Malleable & Steel Castings Co., Cleveland	306,713	402,099	885,689*	1,345,669
National Supply Co., Pittsburgh	815,898	1,775,081	2,248,954	3,989,828
New York Air Brake Co., New York	144,896	421,179	655,876	941,424
Oliver United Filters Inc., San Francisco	47,668	66,758	205,376	216,004
Parkersburg Rig & Reel Co., Parkersburg, W. Va.	220,897	254,607	473,833	373,394
Pittsburgh Screw & Bolt Corp., Pittsburgh	219,212	397,962	800,135	990,532
Seagrave Corp., Columbus, O.	54,624	7,868	84,168	65,274
Sullivan Machinery Co., Michigan City, Ind.	151,409	171,021	383,219	432,234
Superheater Co., New York	202,061	266,702	722,858	980,133
Thompson Products Inc., Cleveland	639,438	341,584	1,463,915	1,264,784
Transue & Williams Steel Forging Corp., Alliance, O.	69,821	64,675	291,284	167,728
Underwood Elliott Fisher Co., New York	502,237	935,012	1,139,082	2,552,226
United Aircraft Corp., East Hartford, Conn.	3,460,932	5,188,382	10,415,920	10,771,732
United-Carr Fastener Corp., Cambridge, Mass.	333,630	273,647	694,447	836,748
United Drill & Tool Corp., Chicago	338,334	434,645	924,117	1,044,402
United States Hoffman Machinery Corp., New York	49,355	176,879	256,935	579,294
Victor Equipment Co., San Francisco	50,860	45,262	115,468	147,578
Wayne Pump Co., Ft. Wayne, Ind.	263,994	307,534	614,690	644,948
White Sewing Machine Corp., Cleveland	26,340	149,802	350,223	550,679

*Indicated. †Before taxes. ‡Revised.

Index of Activity Declines Slightly

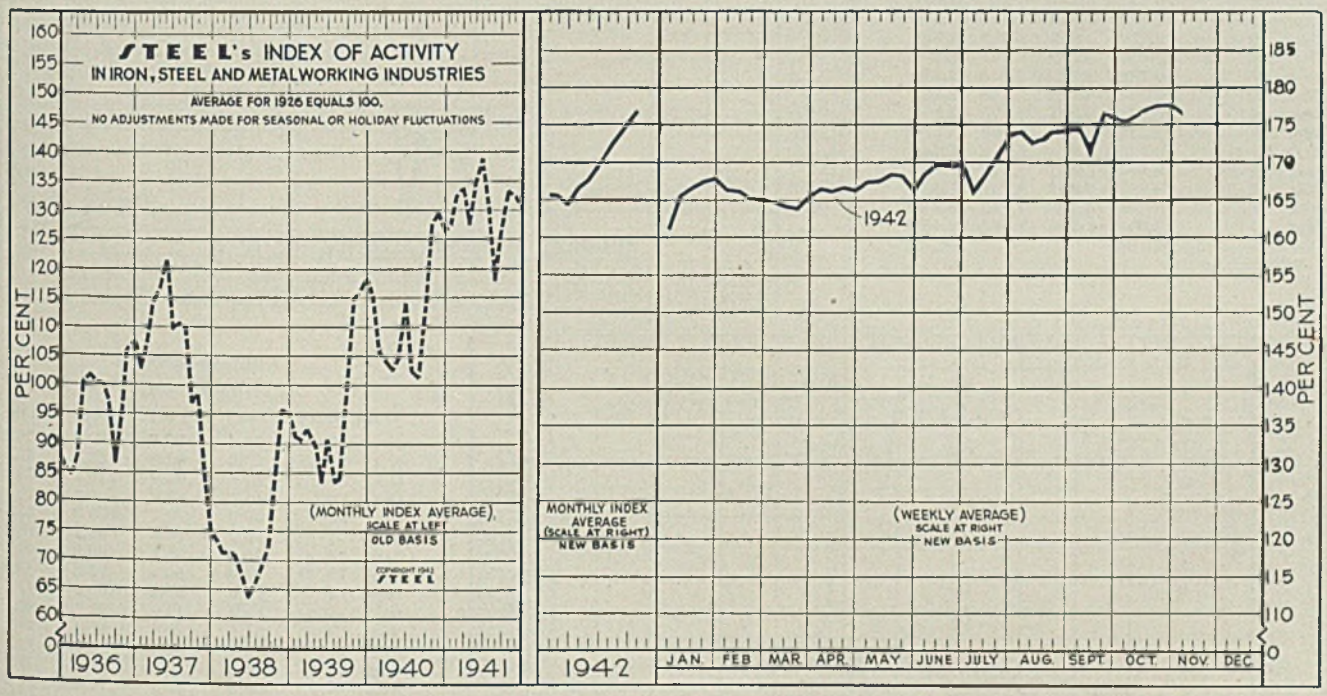
GOVERNMENT control appears to be penetrating into every form of economic activity. Action on the manpower shortage problem is progressing steadily, as are regulations dealing with inflation control and distribution of materials. OPA recently predicted that by next year production of civilian goods will be curtailed to the lowest point of 1932.

Expenditures for war materials in October totaled $5.5 billion, the same as in September. The average for July and August was $4.5 billion.

During the week ended Nov. 7, STEEL's index of activity in the iron, steel and metalworking industries declined 1.4 points to 176.4, reversing the upward tendency recorded in the preceding four weeks.

Work of repairing furnaces reduced steel ingot production one-half point to 98.5 per cent during the week ended Nov. 7. The steel scrap supply situation continues to improve, with many steelmakers reporting larger stocks. Prospects of the steel industry maintaining practical capacity operations throughout the winter are better.

Early estimate of revenue freight carloadings and electric power consumption for the week ended Nov. 7 indicated slight declines in these indicators. Revenue freight traffic in the latest period is estimated at 870,000 cars. This compares with 890,469 cars in the preceding week and 873,585 in the like week a year ago. Electric power consumption declined to about 3,750,000,000 kilowatts during the week ended Nov. 7, but remained well above the 3,325,574,000 kilowatts consumed in the comparable 1941 period.



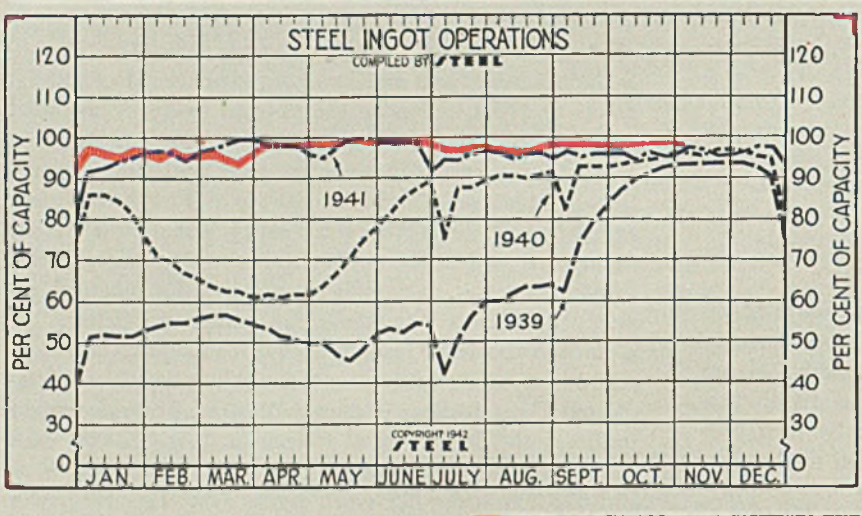
STEEL's index of activity declined 1.4 points to 176.4 in the week ending Nov. 7:

Week Ended	1942	1941
Sept. 5	174.8	111.8
Sept. 12	171.2	131.3
Sept. 19	176.8	130.6
Sept. 26	176.0	132.0
Oct. 3	175.5	132.7
Oct. 10	176.5	132.3
Oct. 17	176.9	133.4
Oct. 24	177.7	133.5
Oct. 31	177.8	133.8
Nov. 7	176.4†	134.4

†Preliminary.

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	165.7	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.8	69.1
Feb.	165.6	132.3	105.8	90.8	71.1	106.3	84.3	82.0	73.9	48.2	55.3	75.5
March	164.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.3	54.2	80.4
April	166.7	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	169.4	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	171.0	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	173.5	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	174.8	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	176.9	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.		132.3	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.3	54.4
Dec.		130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.8

Note: Weekly and monthly indexes for 1942 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production.



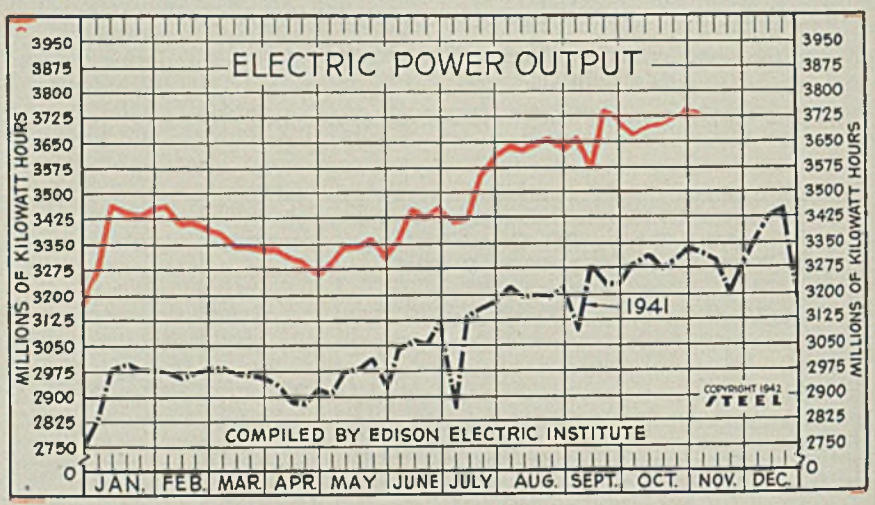
Steel Ingot Operations
(Per Cent)

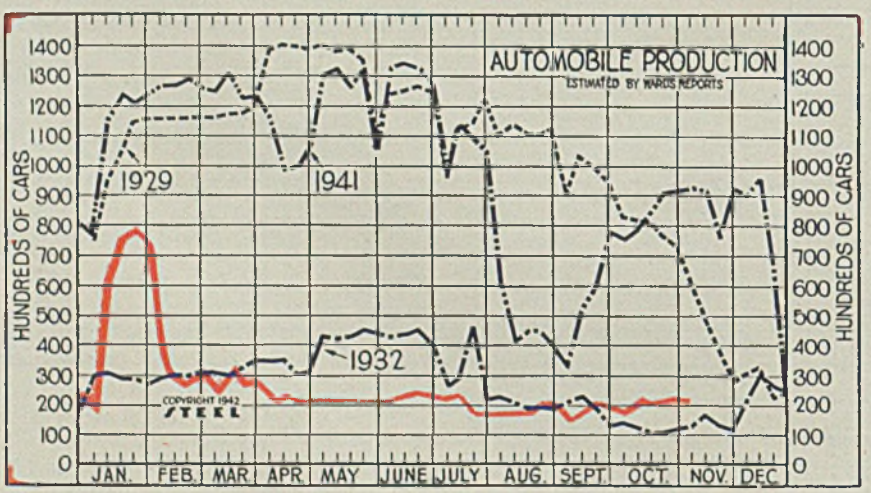
Week ended	1942	1941	1940	1939
Nov. 7	98.5	97.5	96.5	93.0
Oct. 31	99.0	95.5	96.5	93.0
Oct. 24	99.0	95.5	95.5	92.0
Oct. 17	99.0	96.5	95.0	91.0
Oct. 10	98.5	94.5	94.5	89.5
Oct. 3	98.0	96.0	93.5	87.5
Sept. 26	98.0	96.0	93.0	84.0
Sept. 19	98.0	96.0	93.0	79.5
Sept. 12	98.0	96.5	93.0	74.0
Sept. 5	98.0	95.5	82.0	62.0
Aug. 29	98.0	96.5	91.5	64.0
Aug. 22	97.5	96.0	90.5	63.5
Aug. 15	97.0	95.5	90.0	63.5
Aug. 8	97.5	96.5	90.5	62.0
Aug. 1	98.0	97.5	90.5	60.0
July 25	98.5	96.0	89.5	60.0
July 18	98.0	95.0	88.0	56.5

Electric Power Output
(Million KWH)

Week ended	1942	1941	1940	1939
Nov. 7	3,750†	3,326	2,858	2,589
Oct. 31	3,775	3,339	2,882	2,609
Oct. 24	3,753	3,299	2,867	2,622
Oct. 17	3,717	3,273	2,838	2,576
Oct. 10	3,702	3,315	2,817	2,583
Oct. 3	3,683	3,290	2,792	2,554
Sept. 26	3,720	3,233	2,816	2,559
Sept. 19	3,757	3,232	2,769	2,538
Sept. 12	3,571	3,281	2,773	2,532
Sept. 5	3,673	3,096	2,592	2,376
Aug. 29	3,640	3,224	2,736	2,442
Aug. 22	3,674	3,193	2,714	2,434
Aug. 15	3,655	3,201	2,746	2,454
Aug. 8	3,649	3,196	2,743	2,414
Aug. 1	3,649	3,226	2,762	2,400

†Preliminary.





Auto Production
(1000 Units)

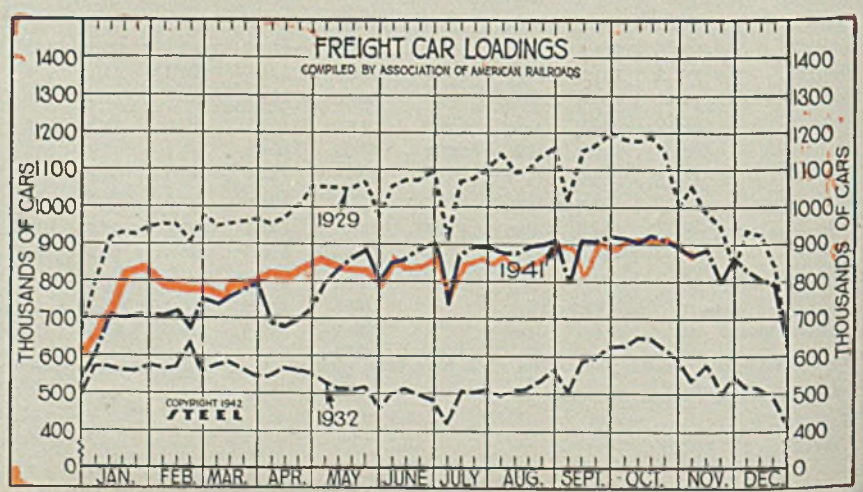
Week ended	1942	1941	1940	1939
Nov. 7	20.4	93.6	120.9	86.2
Oct. 31	20.9	92.9	118.1	82.7
Oct. 24	20.8	91.9	117.1	78.2
Oct. 17	20.2	85.6	114.7	70.1
Oct. 10	20.3	79.1	108.0	75.9
Oct. 3	19.9	76.8	105.2	76.1
Sept. 26	20.9	78.5	96.0	62.8
Sept. 19	21.0	60.6	78.8	54.0
Sept. 12	19.6	53.2	66.6	41.2
Sept. 5	16.9	32.9	39.7	26.9
Aug. 29	21.1	40.0	27.6	25.2
Aug. 22	20.2	45.5	23.7	17.5
Aug. 15	19.2	45.6	20.5	13.0
Aug. 8	19.2	41.8	12.6	24.9
Aug. 1	18.3	62.1	17.4	28.3

Figures since Feb. 21 last include Canadian trucks and automobiles and United States trucks.

Freight Car Loadings
(1000 Cars)

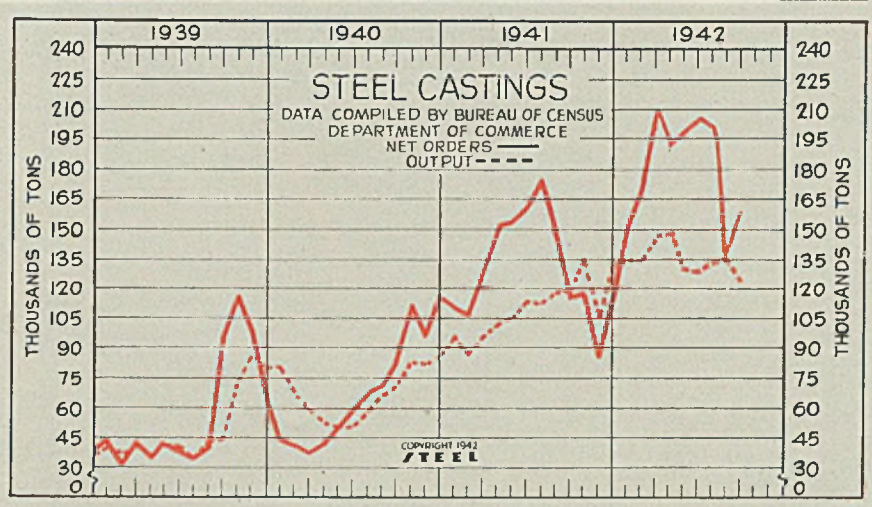
Week ended	1942	1941	1940	1939
Nov. 7	870†	874	778	786
Oct. 31	891	895	795	806
Oct. 24	903	914	838	834
Oct. 17	901	923	814	861
Oct. 10	910	904	812	845
Oct. 3	908	918	806	835
Sept. 26	898	920	822	835
Sept. 19	903	908	813	815
Sept. 12	815	914	804	806
Sept. 5	888	798	695	667
Aug. 29	899	913	769	722
Aug. 22	869	900	761	689
Aug. 15	869	890	743	674
Aug. 8	850	879	727	665

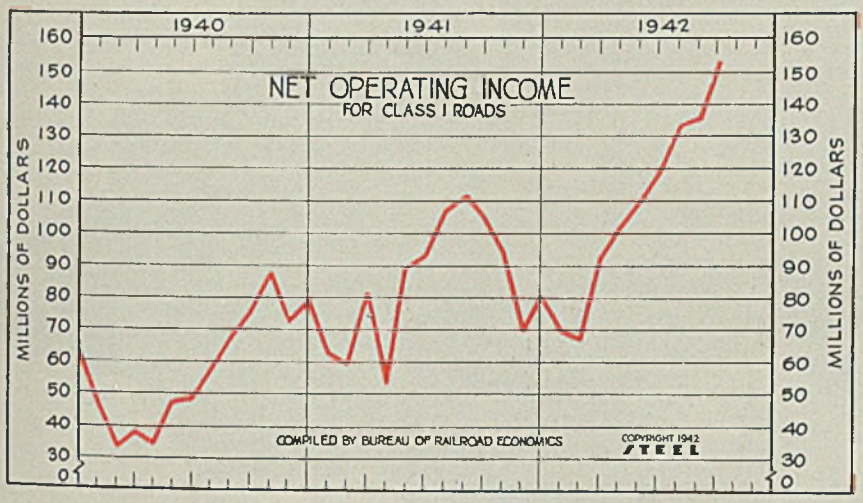
†Preliminary.



Steel Castings

	—Net Orders—		—Production—	
	1942	1941	1942	1941
Jan.	150.551	110,579	134,778	94,409
Feb.	179.880	105,125	133,726	84,492
Mar.	211,081	126,140	146.507	95,185
Apr.	191.195	152.007	149.625	101 977
May	199.619	153,143	131,492	104,971
June	208.243	161,512	131,458	113,988
July	201,679	175,892	133,845	112,364
Aug.	135,777	147,316	135,855	117,703
Sept.	160,300	115,066	124,433	118,543
Oct.		117,516		135,272
Nov.		84,534		104,605
Dec.		113,034		131,518
Tot.		1,561,864		1,316,027



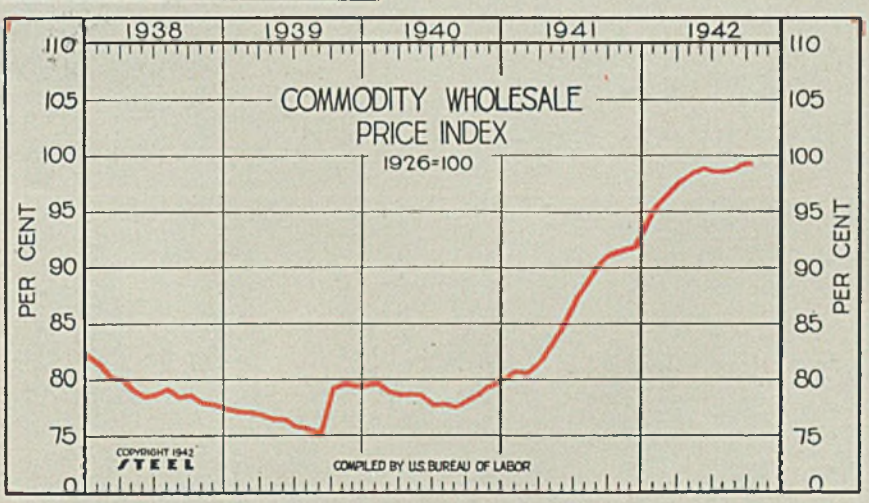


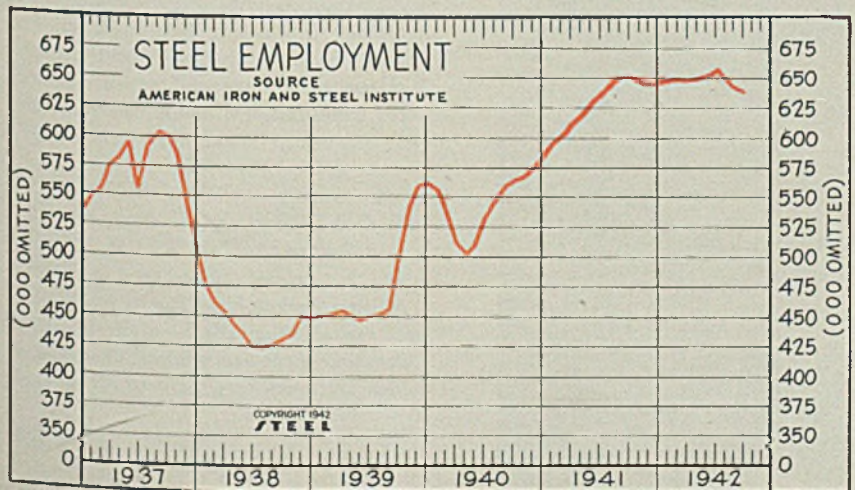
Class I Railroads
Net Operating Income
(Unit: $1,000,000)

	1942	1941	1940	1939
Jan.	$68.97	$62.02	$46.01	$32.95
Feb.	66.49	58.48	32.86	18.64
Mar.	92.39	80.63	37.03	34.38
April	102.03	52.57	34.12	15.32
May	109.63	88.63	47.41	25.17
June	118.73	93.26	48.09	39.17
July	133.00	106.31	57.73	49.00
Aug.	135.26	111.32	66.53	54.57
Sept.	154.63	104.07	74.72	86.53
Oct.		93.66	87.64	101 72
Nov.		68.76	72.00	70.41
Dec.		80.55	78.79	60.95
Average		$83.29	$56.84	$49.02

All Commodity
Wholesale Price Index
U. S. Bureau of Labor
(1926 = 100)

	1942	1941	1940	1939	1938
Jan.	96.0	80.8	79.4	76.9	80.9
Feb.	96.7	80.6	78.7	76.9	79.8
March	97.6	81.5	78.4	76.7	79.7
April	98.7	83.2	78.6	76.2	78.7
May	98.8	84.9	78.4	76.2	78.1
June	98.6	87.1	77.5	75.6	78.3
July	98.6	88.8	77.7	75.4	78.8
Aug.	99.2	90.3	77.4	75.0	78.1
Sept.	99.6	91.8	78.0	79.1	78.3
Oct.		92.4	78.7	79.4	77.6
Nov.		92.5	79.6	79.2	77.5
Dec.		93.6	80.0	79.2	77.0
Ave.		87.3	78.5	77.1	78.6

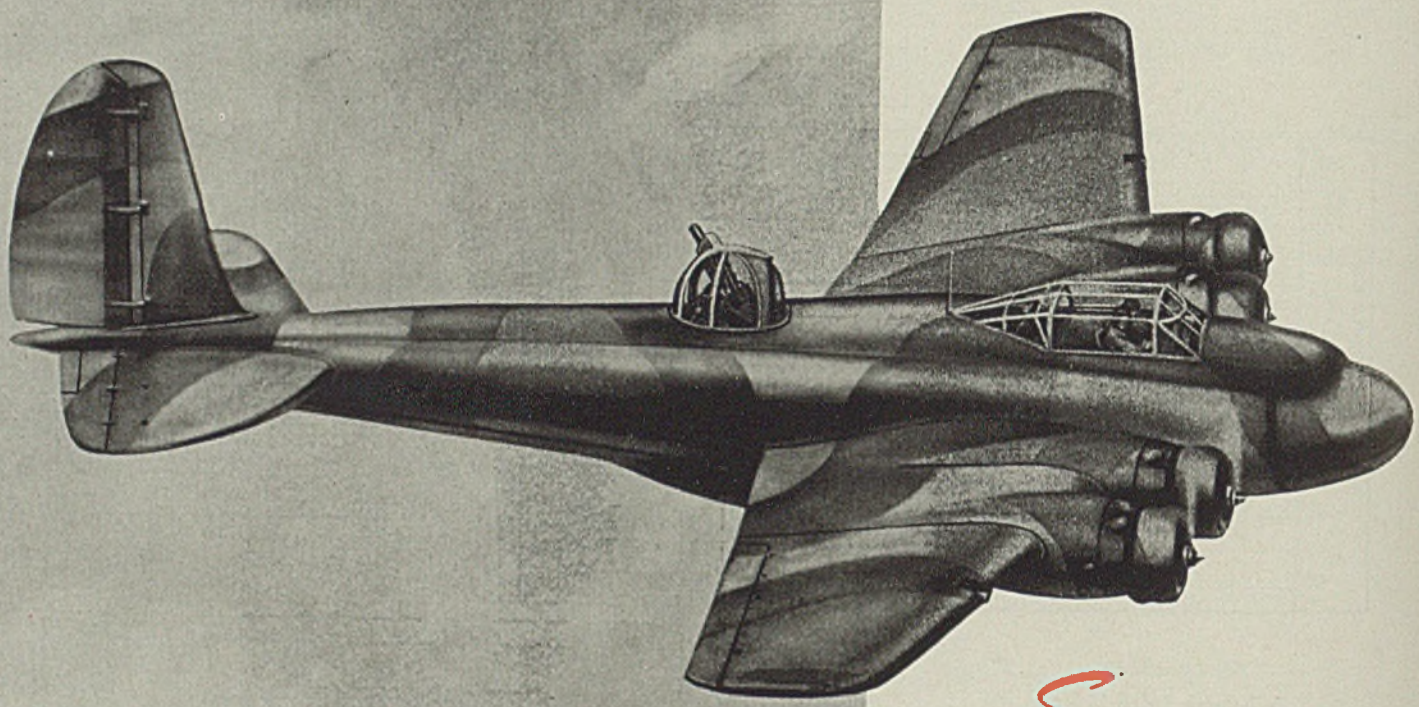


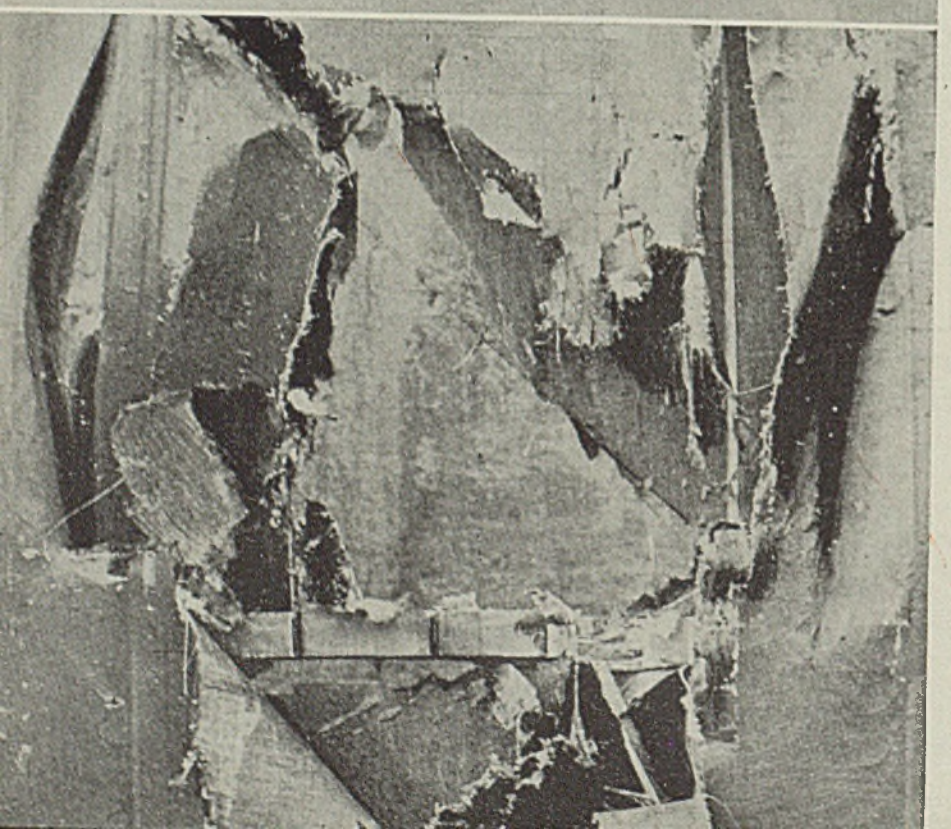


Steel Employment
(000 omitted)

	1942	1941	1940	1939	1938
Jan.	651	598	556	451	475
Feb.	651	603	538	453	461
Mar.	653	613	514	455	455
Apr.	654	621	503	452	445
May	656	632	510	448	436
June	659	638	535	451	425
July	655	648	549	453	424
Aug.	647	654	560	458	427
Sept.	641	652	565	502	431
Oct.		646	568	545	436
Nov.		645	577	561	450
Dec.		646	585	563	449

AIRCRAFT





SEVERAL years ago, aircraft cannon were spoken of as belonging to the category of advanced aerial weapons. The Germans had a 20-millimeter shell-firing cannon mounted on the engine to fire through the hollow propeller spinner. Because it was used on enemy airplanes, it naturally did not get too much publicity. Somewhat later, British and American aeronautical magazines did much to enlighten their readers on aircraft armament, including the increased use of cannon on fighting planes.

Cannon on airplanes are nothing new. In fact, no sooner had machine guns been mounted on first World war airplanes, than some bright spirit suggested the mounting of a 37-millimeter cannon.

Fig. 1. (Left, above)—Cannon mounted in power-driven turret such as shown here makes a most effective weapon

Fig. 2. (Below)—Effect of 23-millimeter Madsen explosive shell on a fabric wing, as viewed from point of exit. Sensitive detonator devices actuate shell upon contact with the very lightest of materials

By L. BRUCHISS
21 West Seventy-Fifth Street
New York

CANNON

Factors in design and operation of aircraft cannon; shell and ammunition; effect of gun and shell size; firing rates; control systems; ammunition capacity; mountings of various types

Several installations were actually tried at that time and were partially successful, surprisingly enough, considering that the gun used was designed for purely land operation, was heavy, slow firing and had a terrific recoil. If faulty ammunition caused a stoppage on land, it did not matter so much. But in the air, the pilot cannot afford to have a misfire.

The sole advantage of the 37-millimeter gun with its 1½-pound explosive shell is that a single hit assures the enemy plane being blown out of action. That single advantage is the only reason cannon are being used on military planes today. The 20-millimeter cannon will not always bring down an airplane, particularly the larger, heavily armored craft. In most cases they will only disable it sufficiently to nullify its use in battle, but the ¾-pound shell will bring it down in sufficiently large numbers to justify the use of cannon exclusively as both defensive and offensive weapons.

The United States has been producing aircraft cannon only since the European war started, but their production, as well as that of planes designed around heavy armament, may be assumed to be well on its way.

An aircraft cannon is nothing more than an overgrown machine gun. Its action is essentially the same. Practically all the various makes operate on the recoil principle whereby the force generated by the first round being fired sets in motion the mechanism that ejects the shell case, pulls up a new round from the ammunition drum or belt feed, inserts this round into the firing chamber, and fires the round—all automatically. The operation is continuous while the trigger device is held down.

Old time 37-millimeter gun action was not automatic. Each shell had to be loaded by hand, and cocking the gun for firing was a herculean job, one that could barely be performed in an airplane.

Until quite recently, both machine guns and small automatic cannon mounted on planes were controlled by cables for cocking, or charging the gun, and Bowden cables were even used for operating the trigger. Now charging is done hydraulically, each gun having a hydraulic cylinder containing a piston alongside its firing chamber. And the trigger is operated electrically by a solenoid trigger motor. Due to the large number of guns used on planes, the very latest development is a central hydraulic charger with a switchboard with pressure lines running to each gun. This reduces the total weight as it obviates individual gun chargers and makes for a more efficient installation.

A complete armament switchboard is more complicated than an old time instrument panel for an airplane. Besides a gun charging unit, it has rounds counters for each gun, switches to throw in or out any one gun in the event it goes out of action, interrupter gear for machine guns synchronized to fire through the propeller, electrical wiring and finger or thumb grips for firing the guns. Too, electrical heating elements keep the gun mechanisms warmed up for high altitude fighting and prevent freezing.

The firing rate of automatic weapons is something that always seems to interest everyone, layman and expert alike. A machine gun and automatic cannon mechanism is essentially simple, yet not so simple that improvements may be constantly awaited. The improvements have been largely in the field of ammunition, more exacting care in the production of the bullets and shell so that gun stoppages and misfires are less frequent.

The guns have been made lighter by reducing the length of the barrel, which in turn results in a much lower recoil force, and this reacts favorably in the way of mountings. Airplane mountings for long-barreled high recoil cannon were impossible in pre-war days except for limited fixed installations, as for example guns firing through the propeller hub and in the nose of twin engined ships. The design of smaller weapons permits their use in quantity on a plane.

The firing rate of the lower caliber automatic cannon is surprisingly high, ranging from 350 to 900 rounds per minute. The latter high rate is credited to one type of Swiss Oerlikon gun, and the German Rheinmetall Borsig 20-

(*Please turn to Page* 114)

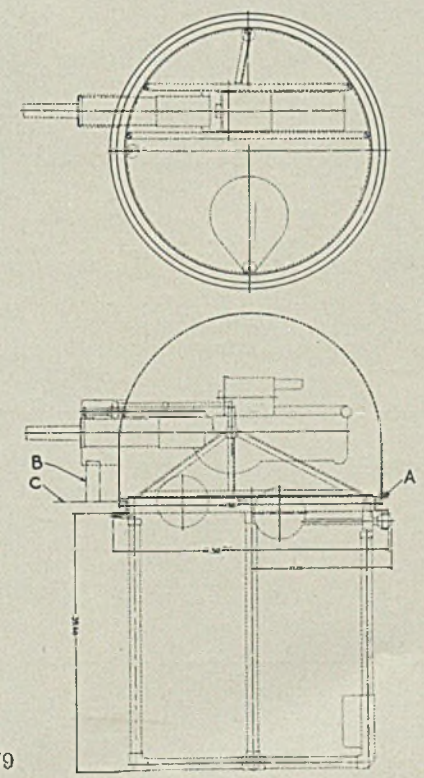
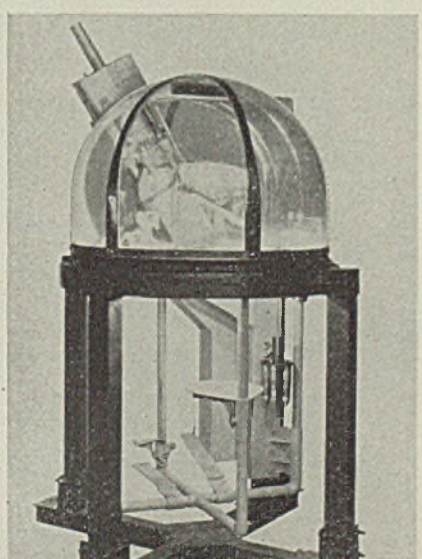
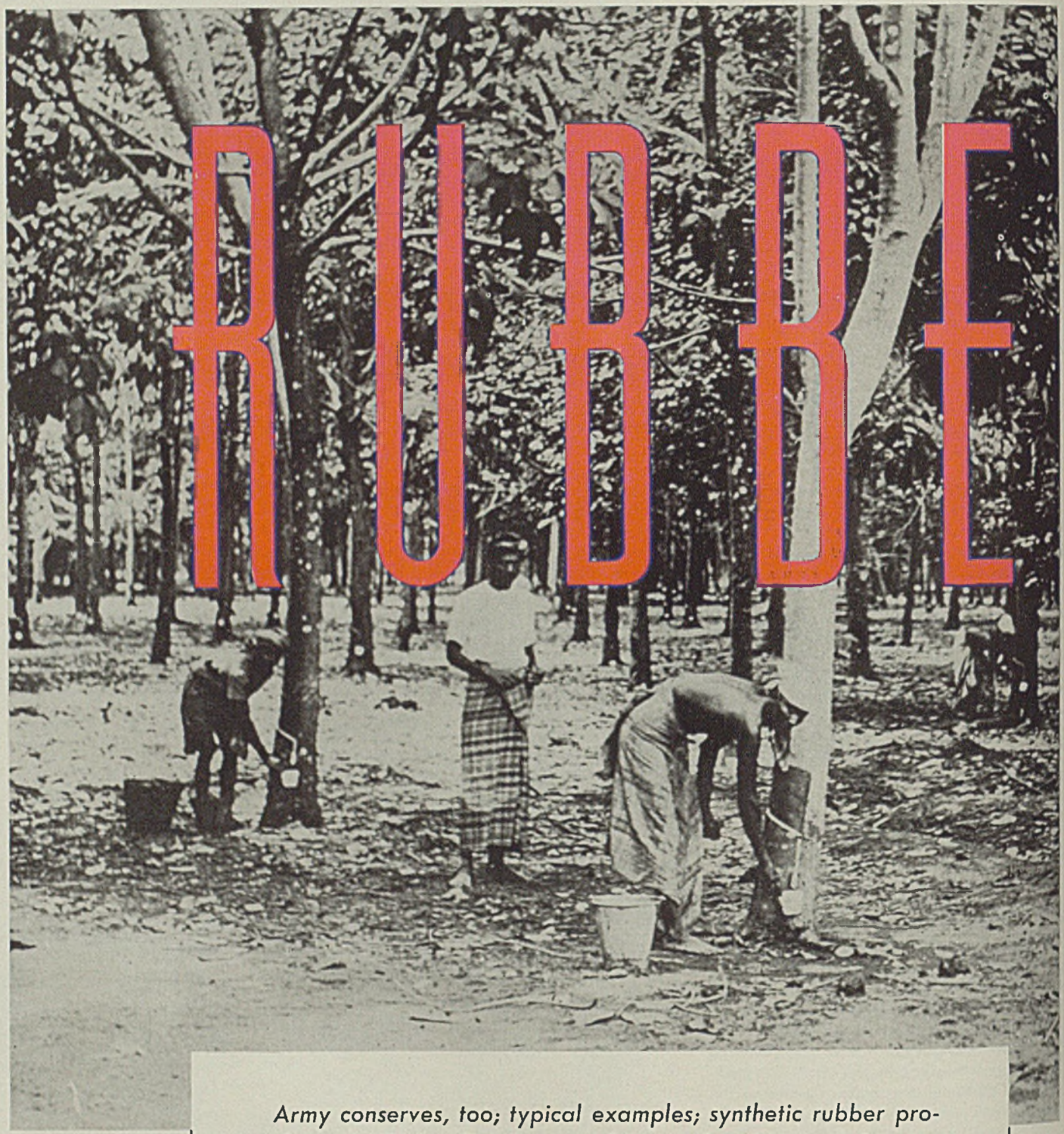


Fig. 3. (*Left, below*)—*Plan and elevation diagram of* 37-*millimeter aircraft cannon mount developed by American Armament Corp., New York. Turret revolves on ring mounted same height as top of fuselage as marked at C. B shows safety member to prevent gun firing on tail assembly*

Fig. 4. (*Right, below*)—*Close-up view of* 37-*millimeter aircraft cannon turret mounted on structural framework for demonstration of operation. Gun not only has complete* 360-*degree horizontal range but vertical adjustment from near straight up to considerably below horizon. American Armament Corp. photos*





RUBBER

Army conserves, too; typical examples; synthetic rubber production; its quality; story of natural rubber; reclaiming processes; how auto transportation is to be maintained

(Section VIII in a Series on Conservation and Substitution in Ordnance Work)

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia, University Station, Va.
And Contributing Editor, STEEL

AMONG the many shortages of critical materials which have arisen as a result of the vast demands of our war production program, none has been so acutely felt as the constriction of our rubber supply. Nor has this been confined to the private user. In the kind of total war in which we are engaged, there ceases to be any sharp distinction between soldier and civilian. Thus the distribution of our dwindling stocks has been and must continue to be governed by national need.

Of the moves which the Army itself has made to conserve this precious commodity we note, for example, the setting of a limit to the amount of crude rubber in each size tire for combat vehicles and reductions in the actual weight, wherever this may be done; the elimination of rubber latex in sateen gimp and fender welt for half-track vehicles; and the abandonment of rubber latex for cartridge clip boxes.

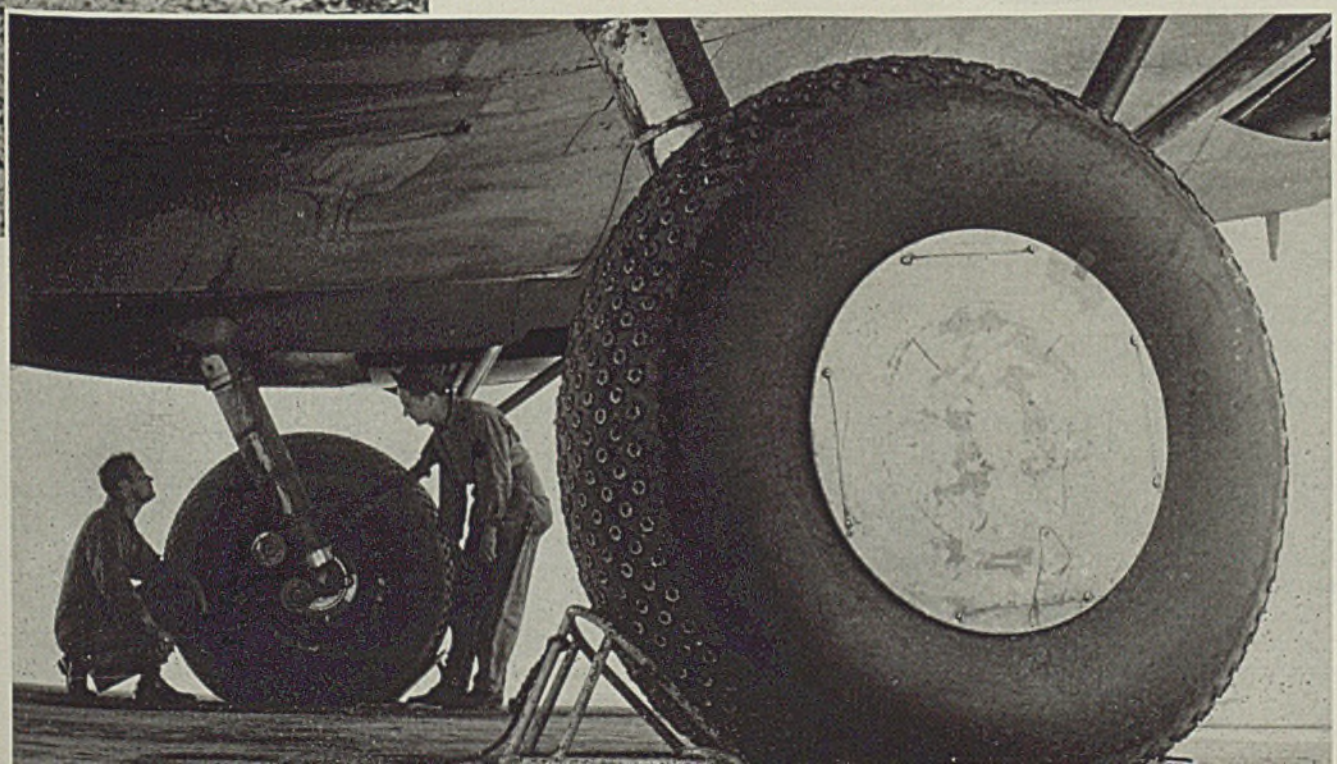
Tires for military vehicles (except certain types of antiaircraft carriages) have been changed from combat tires to regular highway tires—these changes alone being responsible for saving 75,000 pounds of crude rubber this year and an estimated 264,000 pounds in 1943. Further, experimental work is being carried out to use limited-mileage tires for certain types of vehicles which, if successful, will effect additional large economies.

Even such relatively small items as shell grommets have not been neglected. A United States Army Ordnance directive issued early in January of this year ordered that the type of composite rubber-steel grommet then used on 155-millimeter howitzer shell be replaced with one which does not involve the use of rubber.

Among the more radical changes of design necessitated by the cutting of our rubber supply lines has been the substitution of steel in tank tracks (except for bogie bushings). This will, of course, have to be a gradual changeover in order to avoid excessive interference with production. The new tracks may be made of steel stampings, forgings, castings or a com-

Fig. 1. (Left)—A Malayan rubber plantation with natives gathering latex from "rubber" trees

Fig. 2. (Below)—Shown are two very good reasons why civilians must conserve rubber. Our fighting forces must have what they need. And even with the economies being made in those requirements, the rest of us will simply have to get along with less. OWI photo by Palmer



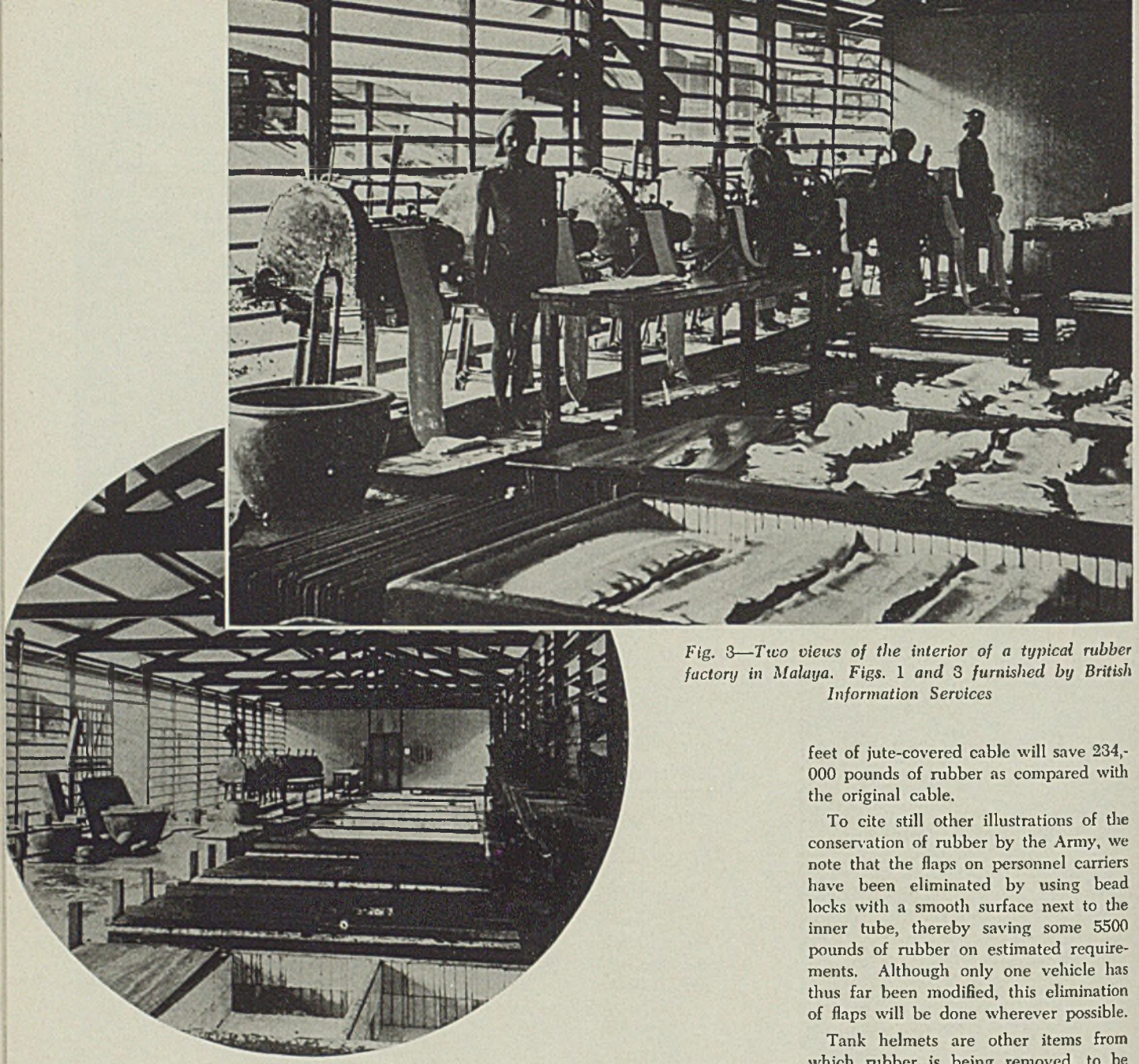


Fig. 3—Two views of the interior of a typical rubber factory in Malaya. Figs. 1 and 3 furnished by British Information Services

posite of partially rolled sections with castings and forgings. All these are being investigated to the end that available facilities may be applied to effecting the change as quickly as possible. Bogie bushings and rollers will still be made of rubber. Other changes affecting the tank include the elimination of rubber latex from crash pads and its use confined to a few essential parts.

The minimum savings in rubber as a result of changes in the design of tank tracks are estimated as follows:

1942 lb.	1943 lb.	
5,000,000	50,000,000	Crude Saved
1,000,000	12,000,000	Reclaim Saved

There will, however, be an increase in the use of synthetic rubber of about 90,000 pounds in 1942; 1,000,000 pounds in 1943.

The ramifications of rubber conservation in Army weapons and devices have spread to remote control systems, fire control instruments and submarine cables. In the first, a considerable amount of rubber is employed in electric cables which cannot, without loss of functional efficiency, be reduced. But it has been found possible to shorten the cables themselves without loss of military effectiveness. Attempts to replace rubber eyeshields with synthetics on fire control instruments have been less successful, the artificial product proving too hard to give adequate protection.

Submarine cables were originally built up with a rubber bedding and a rubber outer serving. Early in April, tentative specifications were prepared to eliminate not only the outer serving but also the outer bedding, these to be replaced with jute or other suitable material such as cotton oristle fiber, which will give a service life in sea water equal to that of jute. This jute covered cable, it is anticipated, will prove even more serviceable than the first design. Each million feet of jute-covered cable will save 234,000 pounds of rubber as compared with the original cable.

To cite still other illustrations of the conservation of rubber by the Army, we note that the flaps on personnel carriers have been eliminated by using bead locks with a smooth surface next to the inner tube, thereby saving some 5500 pounds of rubber on estimated requirements. Although only one vehicle has thus far been modified, this elimination of flaps will be done wherever possible.

Tank helmets are other items from which rubber is being removed, to be replaced with synthetic or plain 100 per cent punched cattle-hair felt. Shortly after Pearl Harbor a number of small arms parts requiring rubber, such as recoil pad, steam condensing device, water chest hose, gasket strips and several other small items were changed from crude to 100 per cent reclaimed rubber. These changes resulted in savings of over 800,000 pounds of crude rubber in 1942 and will save more than 1,500,000 pounds next year.

Even adhesive tape has not escaped scrutiny. Adhesive tape used for ammunition formerly contained 6.5 ounces of plaster mass per square yard. Approximately one-third of this mass—or about 2 ounces—was crude rubber. The plaster mass has now been reduced to 3.75 ounces per square yard and, further, that portion which is rubber consists of 80 per cent reclaimed. This represents total savings of 87 per cent of the crude rubber, together with only

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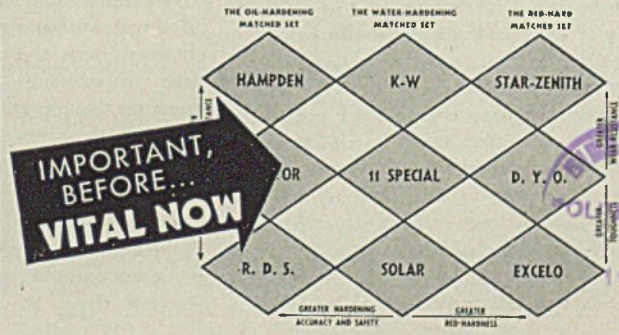


Fig. 4—Pursuing the scorched-earth policy, British forces in Malya burned thousands of bales of rubber, destroyed rubber factories and smashed machinery. Here a rubber factory goes up in smoke. British official photo from British Press Service

50 per cent reclaimed rubber used in replacing the crude. The total estimated savings in crude will be in the neighborhood of 310,000 pounds by the end of this year and 1,360,000 in 1943. The amount of reclaimed rubber required is figured at 160,000 pounds for 1942 and 70,000 pounds in 1943. Further, an extensive investigation is in progress to eliminate entirely the crude rubber required for this purpose.

While soldier and civilian alike can do much to conserve rubber, there is no question but that all such conservation measures merely defer the evil day when we will have no more natural rubber left—provided, of course, the war lasts long enough and we fail to recover old or open up new sources in time. *Thus we are involved in a desperate race between declining rubber stocks and an increase in the supply of synthetic and reclaimed rubber to replace them.*

Out of the welter of confusion and recrimination which has followed the realization of our plight, certain basic facts stand out clearly enough. Among these are certain inadequacies of even a vigorous competitive economy in the face of international brigandage.

Back in 1940 the rubber, petroleum and chemical industries made efforts to convince the government of the desirability of establishing a nationally owned synthetic rubber industry on a scale sufficient to establish plant designs and operating technique and to work out the problems associated with its utilization for important products such as automobile and combat vehicle tires since no legal plan could be worked out whereby free industry could co-operate to this end.

But is was not until May, 1941, that small-scale defense plants for rubber polymerization were authorized without, unfortunately, any provision for the manufacture of the necessary raw materials by means which could be expanded. Before we awoke to the implications of the attack on Pearl Harbor, synthetic rubber was principally required for such purposes as could be better served by the oil and solvent-resistant characteristics of the artificial product.

These included chemical tank linings, gasoline hose, oil gaskets, motor mounts and the like for which Neoprene and Thiokol had been used until the appearance some years ago of the Buna-type rubbers at the hands of the rubber companies and, later, Standard Oil.

However, these are not the most suitable or economical rubbers for such applications as tires, where resistance to oil is unnecessary. Buna S, a combination of butadiene and styrene, is perhaps the most easily available of the group, has the lowest immediate cost and is nearest to natural rubber—so let's examine this material in detail.

At ordinary temperatures, butadiene is a gas which can be prepared in various ways—as, for example, from ethyl alcohol produced from grains, molasses, potatoes and the like. However, with crude oil abundant, butadiene will probably be obtained from this source by modifications of existing techniques affecting pressures, temperatures, catalysts, cycles and so forth.

The other basic ingredient is styrene. This is a liquid at normal temperatures, made by combining ethylene with benzol. Ethylene, a by-product of petroleum processes, can also be made from alcohol. Granted these two essentials, the co-polymerization by means of which the chain-like molecules of synthetic rubber are built up is accomplished by mixing butadiene, styrene, water, a catalyst and an emulsifier in a large vessel and agitating the mixture at the desired temperature and pressure for several hours. The resultant product is Buna S rubber. It is not unlike the milky latex obtained from the rubber tree and may be coagulated in much the same way by the use of an acid. Further, it has the appearance and many of the physical characteristics of natural rubber and can be filtered, dried and baled for transport.

In answer to the inquiry as to how soon synthetic rubber may be available in quantities which will ease the situation for the private citizen, it may be said that the present program calls for the provision of facilities having a productive capacity of around a million tons annually (principally of Buna S) by the end of 1944. Note that none of this is likely to be available for ordinary civilian use for two years. Meantime, four of the large rubber companies have plants of 15,000 to 30,000-ton capacity which are now, or soon will be, in operation.

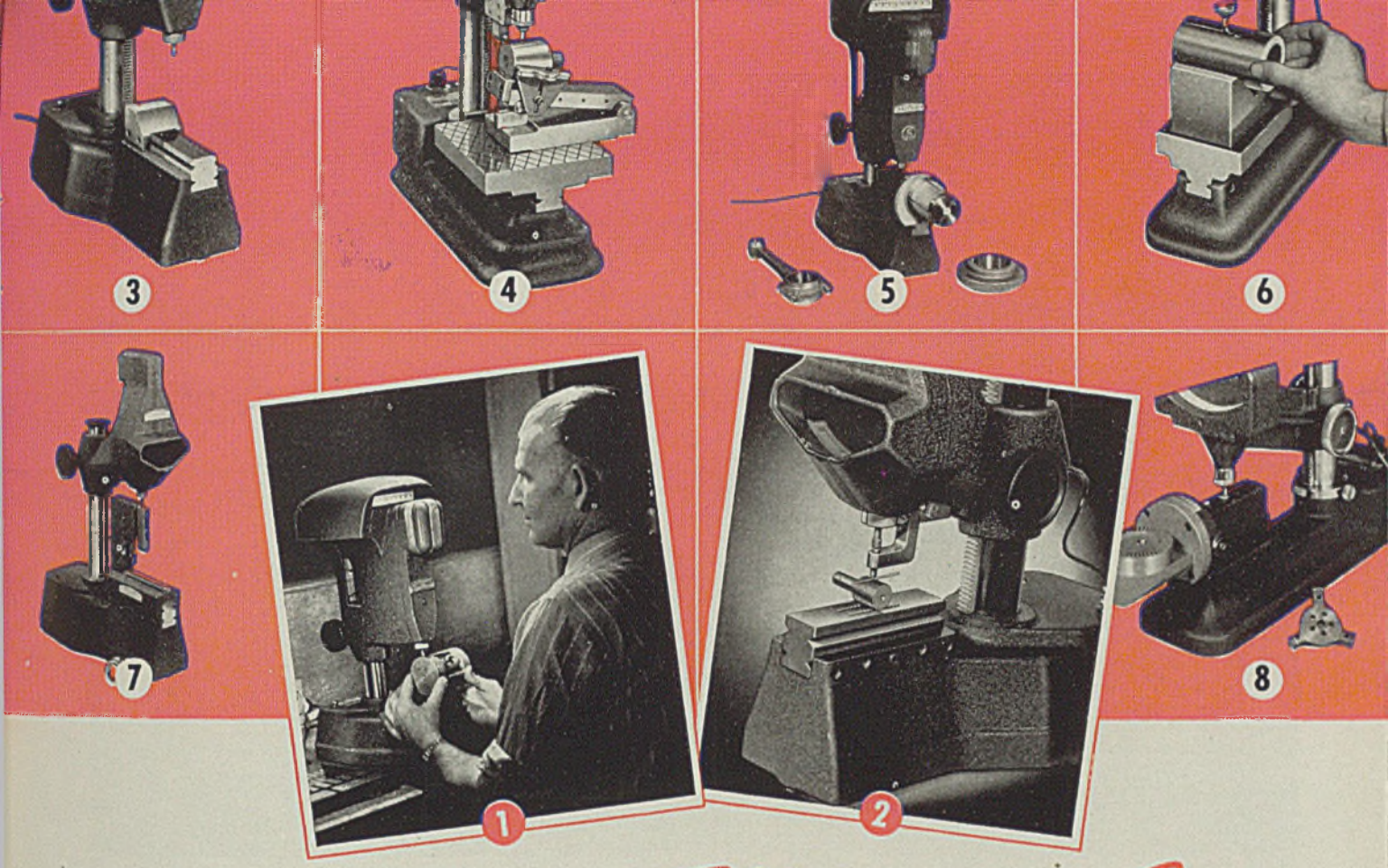
Thus, although not more than some 25,000 to 30,000 tons can be expected by the end of this year, well over a third of a million will be available next year and around three-quarters of a million by December, 1944. However, fighting services and civilians alike will be obliged to practice economy in the use of rubber for some time to come if our commitments under lend-lease are to be met.

It should be emphasized that synthetic rubber facilities cannot be created overnight. The production of one ton requires large amounts of power and 90,000 pounds of steam. Further, we have to provide one ton of refrigerative capacity for every ten tons of annual production capacity of synthetic rubber.

Next in importance to the civilian auto owner is the question as to whether the artificial product will answer his purposes satisfactorily. While it is rather early to answer this question definitely, there is reasonable assurance that it will. Indeed, in some respects it will be superior.

For instance, Buna S rubber resists abrasion better than natural rubber and suffers less deterioration from the effects of sunlight, ozone, oils, etc. Then, too,

(*Please turn to Page* 119)



ARE YOU GETTING *Maximum Service* FROM YOUR VISUAL GAGES?

1. Equipped with plain and serrated anvil for the checking of width, thickness, height, or outside diameter.
2. Equipped with flat anvil and thread wire attachment for checking pitch diameter of screw threads.
3. Equipped with standard backstop for accurate and rapid positioning of work being gaged.
4. Equipped with wide anvil and Sheffield sine bar fixture for the checking of tapers.
5. Equipped with Sheffield Internalgage for the checking of inside diameter, taper, and out-of-round.
6. Equipped with wide anvil and V-block for checking outside diameter of cylinders and bushings.
7. Equipped with fixture to check ball diameter of an inner ball race.
8. Internalgage with fixture to check a depth.

The Sheffield Visual Gage is used for many purposes. If you are not familiar with all of them, the outline here may suggest a means of increasing the effectiveness of your gages and the variety of work they do.

Sheffield Visual Gages are used:

In the Inspection Department

For the final inspection of close tolerance manufactured parts.

For the classification of such parts as the basis for selective assembly.

In the Tool Room

To check fixed size gages for wear.

To check precision gage blocks for wear.

To check the dimensional accuracy of tools.

In the Production Shop

To provide machine operators with an accurate check on work in process.

In the Receiving Department

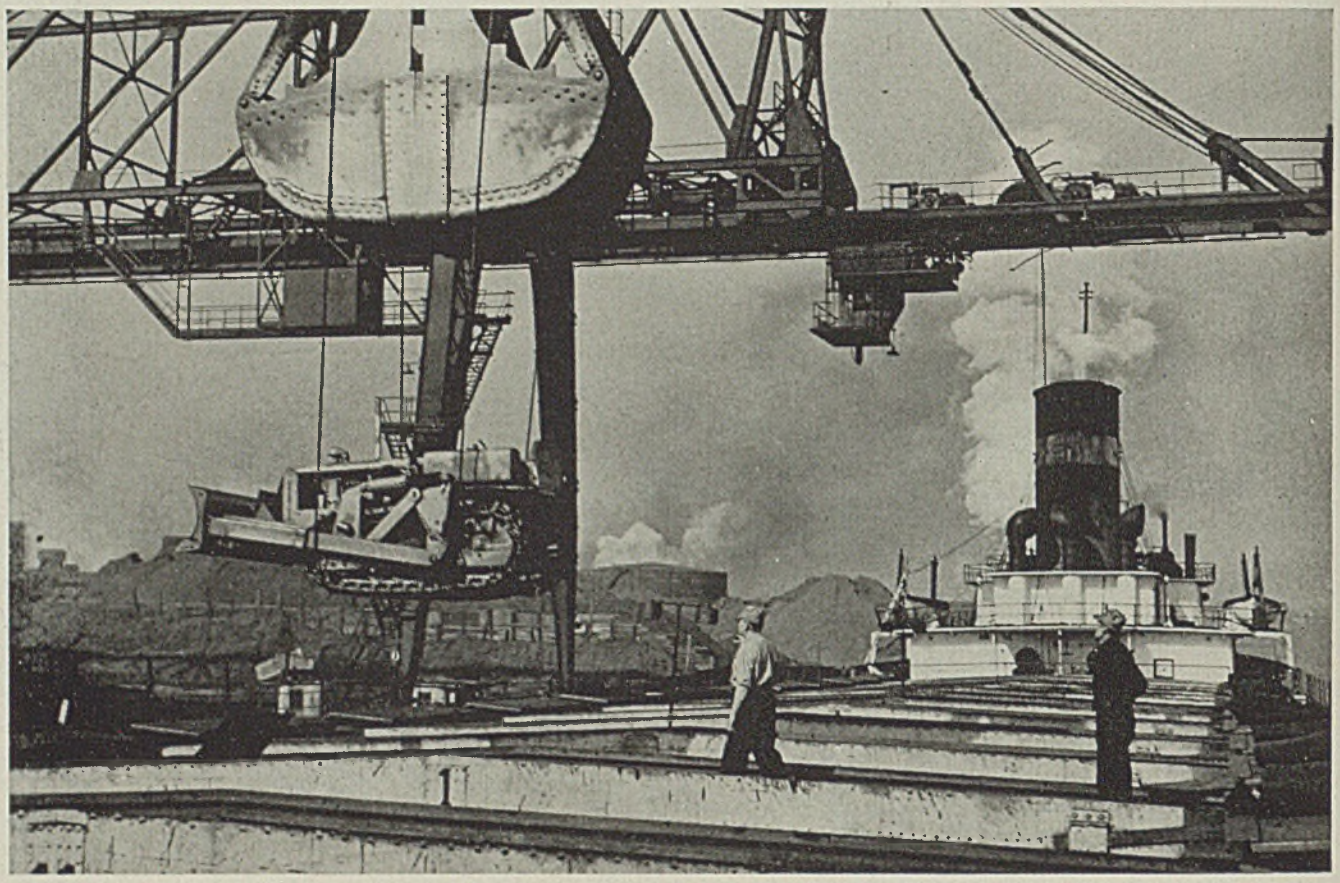
To check dimensional accuracy of purchased parts and sub-assemblies on arrival.

In the Laboratory

To provide maximum accuracy for measurements of all kinds.

THE SHEFFIELD CORPORATION

SHEFFIELD GAGES



Speeds Unloading

. . . . of ships, thereby permitting more trips per season

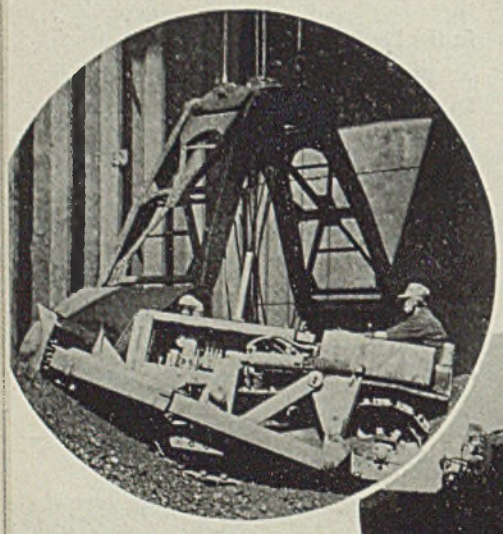
IN TIME OF WAR, truly each hour lost is more important than ever, especially on such operations as loading and unloading ships where every hour gained can mean more trips and more cargo hauled per season.

Typical of the many shortcuts being utilized to speed loading and unloading operations is a scheme employed by a large industrial plant on Lake Ontario in Canada this year to save between 1 and 3 hours in unloading and cleaning up the holds of coal boats. A Caterpillar diesel D-4 tractor equipped with a bulldozer is lowered into the holds of the coal boats by means of a sling hooked to the unloader as shown in Fig. 1. This sling makes it easy to transfer the tractor and bulldozer quickly from one hold to the next.

When lowered into the hold, the bulldozer is employed to push the coal into piles so it is possible to utilize a 12-ton digging clamshell bucket throughout the entire unloading operation. Previously it had been necessary to follow the 12-ton bucket with a 6-ton clean-up bucket. But with the tractor and bulldozer on the job, use of the clean-up bucket is curtailed.

What this means in unloading time amounts to 1 to 3 hours per boat. This in turn enables the coal boats to make more trips per year with their precious cargoes.

In addition, the industrial plant uses a large D-7 tractor with a bulldozing blade to level and compact stock piles of coal as shown in Fig. 3. This not only makes it possible to stock more coal than would otherwise be possible but at the same time permits it to be banked and moved about to reduce the fire hazard and to eliminate fires when they do occur.



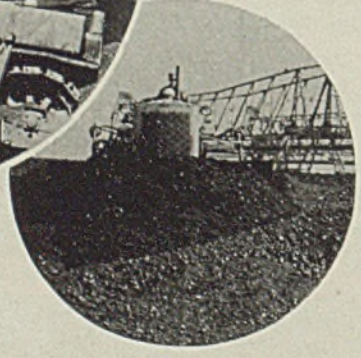
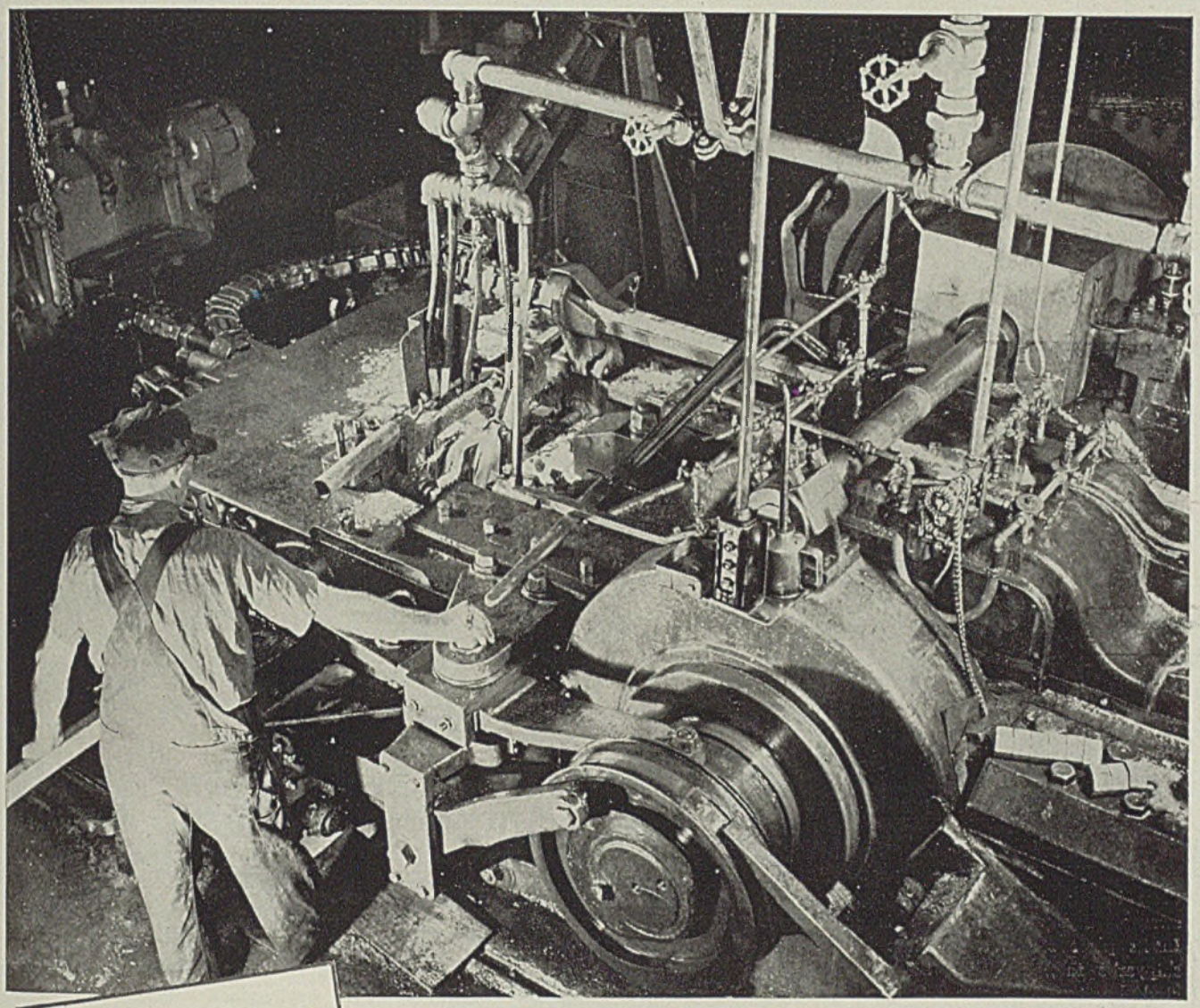


Fig. 1. (Above)—Caterpillar tractor with bulldozer attached is easily moved in and out of the ship compartments by cable slings from the unloader as shown here

Fig. 2. (Far left)—Ore and coal cargoes are cleaned out efficiently by utilizing the bulldozer to pile up remnants, thus allowing the big 12-ton bucket to be used for all operations with consequent savings of 1 to 3 hours in unloading time

Fig. 3. (Immediate left)—Stockpiles can be leveled and compacted, too, for this big "dozer" really "pushes it around". All photos furnished by Caterpillar Tractor Co., Peoria, Ill.



Repunching (an exclusive RB&W process) clears out strained and torn surfaces left from the first punch—and makes possible perfect fit and easy tightening of RB&W nuts. It also prevents use of defective metal, for a nut made from piped or seamy bar will split when re-punched.

Extra punch in the jaws of metal juggernauts

"DEFENSE" — "Numerical Superiority" — "Sheer Weight of Men and Metal" — are *not* winning the war.

It's generalship of attack, with better equipment better fitted to its specific tasks, that must put the *extra punch* into our mechanized combat teams.

Here at R B & W, we're putting a *qualitative plus* into the bolts and nuts that war plants today are buying by the train load, a plus that enables war equipment to be assembled *faster* with accurate, clean-threaded R B & W fasteners.

R B & W's three great plants — its one-purpose nut plant at Coraopolis is the only one of its kind in the world — assure tremendous output to fill the assembly needs of the tanks and tractors, bridges, mining and farming equipment that make and keep America strong.

But even more important, we feel, are the special R B & W processes—one of them illustrated above — which toughen and make accurate the R B & W products which must be both fit for the fight and quick to assemble.

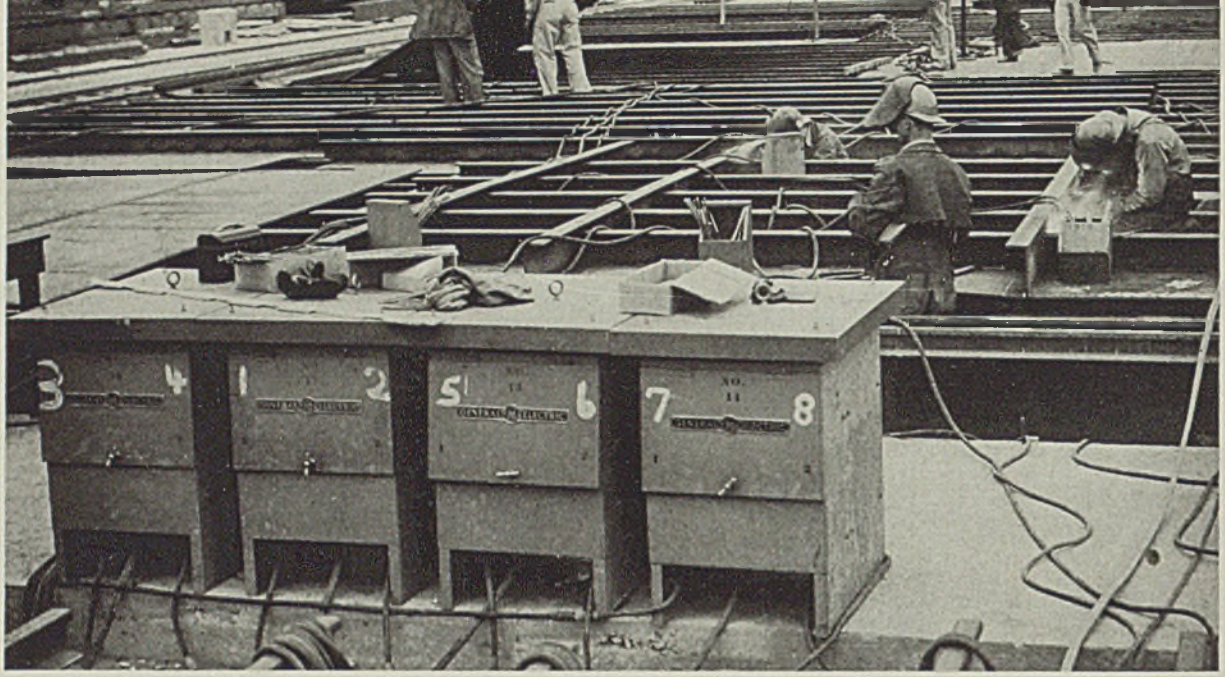
Russell, Burdsall & Ward Bolt and Nut Company. Factories at Port Chester, N.Y., Rock Falls, Ill., Coraopolis, Pa.; sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle.

RB&W **RUSSELL, BURDSALL & WARD**

Making strong the things that make America strong

BOLTS EMPIRE NUTS·RIVETS

AND ALLIED FASTENING PRODUCTS...SINCE 1845



How to get

MAXIMUM UTILIZATION

from your arc welding equipment

By G. W. CURRY
Industrial Department
General Electric Co.
Houston, Tex.

A LITTLE MORE than a year ago, deep in the heart of Texas, stood a swamp. Today that swamp is gone. In its place stands one of the busiest shipyards in the United States, operated by the Houston Shipbuilding Corp. at Irish Bend Island, Tex. Like many others erected during the past year, this yard has been placed in operation to build Liberty ships for the United States Maritime Commission.

According to recent production reports this yard stands well up among those meeting the all-time-high Maritime Commission production schedules.

A complete history of this amazing transition from swamp to ships would make another inspiring story of ingenuity, imagination and perspiration. It would pay tribute to the vision responsible for having all operations laid out on a straight-line production basis from steel plate to finished hull. It would recognize the perspiration of thousands of men who quickly erected the yard facilities — and of the other thousands who now keep the yard operating three shifts a day, seven days a week, to launch a Liberty ship every Sunday.

Also important in the record would be a tribute to the ingenuity with which the capacity of the yard has been doubled and redoubled to meet greatly increased production schedules, even in the face of serious power and equipment shortages. *In fact, ways in which arc welding equipment has been made to do double-duty or better may suggest ways in which other fabricators can get more production out of available welding machines.*

Briefly, the practices followed by the Houston Shipbuilding Corp. to get maximum utility from its welding equipment with the minimum expenditure of time and power may be summarized as follows:

I. All welding equipment is portable or semiportable, thus permitting a rapid movement of equipment as the location of the welding load progresses.

2. Many 200-ampere direct-current single-operator arc welders are mounted

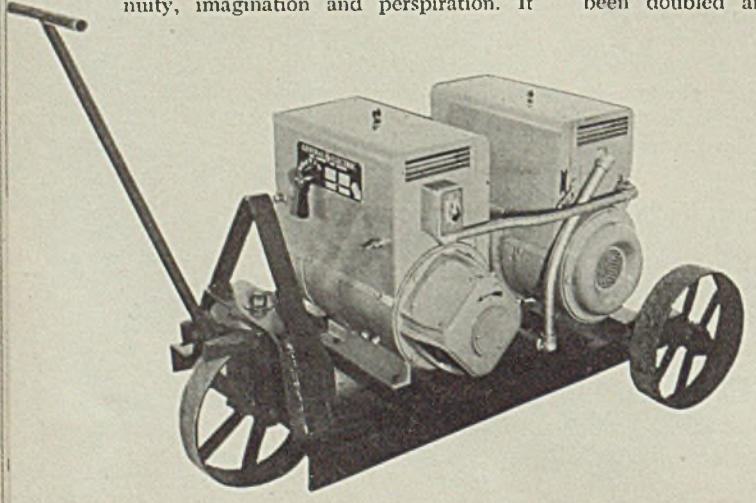


Fig. 1. (View above)—Welding circuit control stations used in conjunction with multiple-operator arc welders are arranged to provide a maximum of 200 amperes to each of two operators or 400 amperes to a single operator

Fig. 2. (Left)—Direct-current arc welders of the single-operator type mounted on a common running gear and arranged for parallel or individual operation permit a guide change from tacking duty to heavier duty, or vice versa, as the character of the welding load changes

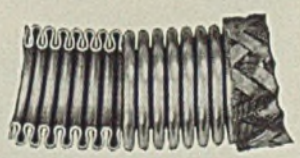
21 INCHES OF FLEXIBLE METAL HOSE PROTECT HIS LIFE

Instead of conveying oil, steam, gas or water, here flexible metal hose houses a parachute ripcord, protects it against mechanical injury, might save a man's life.

Using practically any workable metal, we can build flexible metal hose or tubing for anything from a simple oil can spout to a high pressure *seamless* hydraulic line that can be flexed millions of times without failing . . . a line that will give you the flexibility of garden hose, the dependability of metal and the *strength of rigid pipe.*

Could it be that some type of this hose or tubing is the "missing link" you have been looking for?

42189



American "Seamless", no seams, welds or joints... pressure tight as the metal tube from which it is made.

American "Interlocked", most rugged type of hose... full interlocked joints are packed for pressure tightness.

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn. • *Subsidiary of Anaconda Copper Mining Co.*
In Canada: Anaconda American Brass Ltd., New Toronto, Ontario

American Metal Hose

ANACONDA

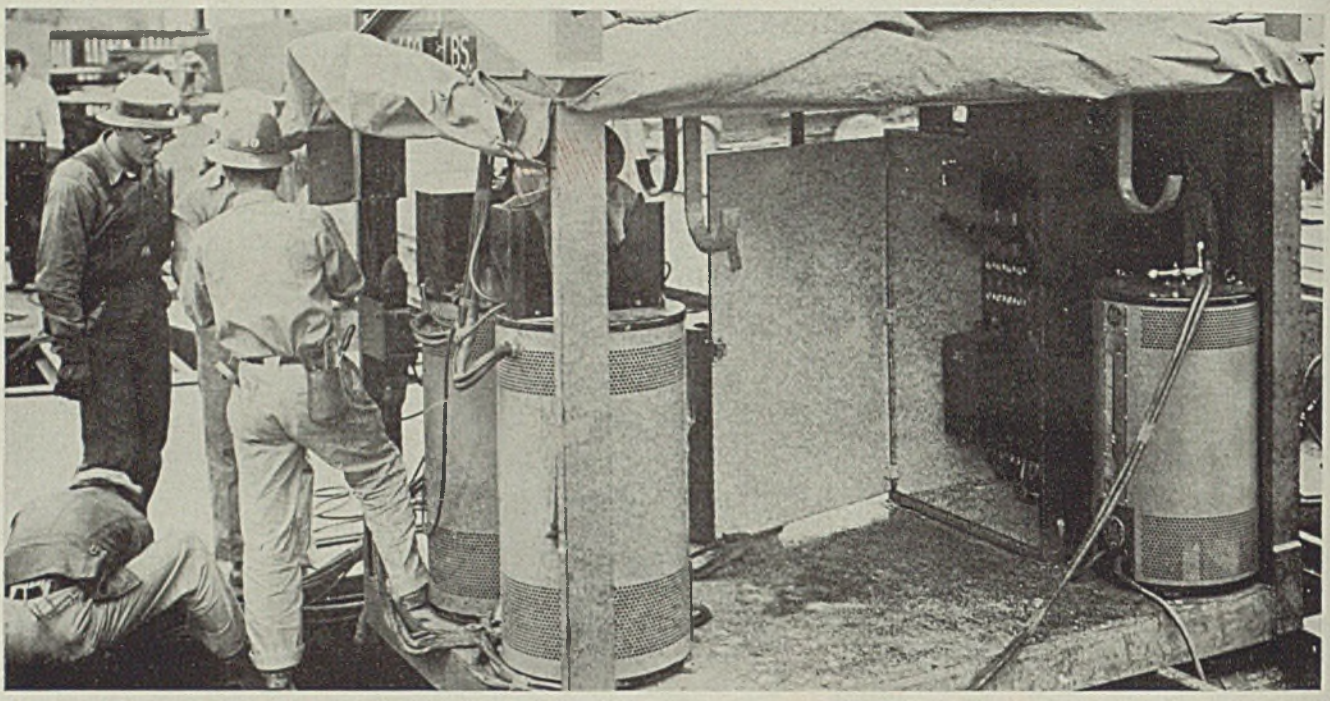


Fig. 3—Heavy current for Unionmelt welding is furnished by alternating-current 500-ampere arc welders. Similar 300-ampere units are used for tacking and for the backing-up bead on Unionmelt work. Note frame and cable slings for moving unit where wanted quickly

in pairs and arranged for quickly changing from individual to parallel operation or vice versa. These sets are used singly for tacking and in parallel for heavy, high-duty welding.

3. Many direct-current single-operator arc welders of the 400-ampere size are arranged so that they may be used as multiple-operator equipment, furnishing current for tacking to as many as six operators.

4. Constant-potential multiple-operator arc welding equipment is applied to low duty-factor work in so far as possible, thus serving the maximum number of operators with minimum power drain.

5. To minimize both kilowatts used and kilovolt-ampere demand, current for Unionmelt welding is supplied by transformers having built-in power factor correction. For the same reason, all the constant-potential multiple-operator arc welders are driven by 80 per cent power-factor synchronous motors.

To speed construction, hulls are prefabricated in subassemblies on the layout slabs where the large majority of welding can be done in the flat or horizontal positions. Due to limited steel mill capacity for rolling sheared ship plate, strip-mill steel has had to be substituted extensively. Although less expensive, it is also of narrower width; hence, it requires more welded seams per ship.

However, due to the high efficiency and power factor of the transformers used in Unionmelt welding, overall costs are no greater than if wider plates were available. Power requirements are further alleviated by the use of alternating-current arc welders, 300-ampere size, with built-in power-factor correction for other heavy manual welding.

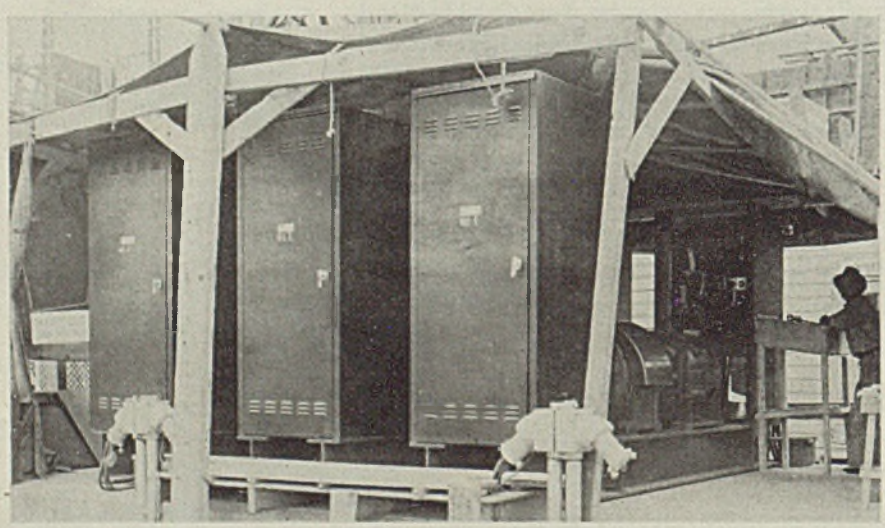
As each subassembly takes shape, it progresses along the layout slab where all available welding equipment is put to work tacking and welding as rapidly as possible. Since practically all welding equipment is portable and suitable for both tacking and welding, maximum utilization is realized at all times.

Subassemblies thus take shape rapidly until they are completed or *reach a weight of as much as* 50 *tons,* whence they are lifted onto the shipways and welded in place. It is on the shipways that the welding duty factor tends to be lowest, hence multiple-operator equipment is employed for this work insofar as possible.

Due to the urgent need for shipway capacity, "Libertys" are launched as fast as hulls are completed, practically all outfitting being done in the outfitting basin.

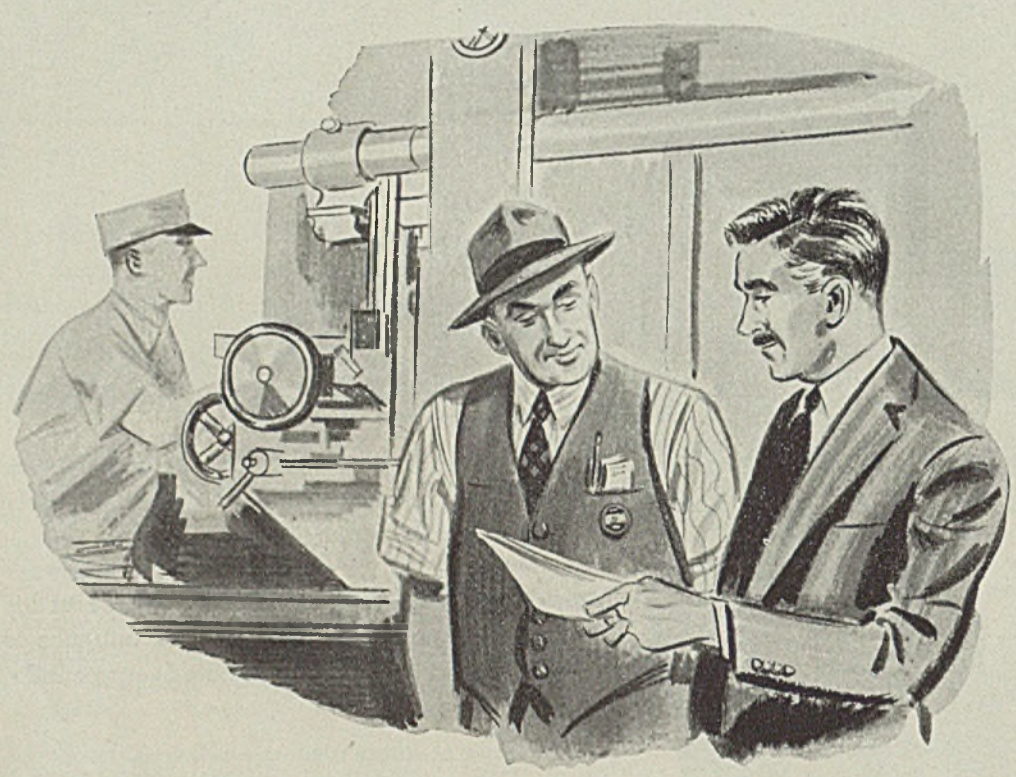
Arc welding electrodes are kept in perfect condition, pending use, in an electrically heated storehouse which keeps the temperature a degree or two above the ambient to prevent moisture condensation.

Fig. 4—Semiportable multiple-operator arc welders of the 1500-ampere size are used principally where they can serve many operators working at relatively low duty factor. They can be moved about by crane




WHERE'S YOUR SCRAP?
Every reader of this publication knows of the nation-wide salvage campaign now in progress. But perhaps you have not fully realized its seriousness or its size.
In iron and steel alone, our immediate military needs require 6,000,000 tons of scrap over and above the regularly available supply.
You as an individual have an active interest and a vital part in the success of this drive. Each reader has this double obligation:
1. As a private citizen, he must scour his home from basement to attic, from front entrance to back fence, to round-up and contribute every pound of useless metal.
2. As a business man or employee, he must exert all his influence to see that his company or employer contributes everything possible to the campaign.
The scrap is rolling in. But NOT ENOUGH. Six million tons of extra steel scrap are not to be found on the front doorsteps of America.
To do your part to keep munitions going to the fighting fronts, contribute ALL the scrap you can muster.
THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN, OHIO
QUALITY
YOUNGSTOWN
SERVICE

He isn't in **UNIFORM**



. . . but the **Industrial Gas Engineer**

plays a vital role in war production

We call him an industrial Gas engineer—because his main job is to help industry to get the utmost efficiency and speed out of gas and modern gas equipment.

He doesn't stand alone—no matter in what city or plant you find him. For behind him are the vast research and engineering resources of the whole Gas industry . . . the industrial heat developments of more than 20 years . . . the close contact between companies whose industrial customers face like problems.

Now that we are in a war that has to be won . . . that calls for faster production of war materials . . . often for unbelievable precision in things the plant never saw before . . . our industrial Gas engineers are spending their days and nights right on the production line, doing a vital war job.

Call for their services . . . if your plant needs help on an industrial heating problem.

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVE., NEW YORK

THE TREND IS TO GAS
FOR ALL
INDUSTRIAL HEATING

MANAGEMENT "KNOW-HOW"

* *improves military equipment*
* *saves critical materials*
* *shortens deliveries*
* *reduces costs*

GETS 15 PER CENT MORE WELD METAL for same electrodes: General Motors butt welds a 3-inch length of common steel to the end of every arc welding electrode before it is used. This allows ALL of the welding rod to be deposited as weld metal. No longer is it necessary to waste 2 to 3 inches of valuable alloy metal as a stub end.

If every arc welding shop employed this scheme, our welding rod would deposit 15 per cent more weld metal. Or we could cut our consumption of welding rod 15 per cent and lay down the same amount of weld metal. Saving 15 per cent of the valuable alloy metal in our welding rods is a vital contribution to the war effort every welder can make. Are you doing it in your shop?
General Electric Co. photo

APPLICATION to the war production effort of all the skill and management "know-how" acquired by General Motors through many years of manufacturing experience is resulting in the conservation of thousands of tons of critical materials, in important savings in man-hours (thus releasing men and machines for further vital work), in sharply reduced costs, in the organization of new methods in maintenance and service and in substantial contributions to an advancing military technology, states Alfred P. Sloan Jr., chairman of the corporation.

Mr. Sloan says that production rates have been accelerated, engines have been increased in horsepower, guns have been simplified and given longer life, and improvements have been made in tank construction, in airplane propeller design and in the manufacture of shell. New devices have been developed, new characteristics built into old devices. Meanwhile, a sound basis has been established for continued advance in war production techniques.

Acknowledging "the generous co-operation of other manufacturers and of Army and Navy technicians, without which much of this progress (in General Motors) would not have been possible", Mr. Sloan cites results obtained in the manufacture of one type of machine gun as illustrative of the approach. Some typical accomplishments in achieving the objective of not only more and more weapons, but better and better weapons in the technical sense, follow:

Mass production begins with planning, involves the attainment of complete interchangeability of parts and, finally, requires the introduction of progressive processing and assembly. In the case of the machine gun example, it became possible through changes in manufac-

(*Please turn to Page* 124)

Scrap could

TIP TO EXECUTIVES

If you find it difficult to decide when to scrap idle equipment or materials, this is a safe rule to follow:

"If it hasn't been used for the last three months and no one can prove it can be used in the next three—find a use for it or scrap it."

★ ★ ★

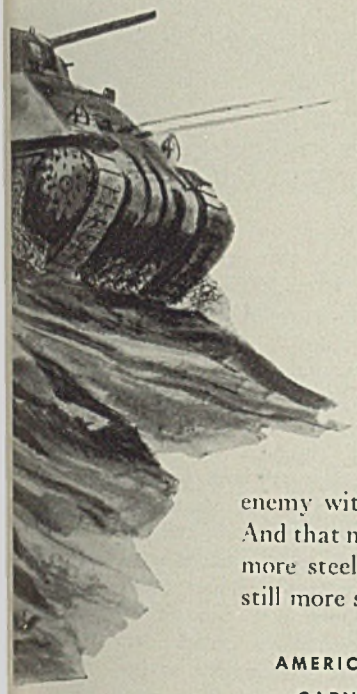
UNITED STATES

mean the difference

BETWEEN DEFENSE AND ATTACK!

Do you know how much steel it will take to overpower and defeat our enemies?

FEW men can even guess. But this we know. Every medium tank that leaves Detroit takes another 28 tons of steel. Every new cargo ship takes another 3500 tons. Every heavy cruiser that joins the fleet takes 6600 tons for its hull alone. The total adds up *fast!* And every additional ton that mills deliver to war industry accounts for another 1000 pounds of scrap.



It's plain that the price of Victory in terms of steel will be much more than we have been paying. Our fighting forces can't out-slug the enemy without superior equipment. And that means more steel—and still more steel. And more scrap — and still more scrap.

Our industry can produce even greater tonnages of steel. But we must continue to count on steel-working industries as one of our biggest and steadiest sources of scrap. You've been doing a grand job. But we ask you to dig deeper for an even *greater* tonnage of scrap from your shops, yards and storerooms.

Does it sound impossible? Scrap miracles are being wrought every day throughout the country. You can perform miracles in *your* salvage campaign by enlisting all your employees as "scrap spotters" — eliminating red-tape on decisions to scrap dormant equipment—making the most of proved systems for sorting and segregating salvaged metals. It will take both plugging and ingenuity.

The urgency of the need for scrap has put everybody into the steel business. It's up to the whole American team to see that a shortage of scrap doesn't keep our fighting forces from launching the attack when and where it will damage our enemies most. So keep your scrap coming!

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
NATIONAL TUBE COMPANY, *Pittsburgh*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
Scully Steel Products Company, Chicago, Warehouse Distributors

USS

STEEL

MOLYBDENUM

Mining and concentration methods; common molybdenum-bearing minerals—molybdenite, wulfenite, powellite; molybdite; deposits producing molybdenite in 1942; deposits in the United States, in other countries

(*Concluded from Last Week*)

MINING and Concentration: Space does not permit a complete survey of methods of mining and concentration of molybdenite. A few references as to mining methods are given under the summary of the Climax, Colorado, and Questa, New Mexico, deposits.

The methods are comparable with those of other sulfides, and are dependent on the size and form of the orebody. At Climax, with a large orebody, a system of underground caving has been developed; at Questa, with small veins, the mining is more selective and typical for small high-grade veins.

Flotation of molybdenite is a relatively simple metallurgical operation; and its separation from copper, considered difficult until recently, has been successfully carried out in the United States, Mexico and South America.

The similarity in methods of mining and concentration and resulting costs makes it possible to determine the potential value of an occurrence of molybdenite and by the same engineering methods of evaluation used in the examination of deposits of gold, silver copper and other metals. If full use were made of this fact by those searching for molybdenite deposits, much energy could be saved and unnecessary disappointments could be avoided.

Common Molybdenum-Bearing Minerals: Molybdenite (MoS_2), is a relatively common mineral in spite of the usual reference to molybdenum as one of the rare elements. Well over 99 per cent of the world's production and known reserves of molybdenum have been and are in the form of molybdenite.

Molybdenite is a soft, shiny, dark, galena-gray mineral, which occurs in tabular six-sided crystals that are easily identified when found in larger grains. Fine-grained molybdenite is easily confused with any one of the several black metallic minerals and with graphite. even coarser varieties of graphite are commonly mistaken for molybdenite.

Identity can be established through a combination of the following physical features: (1) A shiny galena-gray, almost black color with a bluish-black cast; (2) a greenish-gray to greenish-black streak on glazed porcelain or a glossy paper surface; (3) hardness, very soft; (4) a somewhat greasy feel; (5) crystal form, six-sided tabular (although the mineral may occur massive and without form); (6) flexible but not elastic plates; and (7) high specific gravity.

Molybdenite crystals several inches across have been found; but the most common grain size is well under an inch, with the tabular six-sided form usually a little better developed in the smaller sizes. Occasionally masses of molybdenite weighing several hundred pounds are found. As regards coarse massive molybdenite, the color, with a bluish-black cast and greenish streak on porcelain, is sufficient to identify the material.

Although the physical properties are sufficient to identify molybdenite, the chemical tests described earlier are a desirable verification. With fine grained material the physical properties cannot always be established, and chemical tests are the only recourse.

The mineral most commonly mistaken for molybdenite is graphite. The chief difference is in color. Graphite is shiny black on the platy crystal surfaces to earthy black in the fine-grained varieties; whereas molybdenite has a bright shiny luster with a bluish cast, even in powder form. Seen side by side these differences are marked but difficult to describe. The streak made by graphite on porcelain is a dull gray, like that of an ordinary soft lead pencil; whereas a streak of molybdenite has a greenish cast. Also, graphite has a much lower specific gravity than molybdenite

Roasting Effective Test

A relatively simple test for distinguishing graphite and molybdenite is by roasting either with a blow pipe or in an open fire. Molybdenite oxidizes to a white or yellowish-white powder, giving off SO_2 fumes. Graphite does not fuse and is unaffected by ordinary temperatures, retaining its appearance to red heat; at higher temperatures it may burn without leaving any residue.

Finally, if exploration leading to mine development is considered of any molybdenite deposit, it is advisable to consult a reputable assayer, who has had considerable experience with molybdenum analyses. Reliable methods of analysis have been worked out, and they are not overly complicated; but, as with all highly technical procedures, considerable experience is required to assure dependable results.

Wulfenite ($PbMoO_4$) is found in the oxidized parts of lead deposits in many places throughout the world. During the first World War, and earlier, it was an important source of molybdenum The tremendous increase in molybdenum production has been in the utilization of molybdenite, so that today wulfenite is of minor importance, even though on a tonnage basis as much may now be produced annually as in 1918. The known reserves of wulfenite are small, and it is doubtful that the present rate of production of wulfenite in the United States as well as in central Europe and Russia will be maintained after the present war.

Wulfenite is a nonmetallic mineral characterized by red, orange, yellow, gray, and white colors; yellow to orange-yellow being most common. It usually forms thin square to prismatic crystals, but wulfenite may also occur massive without crystal form. The mineral is brittle, soft (2.75-3), and fuses below 2. It has a specific gravity of 6.7-7.0 and is easily concentrated by panning.

Wulfenite is found in the oxidized parts of lead deposits. Its origin is not well understood, because the source of molybdenum has not been found.

Occurrences of wulfenite are too numerous for a complete review, and only a few which seem to bear on its origin are given. All accounts without exception place wulfenite in a zone of advanced oxidation where sulfides are wholly lacking or are present as isolated remnants. The mineral is common in Arizona, New Mexico, South America, northern Africa, Spain, central Europe and Russia.

Powellite ($CaMoO_4$) is not a source of molybdenum, except possibly in a minor way in the recovery of scheelite for tungsten. As a mineral it is inconspicuous and easily overlooked. The author's experience has been that powellite is more common, at least in small quantities than is generally realized.

Powellite occurs as minute, yellow, tetragonal crystals, possibly of primary origin, and earthy or platy pseudomorphs

(*Please turn to Page* 126)

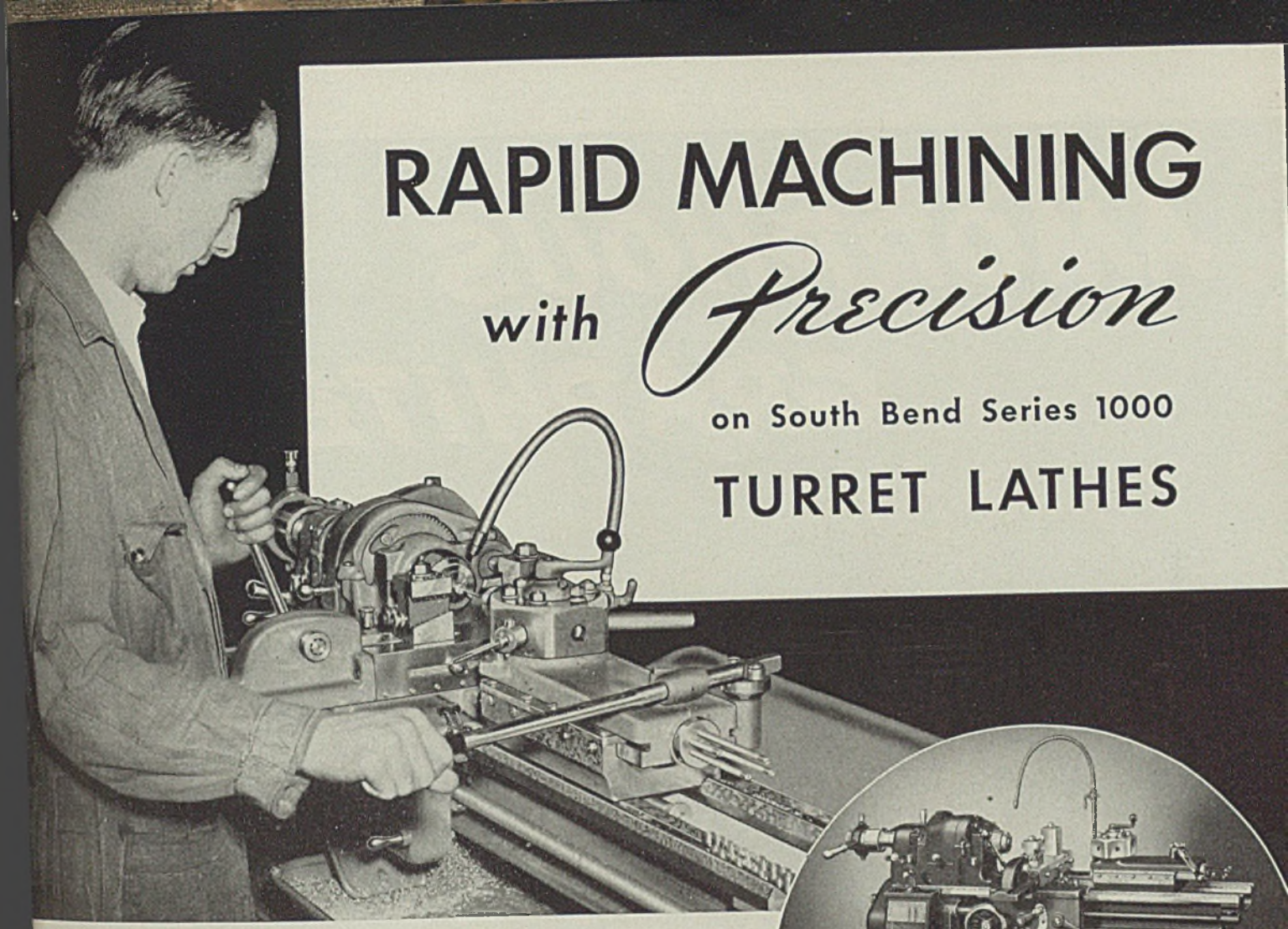
Abstracted from *The Occurrence and Production of Molybdenum*, by John W. Vanderwilt, special lecturer in geology, Colorado School of Mines, Golden, Colo., and consulting geologist, Denver; published by Colorado School of Mines.

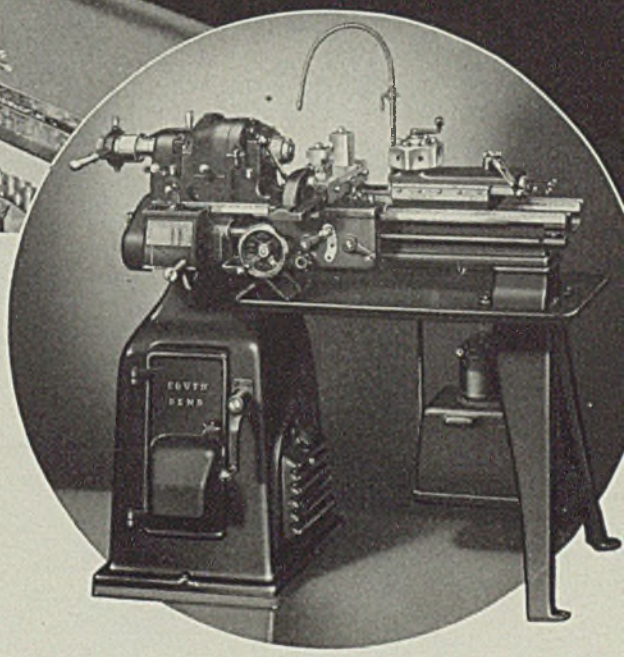
RAPID MACHINING

with *Precision*

on South Bend Series 1000

TURRET LATHES





RAPID machining *with precision* is easily accomplished in shops that are equipped with the new South Bend Series 1000 Turret Lathes. Designed for manufacturing small accurate parts, they have the stamina to maintain exact tolerances on volume production without sacrificing speed or versatility.

These Turret Lathes are especially suitable for second operation work. The basic South Bend features that insure efficient production are supplemented by the handlever operation of the turret, cross slide, and collet attachment to speed up machine operation and lessen operator fatigue.

★

UNIVERSAL CARRIAGE
Provides wide variety of feeds for efficient production work — 48 power longitudinal feeds — 48 power cross feeds — 48 precision thread cutting feeds, 4 to 224 per inch.

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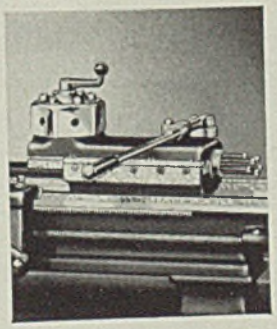

★

HANDLEVER TURRET
Permits rapid positioning of turret tools. Turret indexes automatically on the return stroke. Equipped with adjustable stop for travel of each of the six tool positions.

★

SPECIFICATIONS

Hole through spindle	1⅜"
Collet capacity, round	1"
Swing over bed and saddle wings	10⅛"
Spindle speeds, (twelve)	50 to 1357 r. p. m.
Effective feed of turret slide	4"
Thread cutting range, (48 threads)	4 to 224 per inch

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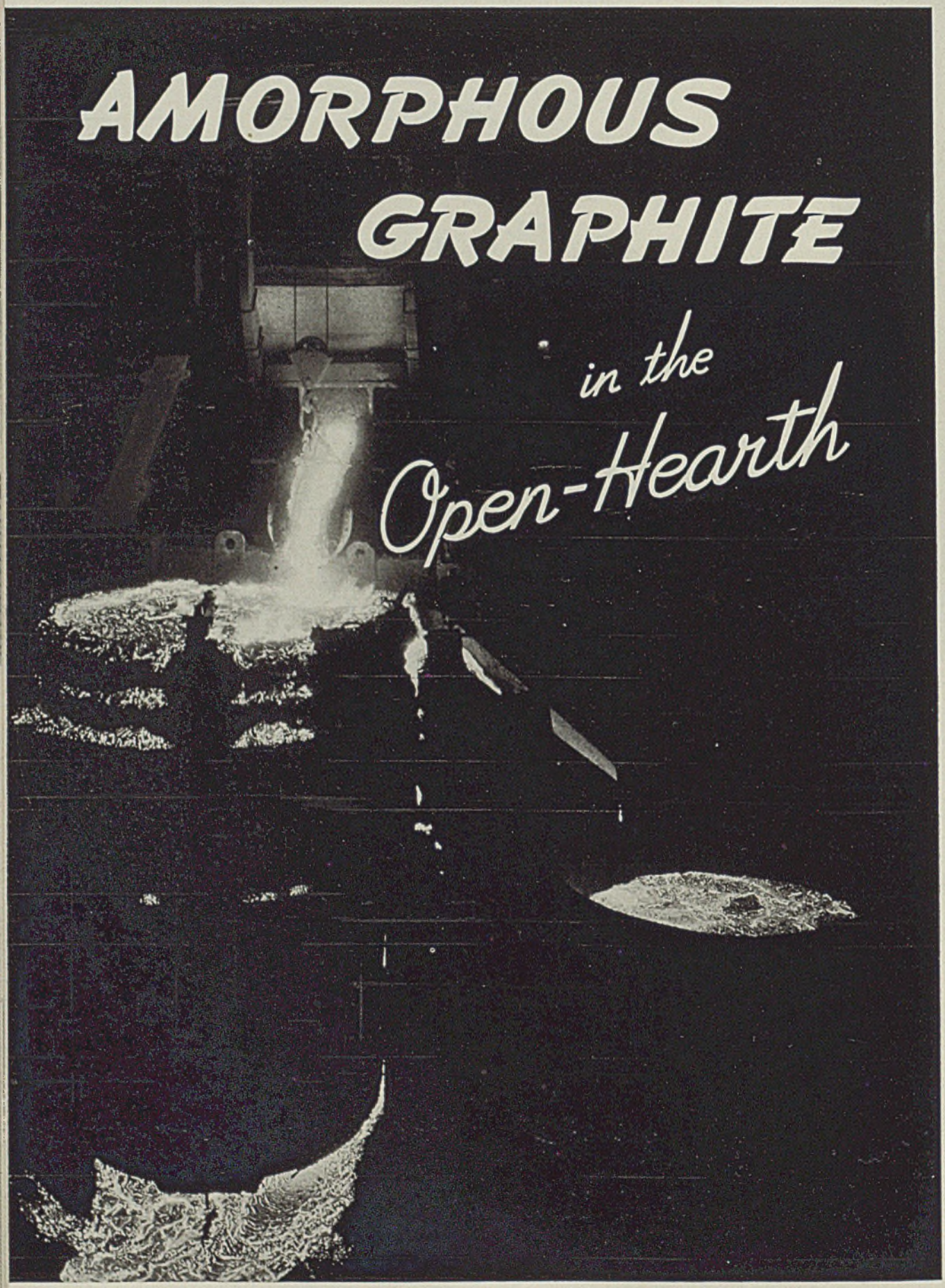
SOUTH BEND, INDIANA

LATHE BUILDERS FOR 36 YEARS


AMORPHOUS
GRAPHITE
in the
Open-Hearth

By R. J. ZEMANEK
Chief Metallurgist
United States Graphite Co.
Saginaw, Mich.

GRAPHITE is a vitally important material in the manufacture of steel—graphite stopper heads are necessary to control the flow of molten steel from the ladle; graphite electrodes carry the surge of power which allows the electric melting and refining process to be possible; graphite crucibles supply the melting unit for the ancient crucible process; graphite is used to protect ingot mold surfaces and provide easy ingot stripping; graphite hot topping compounds reduce ingot piping formations and promote increased ingot yields; graphite supplies the vital parts for modern steel thermocouples; graphite in furnace charges supplies a quiet source of carbon when high-scrap heats are made and does the job of pig iron, whose very usefulness depends upon its graphitic carbon.

The story of graphite is indeed a romance and its chapters are a phase of the history of steel. Metallurgy, chemistry, electricity, ceramics, lubrication, etc., embrace the use of graphite, while even the writer's pencil lead is composed of this versatile material.

The use of amorphous Mexican graphite in open-hearth steelmaking has expanded during the present National emergency to assume new importance, particularly as a charge ingredient and to speed up mold preparation in answer to stepped-up mill production. Its refractory qualities have enabled Mexican graphite to perform yeoman service in prolonging refractory life and improving steel cleanliness. As a furnace recarburizer it cuts delay due to soft heats and when used in the ladle it insures carbon control necessary to meet present rigid specifications.

A few months ago when scrap was still plentiful but pig iron difficult to obtain, several operators charged their basic open hearths with extra scrap, reduced the pig iron, and added a coarse grain sized amorphous Mexican graphite as the source of carbon. This graphite is dense and extremely soluble in molten steel while containing no sulphur. Gassy effects encountered when using coke were avoided and only about 25 per cent as much space was taken up when using Mexican graphite. Nearly normal heat times were realized; and when substituted for coke, as much as two hours' saving in heat time was reported by some operators, with less sulphur troubles and a reduction in foaming heats.

Reviewing the reports of several heats made in different shops, it was concluded that best, most consistent results were obtained when using a Mexican graphite grain size between ¾-inch and 30-mesh size for basic open hearths, and a grain size between ¾-inch and 8 mesh for acid shops. Respectively, these products are called No. 34-30 Mexican graphite and No. 348 Mexican graphite, and both represent the refined, unadulterated ore which is carefully dried and cleaned of dust. The finished product is packed in bags lined with a moisture-proof paper—their 100-lb. unit weight makes for easy charge calculation as well as clean storage in a minimum of space.

No. 348 Mexican graphite, which was discussed in the July 14, 1941 issue of STEEL, is being used extensively in the manufacture of high-carbon steels in the acid open hearth.

Function of Graphite

No. 34-30 Mexican graphite is used in the basic furnace and is designed to supply carbon steadily throughout the heat. It is charged beneath the lime and steadily feeds carbon from around the lime edges with enough being retained to provide sufficient carbon to hold a good melting curve when the slag is being shaped up during the working period. This steady carburization is largely accomplished by proper sizing of the Mexican graphite, since particles over ¾-inch will remain undissolved and float upon the slag surface becoming gradually destroyed by burning while smaller particles than 30 mesh will dissolve too rapidly to provide a steady feeding of carbon throughout the heat. Excessive moisture is also undesirable and a maximum of 1 per cent moisture content is recommended.

When calculating how much No. 34-30 Mexican graphite to use in the charge of a basic open-hearth furnace, a ratio of 15:1 is allowed for the replacement of pig iron. For example, instead of 30,000 pounds of pig iron, it would be necessary to use 2000 pounds of No. 34-30 Mexican graphite and 28,250 pounds of scrap to provide the required amount of iron. This is based upon the silicon and manganese content of the replaced pig iron as well as its carbon content. The overall efficiency of No. 34-30 Mexican graphite would then be 80 per cent, or 60 per cent on the basis of pound-for-pound carbon recovery.

When using No. 34-30 Mexican graphite, it is simply placed upon the top of the loaded charging boxes containing limestone. Usually half the required quantity is charged through the center door and the remainder equally through No. 2 and No. 4 doors of a 5-door furnace. It is safe practice to place the No. 34-30 Mexican graphite directly onto the furnace bottom, since it is inert to basic reactions and, furthermore, will help to part the limestone so that sticky heats are avoided and the limestone is easily released. Where an excessive amount of Mexican graphite is used, it is advisable to charge a portion with the top layer of limestone to give carbon more rapidly to the metal and avoid soft heats.

An example of the charge proportions used and a rough outline of the heat data is given in Table I taken from various heats run in different shops.

Sulphur problems have definitely lessened when No. 34-30 Mexican graphite is used in lieu of coke, especially with oil-fired furnaces whose fuel contains excessive sulphur making the sulphur in coke hard to remove. Because No. 34-30 Mexican graphite contains no sulphur or phosphorus, it is an aid to reduction in phosphorus by replacing high-phosphorus pig irons.

The natural high-density and nonporous nature of Mexican graphite, coupled with its chemical inertness and easy solubility in molten steel, makes for nonfoaming heats where these have been caused by more porous, light, more reactive coke. Foaming sometimes causes long heat delays and after the bath has quieted down the heat may be lack-

Opposite page — Graphite frequently is used as a source of carbon in the manufacture of basic open-hearth steel

Right—Graphite electrodes find wide usage in the melting and refining of electric steel

A "BEST TELLER" FOR PIPING MEN

Look at the timely subjects covered in "Piping Pointers" Bulletin No. 5. What is more important to piping men—NOW—than knowing how to repair valves for better and longer service—to keep war production lines flowing—to conserve metals! We don't know of any other current source of such vital information.

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ing in carbon, requiring more pig iron. Such conditions are expensive and result in lower steel production.

More recently, No. 34-30 Mexican graphite has been used as a source of carbon in hot metal shops where excessive amounts of iron ore or sinter are charged in an effort to obtain extra metal.

In this practice the graphite is charged by placing the bags on top of the loaded boxes of sinter; and when these are then overturned into the furnace, the graphite is sandwiched between the sinter and limestone. By placing the material in this manner, the carbon is next to the ore where it can help in the work of reduction. Tests were made placing the graphite under the limestone, but soft heats resulted with longer heat times because the carbon was buried too deeply.

Offers Many Advantages

Several advantages are apparent when using Mexican graphite of the proper grain size in this application. The inert nature of the material helps it to resist rapid direct action with the iron oxide at elevated temperatures, allowing it to dissolve into the melting scrap and gradually enter into the reaction after the pig iron is added. This steady supply of carbon insures quiet reduction of the oxide and averts sudden violent "blows" due to excessive evolution of carbonaceous gases. "It takes a strong source of carbon to hold carbon" is a phrase which applies here; and when the heat is melted, it will still have sufficient carbon remaining within the bath to work the heat.

The high density and good packing quality of the ¾-inch to 30-mesh size Mexican graphite gives a bulk which requires little space compared to more voluminous coke, and this allows extra space for charging scrap and speeds heat time. The process in general uses less scrap and pig iron and makeup metal is provided by added sinter.

A rather simple method for reboiling a soft heat entails the use of No. 34-30 Mexican graphite handled in the same manner as pig iron and is worthy of mention. One thousand pounds of pig iron is placed onto the bottom of the charging box and then the required amount of Mexican graphite in bags over this.

When the charging box is overturned into the furnace, the weight of the pig iron carries the graphite beneath the slag and into the melt. A ratio of 10:1 is used here in figuring the amount to use —thus, 1000 pounds of pig iron and four 100-pound bags of No. 34-30 Mexican graphite replace 5000 pounds of pig iron ordinarily required. Some loss occurs by floating on top of the slag, but about 50 per cent efficiency of carbon recovery is realized. The heat is not chilled so greatly as only the carbon required to finish is added.

Various particle size Mexican graphite grades are available for ladle recarburization, and the quiet and dependable high-carbon recovery obtained makes carbon control easier in both acid and basic steel.

No. 348 Mexican graphite is usually used to recarburize rimming steels, No. 34-30 Mexican graphite works well in the medium carbon ranges, while No. 8 Mexican graphite is used when adding carbon to high-carbon killed steels. No. 8 Mexican graphite is sized between an 8 and 30-mesh screen and enters into solution rapidly, being used in some shops to recarburize in the ingot mold during teeming. Local conditions somewhat influence the grade selection—it being dependent upon tapping conditions, ladle sizes, steel analysis, number of points carbon desired, steel temperatures, etc.

The addition can be made in sacks, as with barley coal, or the material can be fed through the alloy hopper. The quiet solution of Mexican graphite is not attended by the usual violent flaming and boiling action noted when using coal for this purpose.

Efficiency May Vary

Fire hazards and damage to crane fixtures are eliminated and, where ladles are held by the crane during tapping, the operator's job becomes less dangerous. Recovery of carbon is calculated at 80 per cent efficiency for all normal carbon raising, and this value is consistently realized. The reduction of churning action in the ladle cuts oxidation losses materially and makes alloy additions more efficient.

It will be noted that for large carbon raises on rimming steel the efficiency may vary somewhat; but once a relationship is established, experience has shown that it can be accurately followed.

Mexican graphite also is being used with great success as an ingredient in refractory mixtures.

(Concluded Next Week)

TABLE I—Hot Metal Sinter Heats Using No. 34-30 Mexican Graphite

Pig iron, pounds	Scrap pounds	Iron ore, pounds	Graphite, pounds	Feed ore, pounds	Total ore, lbs.	Heat time, hrs.-min.
170,500	115,600	41,100	3000	7,000	48,100	10:55
175,000	113,300	35,500	3000	12,000	47,500	11:20
167,000	150,600	41,000	4500	.	41,000	13:10
179,000	111,600	41,200	3000	12,000	53,200	11:45
		Sinter				
185,200	116,700	45,400	3000	4,000	49,400	9:35
181,100	117,960	43,400	3000	1,000	44,400	9:30
190,100	115,000	50,000	1000	.	50,000	11:15
			Charged under Limestone			
181,000	107,000	25,000 Ore 25,000 Sinter	3000	1,000	51,000	11:30
182,000 Plus 15,000 Reboil	105,000	21,000 Ore 31,000 Sinter	3000	1,500	53,500	12:10

TABLE II—Cold Metal Basic Charges Using 34-30 Mexican Graphite

Total charge, lbs.	Pig iron, %	Graphite charged, lbs.	Feed ore charged, lbs.	Reboiled pig iron, lbs.	Time of heat, hrs.-min.*	Charging time, hrs.-min.	Lime charged, lbs.
285,000	10.3	4000		2000	15:00	7:30	5.0
290,000	.	7000		2000	14:30	5:40	3.5
285,000	8.3	5500		5000	15:00	8:00	5.0
260,000	24	2000	5000		14:00	7:00	6.5
260,000	25	4000	10000		13:10	5:45	6.0
207,100	24	3000	1000		14:00	6:00	6.0
270,000	20	1400	2500		13:00	7:00	7.5

*From charge to tap.

TABLE III—Ladle Recarburizing Action of Mexican Graphite

Size heat, tons	Graphite Added		Ferro-manganese, pounds	Ferrosilicon, pounds	Carbon	
	pounds	grade			preliminary, %	final, %
125	210	No. 8	1700	1400	0.70	0.77
125	240	No. 348	2300	1400	0.31	0.42
125	150	No. 8	1800	1400	0.68	0.74
105	760	No. 34-30	Rimmed		0.08	0.41
160	475	No. 8	Rimmed		0.15	0.23
160	650	No. 34-30	Rimmed		0.13	0.25

NONBURNING CARBURIZER

—cuts carburizer consumption

—can be used in addition ratios as low as 1 to 15

COMING INTO wider use in heat-treating operations are the nonburning types of carburizing compounds. One of these products, Fig. 1, is manufactured from special analysis coal, which is crushed, premixed with energizer and coked to proper consistency. In this manner, the energizer is distributed throughout the coke, rather than being just a surface coat. For this reason, the carburizer can be used down to pinhead size and will still produce high-carbon cases without the addition of fresh material to raise the energizer content. Up to 20 successive heats have been run on the original compound without fresh additions to prove that high-carbon cases are obtainable.

This material has a weight per cubic foot of approximately 25 pounds, the equivalent of 80 cubic feet of material per ton. Due to low shrinkage of the nonburning carburizer on the first heat, important economies are possible.

Addition ratio of fresh to old compound can be as low as 1 to 15. The product does not continue to burn after withdrawal from the furnace or carburizing boxes, its action being similar to household coke, which does not support combustion long after removal from the furnace. The nonburning compound is clean, free from dust, and easy to handle in the heat treating department. One supplier reports it is being sold in approximately 75 per cent of the commercial heat treating plants.

The following are excerpts from a test report on the nonburning carburizers made in a parts plant in the Detroit area, data through courtesy of Park Chemical Co., Detroit:

Standard tests were made, and samples prepared from SAE 1020 carburizing grade steel, having about 0.70 per cent manganese content. Boxes containing samples were placed in furnace at 1700 degrees Fahr., held for 9 hours at that temperature, and allowed to cool in the furnace. Nature and depth of case were then determined. To determine life of carburizer, tests were conducted through 20 cycles, without addition of new material.

It will be noted, Fig. 3, that after 20 tests, during which carburizer was used continuously without new additions, it had not lost any carburizing power, and shrinkage was only 59.6 per cent. To simulate conditions at the heat treat, the fines and dust were blown from remainder, and a further loss of 5.4 per cent was found. The probable total loss through the entire test was 55 per cent. Average loss per cycle is 2.7 per cent. To maintain volume in practice at this rate, additions would be necessary at the rate of one part new to 35 parts old. Present practice at heat treat is one part new to 5 parts old.

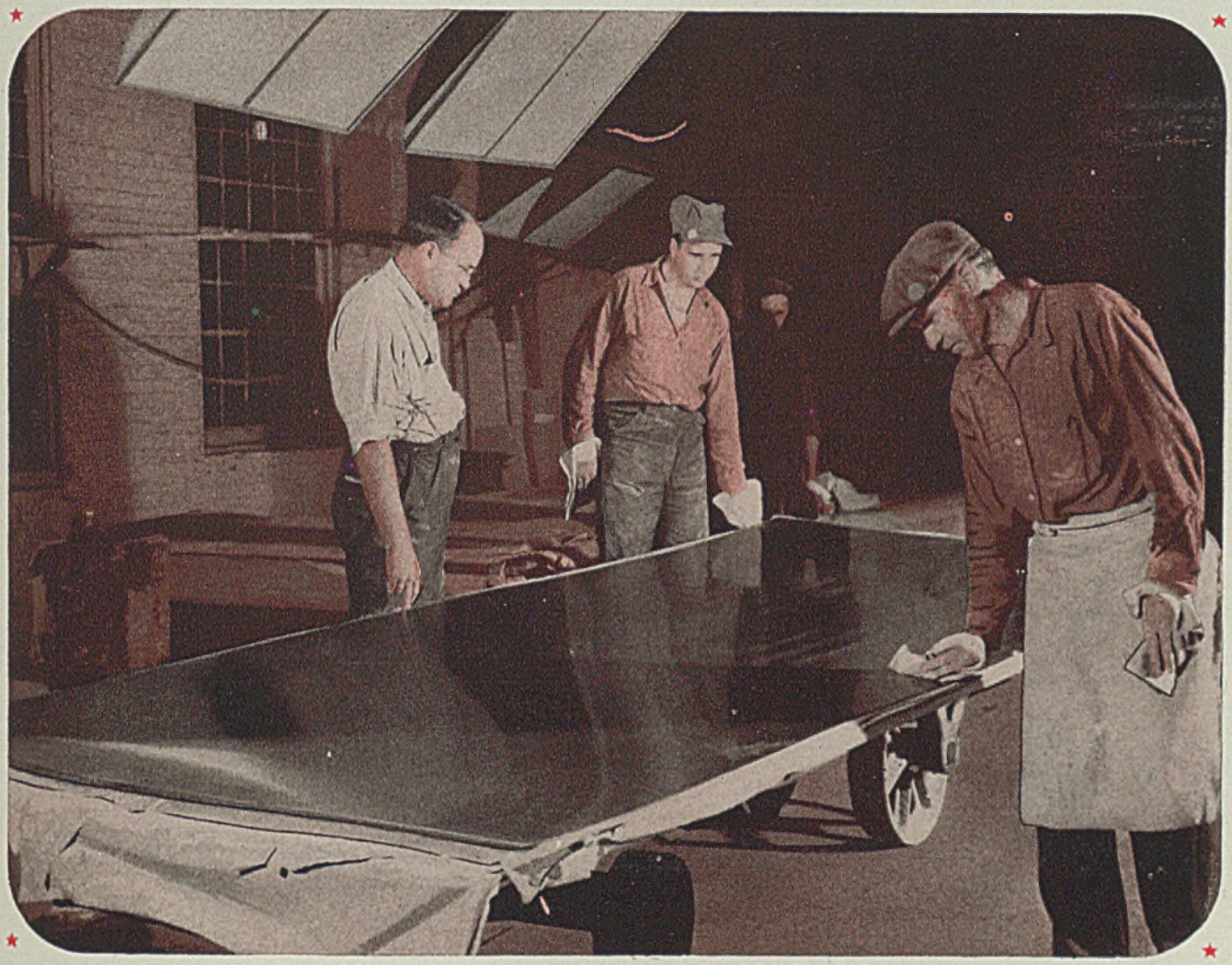
A four-month test at an Indiana heat-treating plant was run as close as possible to conditions previously existing; that is, mixture of one part new to 10 parts old compound. Ordinarily this department mechanically sifts and mixes compound. But this test was hand sifted through ⅛-inch mesh screen, after being dumped from box on canvas. The same box was used throughout test, as well as same amount of work to be carburized, 151¾ pounds. Weight of compound was 55 pounds. Box was pushed on light case row of furnace, 40 minutes push time, 1650 degrees Fahr.

One SAE 4620 steel stepdown pin was run in each test, as well as three SAE 1115 test pins. Three cuts were taken on 4620 steel stepdowns, 0.005-inch on a side. Hardness was read on outside diameter surface and each of the three cuts. Total case was measured on outside diameter surface of each of three cuts. Carbon determinations, hardness and total case measurements are from total of 30 tests. Results are shown in Table I.

Shrinkage by weight was measured after each test, minimum being 2.3 per cent and maximum 3.6 per cent, with exception of first test, which showed 7

Fig. 1—(Upper left)—Nonburning carburizer before crushing and screening, showing inner cell impregnation of energizer

Fig. 2—(Lower left)—Nonburning carburizer in regular No. 3 size, after crushing and screening



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Final Examination

BEFORE STAINLESS GETS ITS WINGS

REDUCE ACCIDENTS!

In 1941, accidents were first cause of death among men from 22 to 38 years of age. The productive man-days lost were enough to build twice as many battleships as now possessed by the combined Allied Navies. These are losses that *can* be avoided. Warn your employees repeatedly not to take risks on or off the job—cooperate in every way possible with the National Safety Council's *War Production Fund to Conserve Manpower,* 71 Broadway, N.Y.

A GREAT DEAL of costly processing is done on stainless steel, to secure the physical characteristics and surface finish required for the particular war job it is to perform. But one day all the hot and cold rolling, heat treating, and pickling, grinding or polishing is completed, and bright sheets of Allegheny Stainless lie on protective layers of heavy paper, ready for final inspection and shipment to the war plants.

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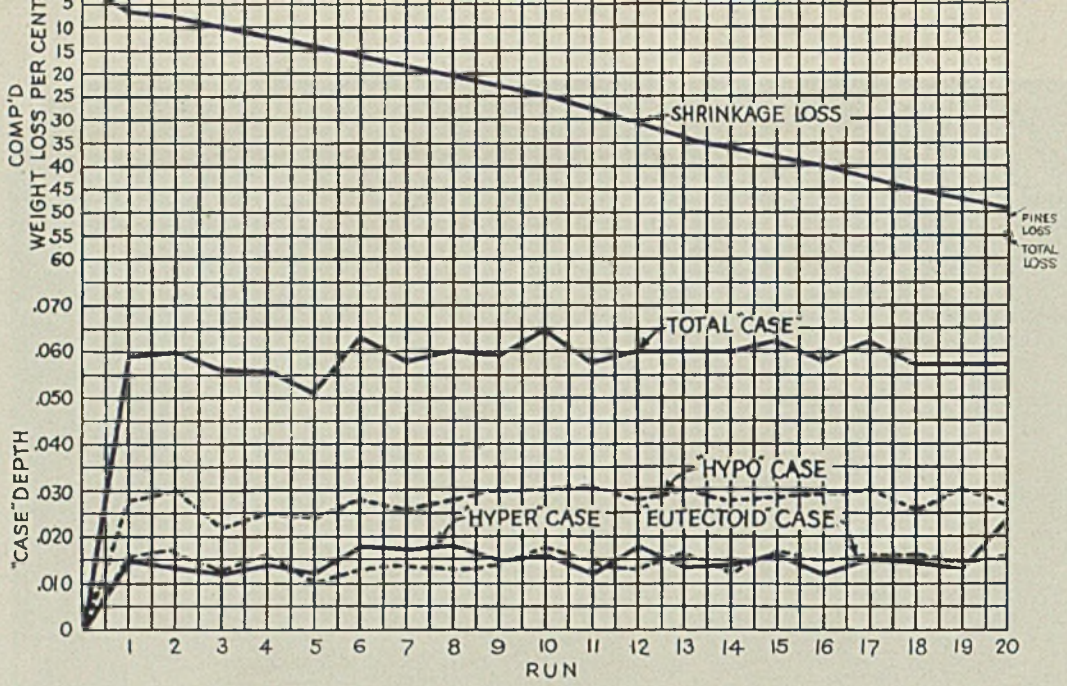


Fig. 3—Summary of 20 carburizing tests made with nonburning compounding at Detroit motor parts plant. Tests were made on SAE 1020 steel, 9 hours at 1700 degrees Fahr., with a furnace coal. No additions were made to compound. Courtesy Park Chemical Co., Detroit

per cent shrinkage when all new compound was used. Dust was weighed after each test minimum being 9 ounces (1.02 per cent) and maximum being one pound (1.8 per cent).

Tests of nonburning carburizers were made about a year ago at one of the motor plants in Detroit. SAE 4620 steel samples 5 inches long and 1⅛ inches in diameter were run 23 times in a pusher-type pack-carburizing furnace. Each run took 11 hours at 1675 degrees Fahr. At the end of each run, boxes were placed on a flat and allowed to cool to room temperature with covers on.

Depth of shrinkage was measured and pots were weighed to determine loss of compound by weight. Test specimens were replaced by new ones and the next run started without addition of fresh compound. Bars were heated in an electric furnace to 1500 degrees Fahr. and water quenched for hardening, after which they were broken to determine depth. Half the specimen was polished and rockwell hardness readings taken.

With the nonburning compound, additions were at the rate of 450 pounds a day or 2250 pounds per week. Costs of compound, related to production of 50,000 cars a year, are shown in Table II.

TABLE I—Test Results

SAE of Sample	Total case depth Inch	Carbon Per Cent	Hardness Rockwell C
4620 steel, first cut	0.038-0.046	0.84-0.96	59-64
4620 steel, second cut	.....	0.82-0.91	57-63
4620 steel, third cut	.....	0.75-0.85	55-62
4620 steel, outside diameter	.....	.....	61-64
1115 steel, first sample	0.040-0.052	.....	.....
1115 steel, second sample	0.038-0.048	.....	.....
1115 steel, third sample	0.042-0.052	.....	.....

TABLE II—Cost Data

Item	Nonburning Compound
Daily additions, pounds	450
Cost, per pound	$.033
Addition cost, per day	$14.85
Weight per cu. ft., pounds	25.0
Cu. ft. per ton	80
Cost per cu. ft.	$.82
(Based on 175 operating days per year, or production of 50,000 cars per year).	
Yearly additions, pounds	78,750
Additions per car, pounds	1.57
Cost of additions, per car	$.051
Cost advantage, per car	$.064
Analysis, per cent	
Barium carbonate	12 min.
Calcium carbonate	0
Charloal	0
Coke	88

Reports Hyper-Milling Steps Up Production

Hyper-milling, a new milling method which is reported to increase production rates is being recommended by Firth-Sterling Steel Co., McKeesport, Pa. The method is said to shear the metal in place of digging it off as in conventional practice.

The process uses Firthite sintered carbide tipped inserted blades with both the rake and helix angles of the mills negative up to 10 degrees, with the cutters operating at speeds up to 10 times those normally used and with resulting feeds up to six times those of conventional high speed mills on hardened alloy steel parts..

It is particularly applicable to hardened, heat-treated steels, including alloy steels which present difficult milling problems. Not only is the surface being milled burnished by the process, but it also produces less tool wear and keeps both the work and the tool cooler, resulting in a minimum of distortion, even on fragile work pieces.

New Device Figures Pay Rolls Quickly

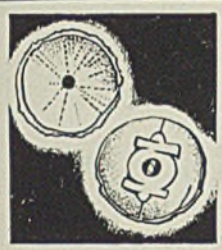
Pay rolls and job costs, it is claimed, can be figured in a fraction of the usual time through the use of a new calculator, recently developed by Berger-Bricker Co., Los Angeles. Operating on a simple new principle, it includes all hourly rates of pay from $.50 to $1.75 with a ½-cent spread between rates.

The device covers all time periods up to 104 hours with divisions of 1/10 of an hour. Made of lacquer wood, it is of a size that fits into a desk drawer easily.

Issues Bulletin on Heat Output of Radiators

"Some Factors Influencing the Heat Output of Radiators," is the title of bulletin No. 29 recently issued by Cornell university engineering experiment station, Ithaca, N. Y. The author, Dr. David Dropkin, instructor in experimental engineering and Westinghouse research associate at the university, presents in the bulletin the effects of test room insulation, number and arrangement of windows, and the size of radiator on performance under test room conditions. Tables, drawings and other engineering data also are included.

Rolling . . DID IT THEN



Early man invented the WHEEL. First, he dragged things on the ground that were too heavy to carry. Then, he built sledges to slide along and next, used rolling logs under them.

Ancient wall-carvings portray how people once moved their great stone images—tree trunks used as rollers . . . many men used to pull the loaded sledge . . . others picking up logs left behind and running around to the front, thus making a continuous track.

Perhaps, someone noticed that a roller, wider than the sledge, was worn so that it looked like a spool. They found things went better because the roller did not slide out on one side. It became evident that slices of tree trunks joined by a limb of a tree could work and therefore it was needless to wait for a log to wear down in the middle.

From chariots to Conestoga wagons to automobiles to Consolidated's B 24's (they need "wheels" to land upon), the ROLLING WHEEL has been the symbol of progress.

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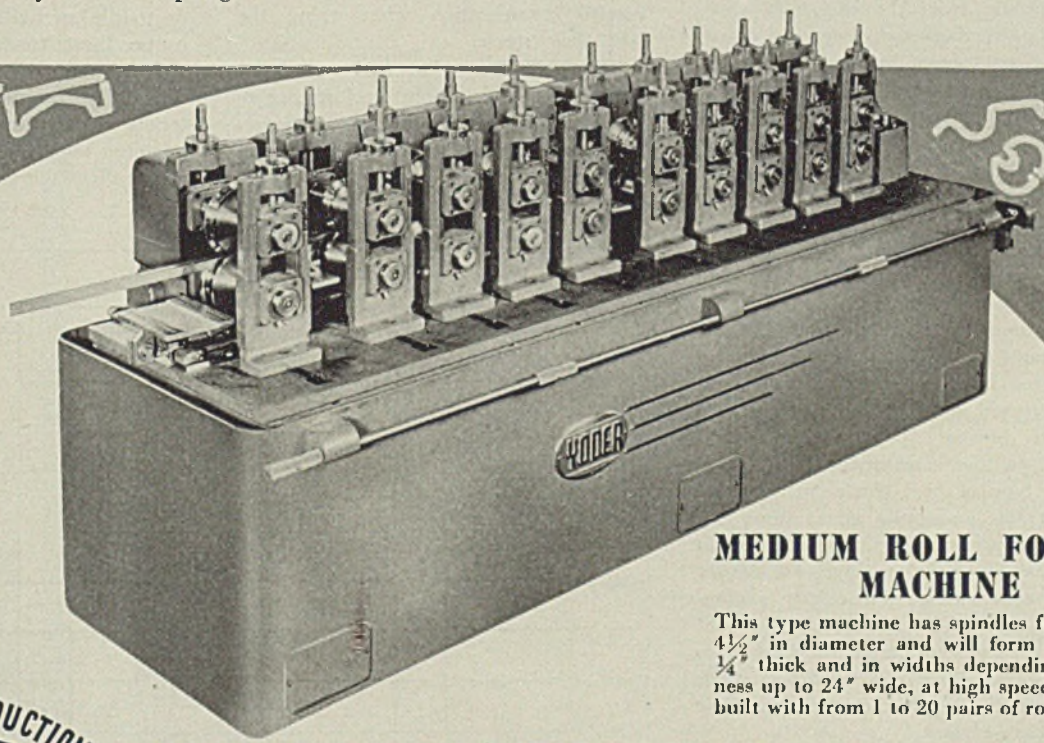
Present-day evidence of this is seen on every hand: the track-laying tractor, the circular stock-bins on an assembly table, the newest in record-reference systems and THE YODER ROLL-FORMING MACHINE.

As "wheels" were the first move made by man in his desire to go places "easier and faster," so "rolls" are a large factor in today's industry to turn out "more and better".

Many fabricators will be glad to know of the increased number of metals and the infinite variety of shapes that can be handled on today's Yoder Roll-forming Machine. Show us a sketch of the shapes you need formed and we'll be glad to bring the results of our years of experience in the designing and manufacturing of ROLLS and ROLL-FORMING MACHINES to focus on them.

- (YODER) A complete line of Roll-forming Machines!
- (YODER) Each size covers the widest efficient range of operation!
- (YODER) Roll "designing" and "grinding" based upon a "world of experience"!



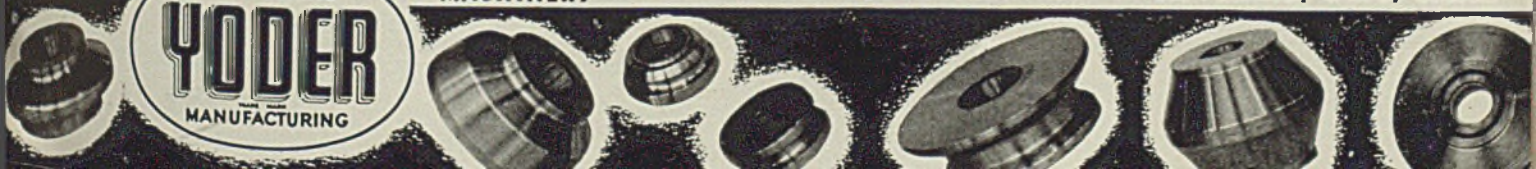
MEDIUM ROLL FORMING MACHINE

This type machine has spindles from 1½" to 4½" in diameter and will form stock up to ¼" thick and in widths depending on thickness up to 24" wide, at high speeds. They are built with from 1 to 20 pairs of rolls.

METAL • FORMING • PRODUCTION • MACHINERY

ENGINEERING YODER MANUFACTURING

THE YODER COMPANY • CLEVELAND, OHIO, U.S.A.



Gearmaker Reports on Successful Applications of . . . .

By E. J. WELLAUER
Research Engineer
Falk Corp.
Milwaukee

NE (National Emergency) ALLOY STEELS

DISTORTION: Because of the critical function of accuracy in gearing as related to load capacity, the problem of "distortion" of gears heat treated after cutting is considered an engineering problem. In fact, the engineer must compensate his calculated ratings for the lesser accuracy of gears hardened after cutting. Final grinding after cutting can partially rectify heat treating distortions, although other difficulties prevent full utilization of the high accuracy secured on gears cut before heat treatment.

The distortion obtained in gears heat treated after cutting is a direct function of the severity of the quench necessary to produce the proper hardness. The severity of the quench is dependent upon several metallurgical factors involving critical cooling rates, transformation temperatures, etc., which cannot properly be presented within the confines of this discussion. It cannot be expected that the NE steels with lower alloy contents will perform as satisfactorily from the distortion viewpoint, particularly when present heat-treating equipment is unchanged. The problem is not insurmountable, however, since developments in heat treating apparatus such as quenching fixtures, quenching media, grain size control, etc., have alleviated many of the difficulties with distortion.

Consideration of basic design to reduce warpage during quenching will demand more attention when the NE and lower alloyed steels are used. Sections must be made more uniform, and supported rims connected to webs must be increased both at the rim and the web to prevent "bowing" or a bell-shaped contour after quenching.

The type of heat treatment accorded a gear has a definite effect upon the final distortions. This is illustrated in Fig. 2, showing the warpage of a slender pinion of a design particularly susceptible to distortion. It is obvious that a direct quench for case carburized steels or pre-normalized fully hardened steels produces the least distortion in their respective classes.

The fine-grained NE steels are suitable for direct quench and will be required in lieu of double quenching where preference for minimum distortion outweighs core toughness. When production operations prevent a direct quench and maximum core toughness is required, the reheat quench temperature must be carefully investigated. For example, an increase of the re-quench temperature by 100 degrees Fahr. over a standardized temperature for a low-alloy steel increased the Izod impact from 28 to 50 foot pounds.

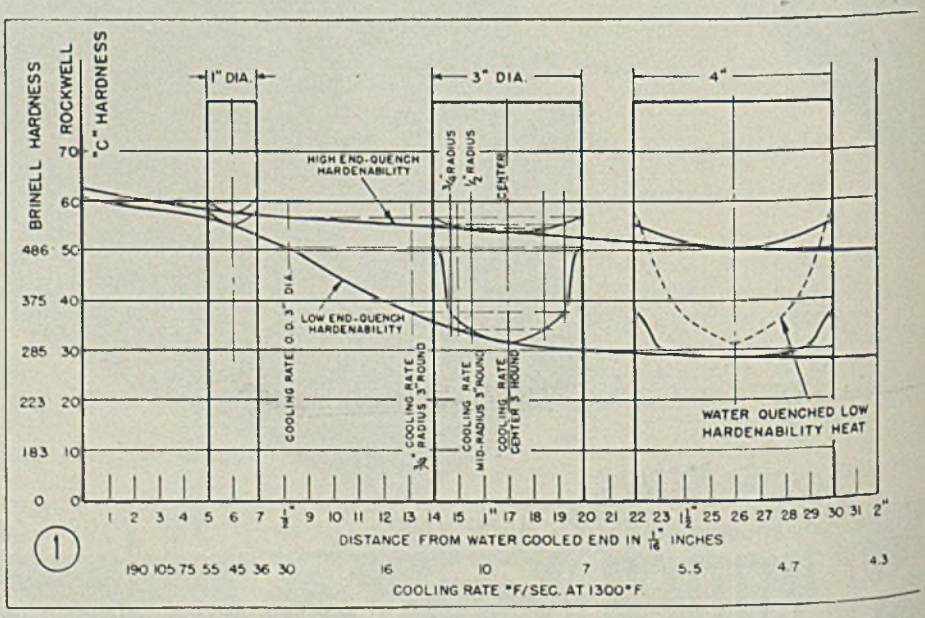
An extremely high core toughness is not a primary requisite for gears, as has been thought for a number of years. Except for a few isolated applications, pot or direct quenching is entirely suitable for industrial carburized gears. As illustrated, the full hardening steel will produce considerably less distortion than the carburized steel. In many instances, the increased capacity due to reduction in dynamic loading will provide greater capacity than higher hardness case-carburized product. This point warrants careful consideration when using the NE alloy steels.

The Falk Corp. has had experience with a manganese-moly steel similar to NE 8020, although of lower manganese, with good results from the standpoint of both distortion and service. Core strengths of over 110,000 pounds per square inch were consistently secured, which are satisfactory, although not equalling the 125,000 pounds per square inch secured with AISI 4119 or 140,000 pounds per square inch obtained with SAE 2315.

Internal stress in steel is proportional to the severity of the quench and the degree of internal stress relief obtained in the tempering operation. Here again, the amount and balance of the alloys plays an important part. Undoubtedly, a great source of trouble, which will remain hidden if only casually investigated after failures of NE steels, will be the tendency to extend the range of the lowest hardening alloys by extremely drastic quenches without properly tempering to relieve the internal stresses and obtain a stabilized metallographic structure.

Engineering Properties vs. Alloying Content: Normal properties required for gearing are little affected by the alloys present, provided the desired hardness or tensile strength can be obtained by proper heat treatment.

It is necessary, particularly in these times, for the design engineer or materials specification engineer to be acquainted with the manner in which the alloys affect the heat-treating operations.



From a paper delivered at meeting of the American Gear Manufacturers' Association, Oct. 15-17, 1942, Skytop, Pa.

For other information and complete history of development of NE steels, see STEEL, *Feb.* 9, 1942, *p.* 70; *March* 16, *p.* 72; *June* 8, *p.* 66; *June* 15, *p.* 66; *July* 20, *p.* 86; *Aug.* 3, *p.* 70; *Aug.* 17, *p.* 40; *Aug.* 31, *p.* 41, *p.* 76; *Sept.* 7, *p.* 78. *Nov.* 9, *p.* 96.

For latest revised list of NE steels and their chemical composition, see STEEL, *Aug.* 31, *p.* 81.

With a basic knowledge of these properties, a logical approach can be made to a materials substitution problem either individually or in co-operation with a metallurgist if available.

Metallurgical Properties vs. Alloying Elements

Hardenability: Since the ultimate

(*Please turn to Page* 129)

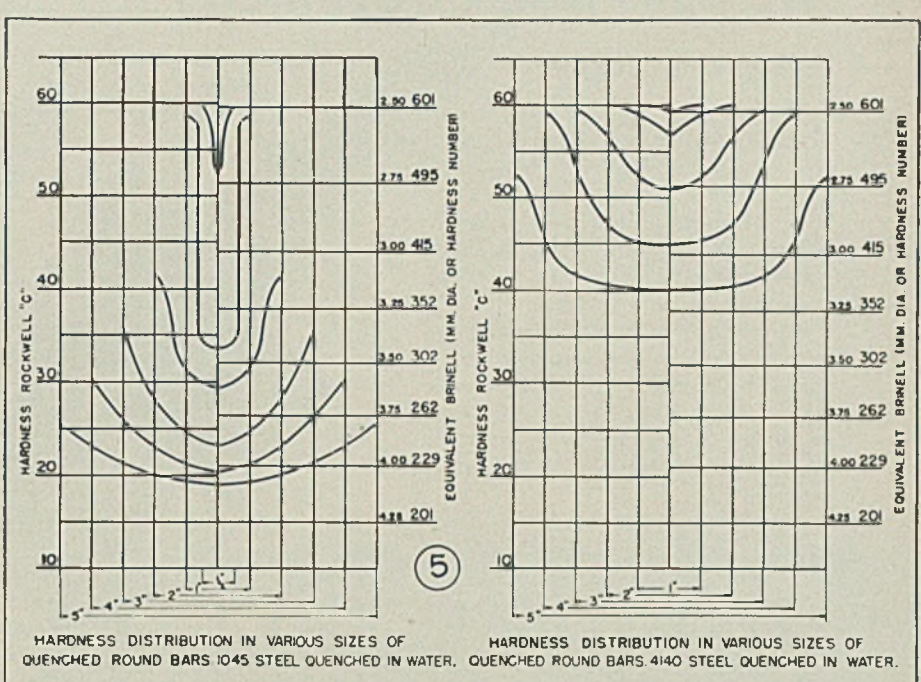
Fig. 1—*Constructed transverse hardness curves for high and low-hardenability heats of manganese-chromium-molybdenum steel, oil quenched*

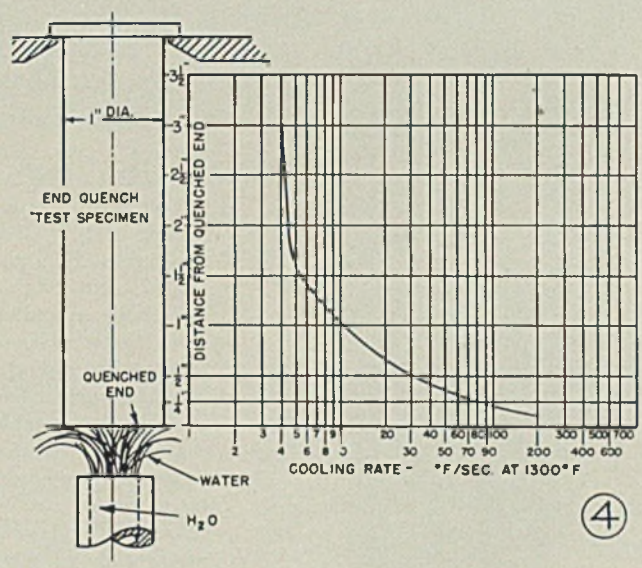
Fig. 2—*Profile distortion test on pinions heat treated after cutting, showing amount of lead and profile distortion of two types of steel and five tests*

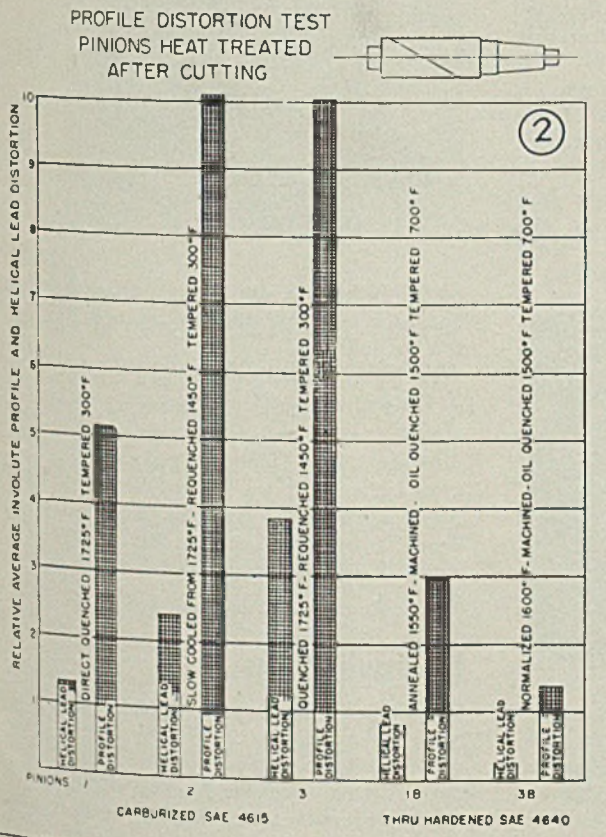
Fig. 3—*End-quench hardenability curves*

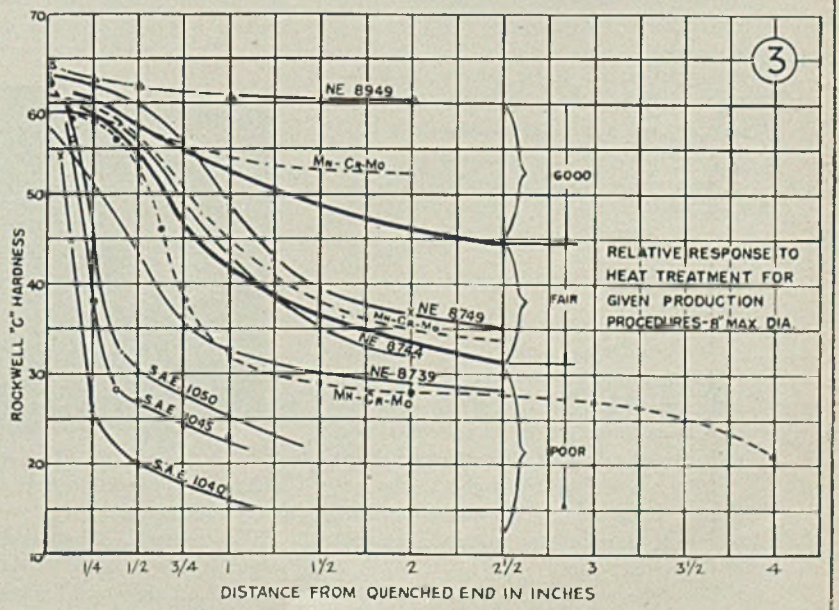
Fig. 4—*End quench specimen showing how end-quench test curves are derived*

Fig. 5—*Transverse hardness curves obtained by sectioning bars*







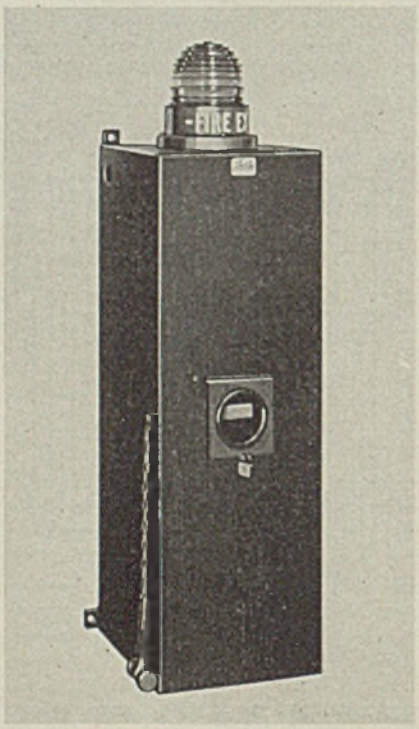


Extinguisher Cabinet

Lintern Corp., 50 Lincoln avenue, Berea, O., has placed on the market a fire extinguisher Overcoat designed to protect soda acid and foam type units. Since it can be opened only by key or breaking the glass window, the extinguisher cabinet reveals any tampering upon even casual inspection.

A padlock locks the small door (hinged at top) which the inspector raises in order to operate the hasp holding the main door securely in position. The Overcoat or cabinet is all steel and dust tight protecting the extinguisher in all kinds of weather.

A red signal light on its top clearly marks its location day and night. When

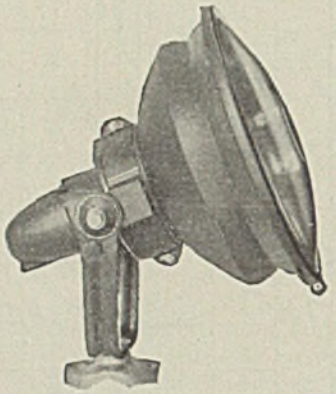


extinguishers are to be exposed to freezing weather, a special cartridge type heating unit for placing under the base of the extinguisher, is available. The cabinet accommodates standard 2½ gallon units.

Floodlight

General Electric Co., Schenectady, N. Y., is offering a new L-43 floodlight which features a bowed-in silvered-glass reflector which creates the equivalent of a large floodlight in its collection and utilization of light. Reflector shape makes it possible for light to be reflected back to the parabolic surface, where it is redirected outward as part of the main beam.

The reflector is made shatter-resisting by backing it with an extra coating of electrolytically deposited silver. A standard 1000-watt lamp is used with the unit. The floodlight is particularly



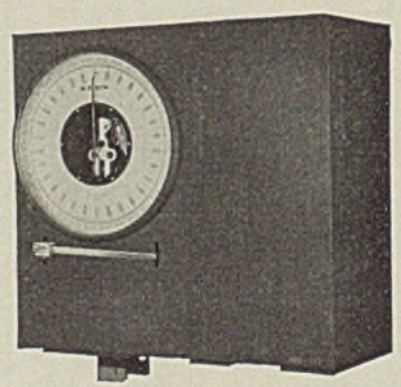
useful for protective lighting, railroad lighting, general area lighting, and lighting for construction work. It can be equipped with a metal visor for use in dimout areas where outdoor night work must continue.

Draw-Bar Dynamometer

Kron Co., Bridgeport, Conn., announces a new draw-bar dynamometer for control cable testing in the aircraft industries. It has a capacity of 30,000 pounds with its dial chart graduated in increments of 25 pounds.

Dial chart of this scale is equipped with both an indicating pointer and a dead needle which will remain in place to show the ultimate strength when the cable ruptures or the swedged tips break away from the cable.

Draw-bar dynamometer scale is mounted at one end of the stretch frame consisting of structural steel members. Anchored at the other end is a hydraulic piston and cylinder attached to a draw bar equipped with grooved sheaves. Also a draw bar with grooved sheaves is at-



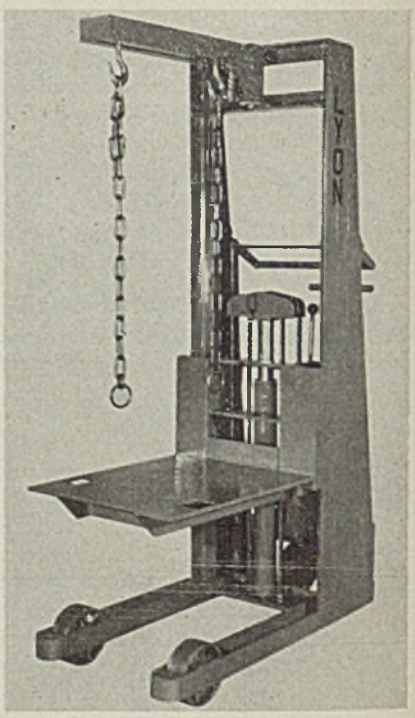
tached to the bottom arm of the draw-bar dynamometer.

The control cables used in aircraft assembly are attached to each other end on end and are roved back and forth between these two sets of sheaves. Hydraulic pressure produces the tension on the cables which is registered on the dynamometer dial.

Control of the hydraulic pressure is located at the same end of the equipment as the scale so one man can conduct the entire test rapidly. The dynamometer scale indicating mechanism is protected from back lash by a hydraulic shock absorber to prevent injury from cable rupture at full tension.

Die Stacking Truck

Lyon-Raymond Corp., Greene, N. Y., is offering a new die handling and stacking truck feature of which is it can be converted from a platform truck to a



boom truck, to a die separating device and back to a platform truck again in a few seconds.

Of the cantilever type, it has a capacity of 1000 pounds. Its boom can be attached either to the carriage or the uprights. Truck platform measures 25 x 30 inches. It has a lowered height of 8 feet and elevated height of 62 inches. Truck is equipped with a fifth wheel steer, all wheels being 8 inches diameter.

Hydraulic Press

Denison Engineering Co., 1152 Dublin road, Columbus, O., is offering a new model DL0S2-100 multi-purpose, 100-ton HydrOilic open-side press for widely varying operations in the fields of assembling, pressing, and straightening. It

PENNSALT CLEANER

REG. U. S. PAT. OFF.

HELPS INDUSTRY RECLAIM STEEL DRUMS

CUTTING CLEANING COSTS 33⅓%

MANY MANUFACTURERS are faced with the urgent wartime necessity of reclaiming and re-using metal containers. The demand is for a cleaner that will do a *thorough* job—do it *fast*—and keep costs *down*.

A prominent oil refiner found the answer in a Pennsalt Cleaner.

The problem was to remove various types of oil, grease and solvents from steel drums—and to strip paint from these containers. The operation was carried on continuously in a 1000-gallon drum washer at 145 to 155 degrees Fahrenheit.

Several kinds of commercial cleaners had been tried previously, but cleaning was not satisfactory, rejects ran too high and costs were out of line. The method in practice was the use of an initial charge of 400 pounds of flake caustic soda, followed later by an additional 300 pounds.

The Pennsalt representative was able to improve greatly on this with the correct type of Pennsalt Cleaner. The amount required was only about 35% of the caustic soda necessary. The cleaning action was highly effective—the drums dried faster—and grease containers could be included in the cleaning operation, an advantage not previously possible.

What's more—*careful comparison of costs showed that Pennsalt Cleaner was saving this plant 33⅓ percent!*

That's a saving that should interest you, if your plant has a metal cleaning problem. Let our experienced technical staff show *you* how a Pennsalt Cleaner will help you get better results at lower costs. Or write fully to our Pennsalt Cleaner Division, Dept. S.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

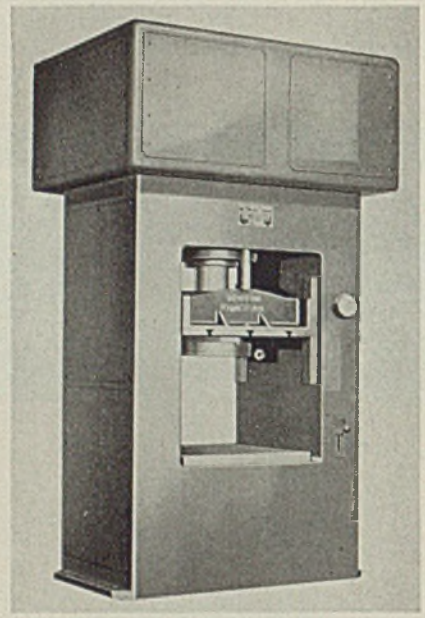
1000 WIDENER BUILDING, PHILADELPHIA, PA.

NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • WYANDOTTE • TACOMA

is reported to be suitable for either small-lot or production line work.

Press frame is of welded steel construction while the cylinder assembly consists of cast steel. Its ram is fitted with a guide head operating in the ram guides on the inner sides of the press. The unit is available with either a guided platen or a threaded ram.

Maximum stroke of the ram is 18 inches and the maximum throat opening is 18 inches. Vertical opening is 36 inches. It has a working pressure up



to 2000 pounds per square inch. The press overall stands 11 feet six inches high. Width of the base is 64 inches.

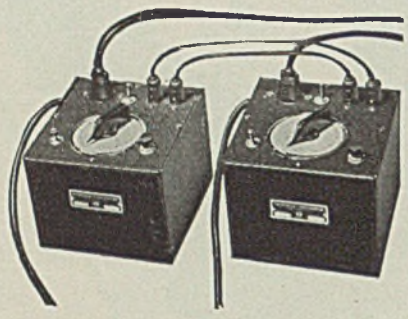
Dual control hand tie-up can be furnished to keep the operator's hands fully occupied and out of danger. The press is adaptable for various special operations by alternating certain key parts. In its operation it utilizes oil for the transmission of power.

Electronic Timer

Photovolt Corp., 95 Madison avenue, New York, announces a new electronic timer for use wherever short, accurately controlled timing periods are required. It is designed for single as well as for sequence timing and recycling in continuous operation.

The powered load outlet of the timer is a standard socket located on the panel. The connections for the unpowered load are made by means of leads which pass through an opening in the casing. Besides the powered load outlet, the panel carries the remote control socket, the sequencing outlet, and on-and-off switch, a steady switch which can be used to hold the relay in the energized position, and a time-control knob with dial.

The time-control knob provides stepless control of the timing interval. Dial divisions are arranged in approxi-



mately geometric progression so that turning the knob by a given angle results in the same percentage or decrease of the time interval over the whole length of the scale.

The timer opens or closes for the selected interval irrespective of how long the push button is pressed or how long the remote control impulse lasts. It does not "run back" and is ready for the next operation as soon as the condenser is recharged from the power line.

To change the loads on the unit from "normally open" to "normally closed" or vice versa, it is only necessary to remove the bottom plate and to change the connection of terminals. The two loads are independent from each other so that the timer can operate with both "normally open" or both "normally closed" or the one "normally open" and the other "normally closed".

Dust Respirator

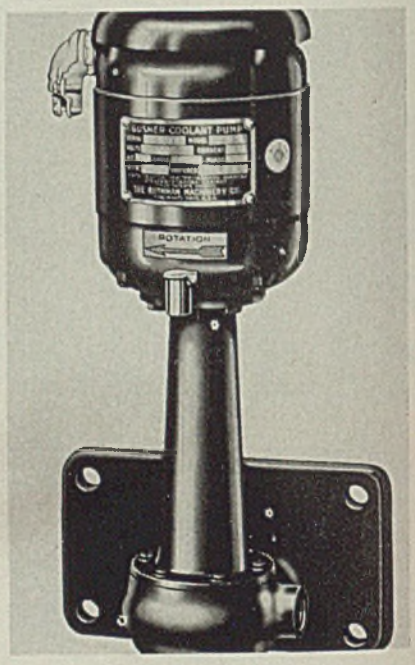
Willson Products Inc., 273 Thorn street, Reading, Pa., now is offering a new light-weight No. 10 dust respi-

rator which can be used by workmen for long periods without impairing efficiency. Breathing freedom is provided through especially designed inhalation and exhalation valves.

Elastic headbands are provided to hold the unit comfortably in place. The face piece is adjusted easily to fit the contour of the wearer's face, and is particularly adaptable for use by women. The respirator is said to be one of the lightest weight units ever to receive approval by the Bureau of Mines.

Gusher Pump

Ruthman Machinery Co., 1819 Reading road, Cincinnati, announces a new model 5-P3 vertical 1/10-horsepower motor-driven gusher coolant pump for use on new machine tools as well as machine tools already in service. It features a capacity through ½-inch pipe at 5 feet



head, of 10 gallons per minute.

The discharge relation of the unit is available either right or lefthand. Impeller housing and mounting flange are cast in one piece. The latter is larger so as to be interchangeable with larger size pumps.

Motor is a full ball-bearing type with one-piece suspended shaft to the pump housing. The seal, between motor and pump, is accomplished by the use of "lubri-sealed" ball bearings in direct conjunction with a centrifugal slinger. The impeller is of the twin equalized intake type.

Barrel Pump

Trabon Engineering Corp., Cleveland, has introduced a new series H electric-hydraulic barrel pump for servicing bearings of various manufactured articles

DoAll CUTS MAN HOURS 500%

At the first DoAll, drive shafts for wobble pumps are filed in 30 min. each. Formerly they required 3 hours of hand filing. The other DoAlls are sawing out patterns, filing key ways for gun mounts and machining 6" thick die blocks. Nine are filled with DoAll production jobs.

● Don't worry about your shape cutting jobs. The DoAll gives you a precision finish on 1/2″ thick armor plate as shown at the left—metal blocks a foot thick—tubing or flats or sheet metal—special replacement parts for machines or equipment. DoAll performance will amaze you because (a) the speed with which cutting is done saves valuable man hours, machine time and power, (b) no further machining is required.

The DoAll is a MUST in every tool and die room, also a regular First Aider on production lines—easily moved to any part of a plant to relieve $5,000 to $40,000 machine tools of overload work.

ASK FOR DEMONSTRATION IN YOUR OWN PLANT

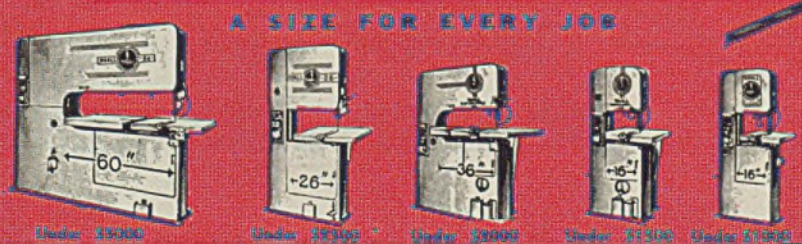
FREE BOOK—"DoAll on Production"—a pictorial story of DoAll at work in many plants. Send for copy.

CONTINENTAL MACHINES, INC.

1324 S. Washington Ave., Minneapolis, Minn.

Associated with the DoAll Company, DesPlaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines

A SIZE FOR EVERY JOB

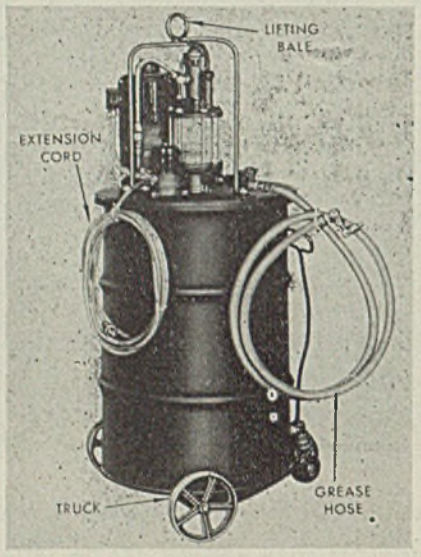


Under $3000 Under $3000 Under $3000 Under $1500 Under $1500

prior to shipment. It also is especially suited for use by installation crews, setting up machinery in new plants, and by maintenance men working on holidays when compressed air is not available.

The pump is operated simply by plugging the extension cord into an electric outlet. It, complete with motor, hydraulic cylinder, etc., is mounted rigidly on a flanged head. The flange fits snugly over a standard 55 gallon-400 pound drum permitting oil, or light, medium or heavy grease to be pumped from the original shipping container without rehandling.

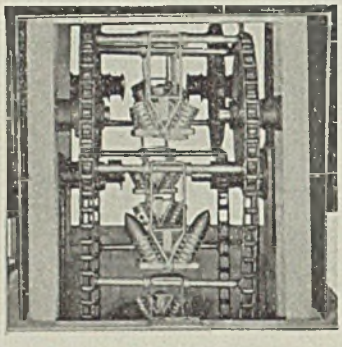
A lifting bale permits the unit to be transferred easily from one drum to another, with a hand hoist or lifting bar. Pumping action of the unit is entirely automatic. Operation is controlled usually with the automatic pressure switch. It is being offered in six different discharge capacities and pressure combinations to meet different service requirements.



Shell Degreaser

Phillips Mfg. Co., 3475 West Touhy avenue, Northtown station, Chicago, now is offering an automatic portable shell degreaser for handling 20 to 75-millimeter shell. It requires neither steam, water nor gas connections. Also offered is a stationary degreaser built along the same lines to handle larger shell. The degreaser utilizes a conveyor belt equipped with swiveled carrier basket-pockets, to automatically and continuously place the shell in position for forcing solvent in the shell interiors under pressure. Solvent injection is at an angle that avoids the forming of air pockets and insures thorough flushing.

The accompanying illustration shows passage of shell through the degreaser. In this unit shell with openings at both ends follow one path and those closed at one end follow another. After the shellcase has been carried downward through



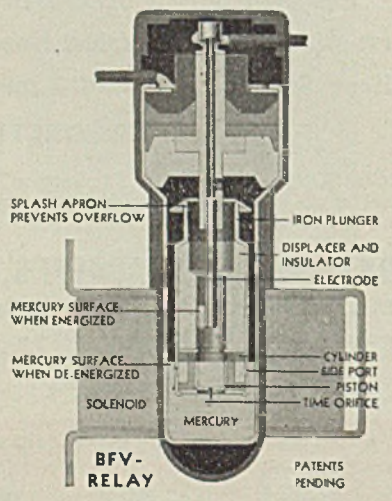
the degreasing vapor and has been subjected to solvent via pressure, it rises on the conveyor and the liquid drains out.

The shell then passes through a hot vapor zone and reaches the loading and reloading station drained dry and clean. Cases open at both ends follow the other path which provides for horizontal travel over a section where two sets of spray heads inject solvent under extra pressure.

The conveyor and its driving motor form a removable section mounted in the upper portion of the housing, permitting easy access to the interior of the degreaser for adjustments and cleaning. The solvent pump assembly on the lower side of the housing is designed for continuous operation. Thermostatic switches guard against over-heating.

Time Relay

Durakool Inc., Elkhart, Ind., announces a new hermetically sealed BFV time delay relay suitable for communication systems, such as telephone and signal work,



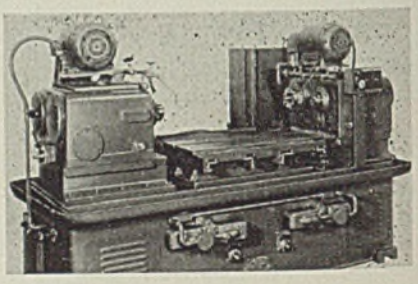
machines, motors and electrical circuits where a delayed action is required before a secondary or auxiliary circuit is called upon to operate. It also lends itself to recycling operations and flashing actions.

The relay has a delayed action in closing the circuit and a quick reset. Its tube is filled with an inert gas, which cools and quenches the arcing. The hermetically sealed mercury time relay is unaffected by the elements which ordinarily oxidize and disintegrate the contacting materials.

Innumerable types of delays can be readily built up on the foundation of this unit, according to the company. Seventy-five amperes in a C model are now available. The B model, illustrated, has a maximum of 30 amperes. By paralleling the larger C relay, 140 amperes are readily obtainable. By tripling, a 200-ampere capacity is available. The company at present is offering the relay in capacities up to 75 amperes, with solenoids wound for any voltage and frequency.

Centering Machine

Snyder Tool & Engineering Co., Detroit, announces a heavy-duty, double-end facing and centering machine in sizes that will take work lengths ranging

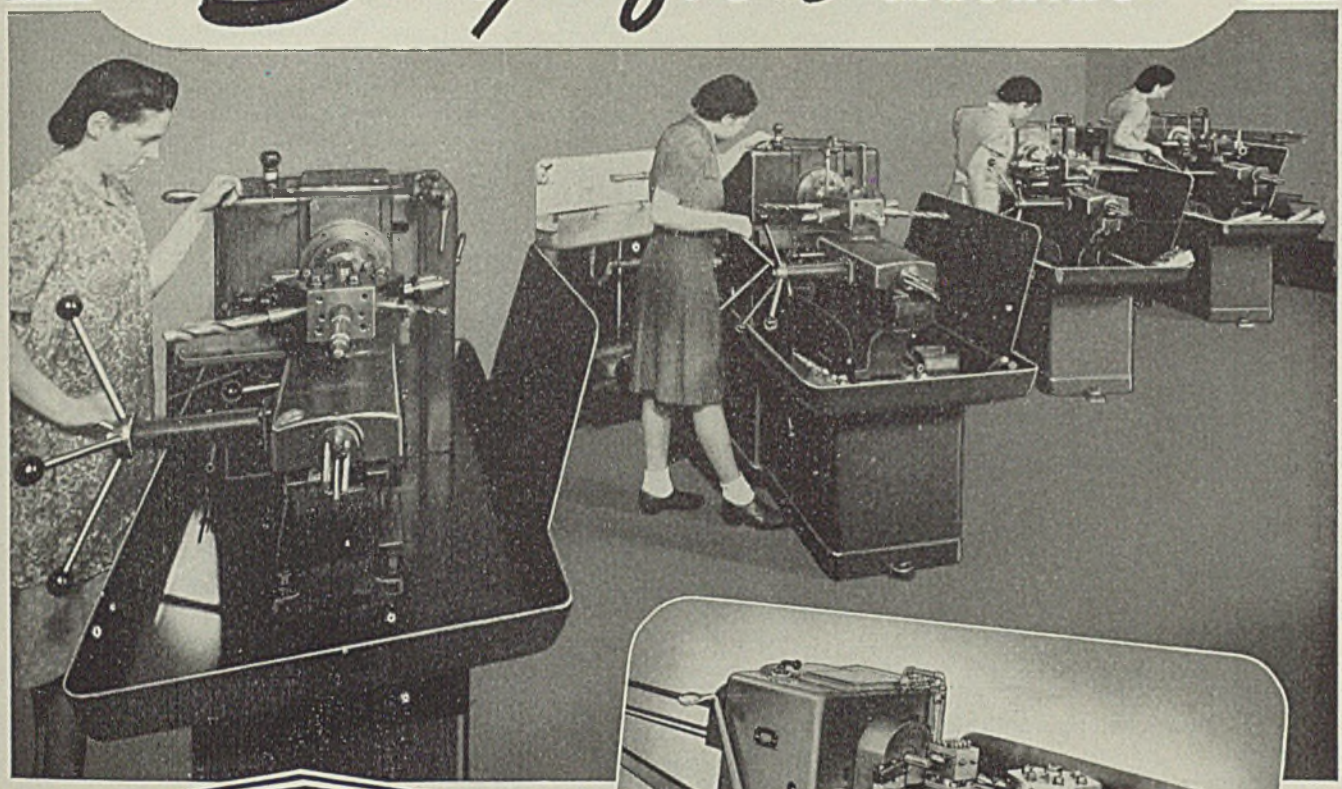


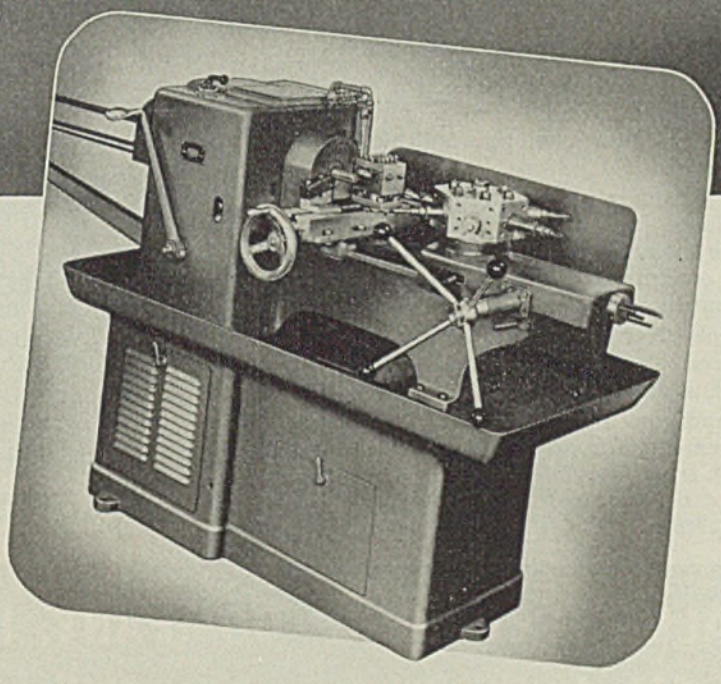
from 12 to 20 inches; 20 to 28 inches; 28 to 36 inches and 36 to 44 inches. It consists of two units, each equipped for milling and centering.

The milling spindle is provided with a No. 50 National Machine Tool Builder's standard taper. It is worm wheel driven. The centering spindle is ball-bearing mounted and is of quill type construction, the quill having hydraulic feed.

Cutter range for milling is 3 to 8 inches and center drills may range from 5/16 to ¾-inch. The machine is hydraulically operated and electrically controlled. Moving parts are lubricated by an oil pump from a built-in reservoir. The welded steel base of the machine encloses the hydraulic equipment, piping, etc., and adjustable trip-dogs which are set up at the beginning of the job for the respective work lengths. Coolant is contained in an auxiliary tank in the rear of the machine. The cover of this tank is a removable chip tray.

Beginners learn rapidly on this *Simplified* machine





OSTER

NO. 601 "RAPIDUCTION" Turret Lathe

In double-quick time, you can train new operators on the Oster No. 601 SIMPLIFIED Turret Lathe. This motor driven machine is equipped with manually controlled, 6-position turret, or with plain saddle, as desired.

Another option is the choice of either worm drive or direct drive. Automatic chuck capacity is 1½" round bar. Swing over bed is 14". Swing over cross slide is 6½".

Complete details in Catalog 27-A. Write, wire, or 'phone for a copy.

THE OSTER MANUFACTURING CO.
2037 East 61 Street • Cleveland, Ohio, U. S. A.

Aircraft Cannon

(*Continued from Page 79*)

millimeter cannon. A high firing rate is produced and maintained only at the expense of a short-lived gun barrel.

It may be that most recent advances in alloy steels and heat treatments of barrel forgings permit such high rates of fire but exhaustive tests made by foreign cannon manufacturers have shown that for reliable operation, and even in hectic second-to-second air combat, reliability is the factor most desired. This means automatic cannon are best operated at a moderate cyclic rate, varying between 350 to 500 rounds per minute.

Again, it must be said that new methods of heat treating barrels, combined with cleverly designed ammunition will allow sustained high firing for short periods. If this can be done, air combat takes on a new aspect. For if you increase a firing rate by 100 per cent, you have a tremendous advantage.

The Madsen Co., operating in Copenhagen, Denmark, has had many years of experience with machine guns and automatic cannon. In numerous competitive tests under adverse conditions, in France and England, their weapons have stood up amazingly well.

Madsen Guns Among Best

Firing continuously thousands of rounds of bullets and shell, sometimes for half an hour at a time with interruptions only for replenishing ammunition belts, affixing new drums or for intentional interchange of gun barrels, these operational tests have proved the worth of their carefully designed guns and ammunition. Sometimes after firing 10,000 rounds, the accuracy of the gun barrel was not impaired in the slightest degree, wear being constant and the average dispersion at the target remaining the same as it was at the beginning of the tests.

An analysis of cannon designed specifically for aircraft is not amiss here. While the 20-millimeter was and is still in vogue, the Madsen Co. decided some years ago to design a new gun that carried all the features of their 20-millimeter which compared generally with several other well known makes, but that had the hitting power of a gun of much higher caliber. Here is what they did.

They chose a 23-millimeter as an optimum caliber. Using the same overall length of gun and barrel with only the slightly larger bore, they managed to retain the same total weight of gun but employed a somewhat heavier shell. Whereas the 20-millimeter explosive shell weighed 4.64 ounces, the 23-millimeter weighed 6.00 ounces. This applied to the shell only, not the complete round, which weighed 10.5 and 11.9 ounces re-

CONSERVATION and SUBSTITUTION *In Ordnance Work*

REPRINTS AVAILABLE

• To supply help and information on the acute need of conservation and substitution of critical materials in ordnance production, STEEL began in the October 5, 1942 issue a continuing series of articles published with the approval of the Army Ordnance Department.

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spectively. While the explosive content could be increased by one-third, the actual result of the explosive action could be estimated as almost double that of the smaller shell, due to progressive ratio. For the same reason, the larger caliber shell up to and above 37-millimeter are yet more preferable. However, we then come into the heavy gun group, with slower firing rate and excessive recoil.

The 23-millimeter has a muzzle velocity of 2395 feet per second compared with 2920 feet per second for the 20-millimeter. The latter was an excellent initial velocity, but experience has shown that a somewhat lower figure is sufficient for the short ranges common in air combat. Theoretically, the higher the muzzle velocity, the better, for even a fraction of a second's error on a target may mean a miss. But since velocities, time of flight, trajectory curvature and other characteristics do not enter into pilot or turret gunnery as yet because use of tracer ammunition is depended upon for the control of gunfire, the 23-millimeter has been an efficient size.

Ammunition of Explosive Type

But because of precedent and the necessity of using proved designs as well as available manufacturing tools and methods, the 20-millimeter is likely to remain standard for intermediate aircraft cannon for some time to come.

Aircraft cannon ammunition is largely explosive, being supplied with a sensitive detonating point that explodes on contact, even with a wing fabric. Some are armor-piercing, the shell being made with a specially hardened steel nose, without the sensitive fuse. Then explosion occurs after penetration. The fault here is that nonresistant parts may be penetrated without causing an explosion. Tracer shell is used only for observing and correcting gunfire, and incidentally, for its incendiary effect. In modern planes, however, an explosion is much more likely to cause a fire than a tracer shell.

With a view to eventually applying fire control devices for airplane based cannon, studies have been made to determine the effect of varying altitude on velocities and trajectories. While at the moment, little, if any, practical use is being made of the results of such studies, future mounting of heavier cannon on Flying Fortress type planes and flying boats with consequent longer ranges will require preparation of ballistic tables.

The ballistics of bullets and shell fired from airplanes are extremely complicated. There are probably some conditions that never will be predictable, assuming that cannon and ammunition

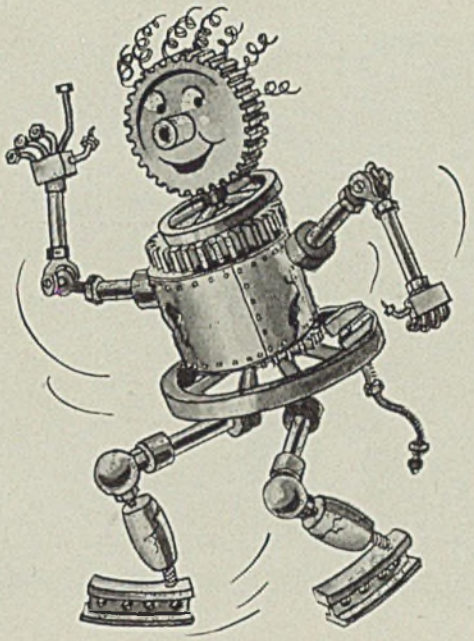
Segregate Your Scrap Metal by Alloy Content

SCRAPPY SAYS:

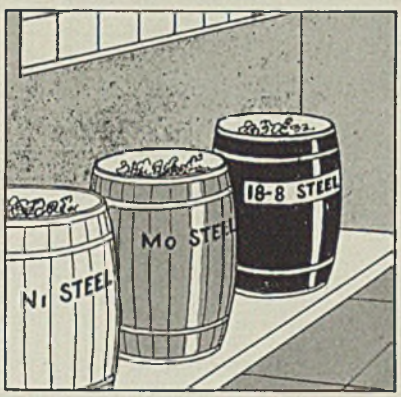
To insure your supply of alloy steel needed for weapons of war—

To prevent the waste of tons of alloys lost as residual content in plain-carbon steels—

HERE'S WHAT YOU DO:



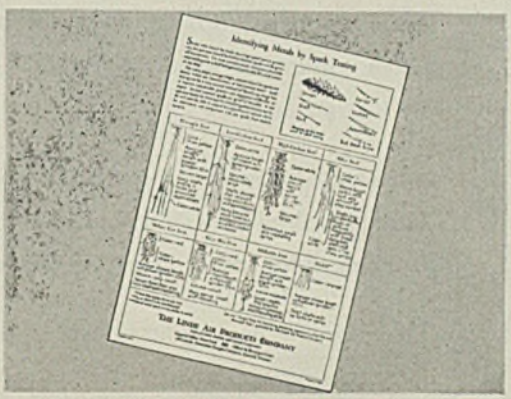
1. Segregate your alloy metal at the time scrap is created—at the lathe, shears, planer, screw machine.



2. Place the scrap in containers correctly labeled with the known analysis of the steel or its grade number.

3. Maintain a system of replacement when containers are full. Label replacements to compare with filled containers.

4. Keep the alloy metals segregated in the scrapyard while they are waiting shipment back to the steel mill.



5. If scrap does become mixed, or if you have metal, such as old equipment, of unknown analysis, you will find spark testing is helpful in identifying the alloy content. The Linde Air Products Company, another unit of Union Carbide and Carbon Corporation, has published the spark-testing chart shown here. If you can use it, ask for as many copies as you want, by Form Number 4666.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York, N. Y.

As a producer of ferro-alloys and alloying metals used in the production of alloy steels, Electro Metallurgical Company is concerned with the conservation of these vital materials. From their fund of metallurgical information Electromet's technical service staff can advise you on the selection, fabrication, and use of alloy steels. Your request for this service will not obligate you in any way.

Electromet
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as we know them will continue to be used in the near future.

Fighter planes of the past have been unable to take cannon mountings because of limited space within the wing, necessitating outboard mountings mostly underneath the wing. This caused drag, introduced other undesirable aerodynamic characteristics and had so little in common with the modern streamlined fighting plane that outboard mountings have been practically abandoned. Early attempts to install cannon within the wings were difficult, because the wing sections were narrow and part of the gun mechanism, particularly the feed guide, protruded above the upper skin, necessitating fairing.

More powerful engines now permit heavier wing sections to be built and so several types of modern planes have completely buried wing cannon installations, the most notable among them being the British Hurricane II. The Hurricane has proved the most versatile fighter plane in the world. First to mount eight machine guns in the wings, it can now take either four 20-millimeter cannon, eight 50-caliber machine guns, twelve 30-caliber guns or a combination of those weapons.

Ammunition Capacity the Problem

The Spitfire is equipped with only two 20-millimeter cannon. Installing a cannon on an adjustable wing mount (for it must be adjustable on the ground within restricted limits to obtain predetermined convergence points for specific types of combat) is not the principal problem confronting aircraft armament designers. The guns have to be fed with shell, belts of them, each with a mechanical feeding device that hitches the belt along its way to reduce the strain on the gun mechanism, which under severe gravity loadings has been known to fail completely.

There is not alone the question of providing room for all the ammunition containers; the weight factor is an important one. Powerful engines or no, the useful load of a fighter plane still has limitations. The cannon with their mountings constitute a sizable weight; the wing structure is stiffened to take up the increased recoil from the heavy weapons; armor plate has been added to resist cannon fire from enemy planes; how much is left for ammunition? Two of three hundred rounds per gun in a four-cannon ship is a lot of ammunition, but still not more than half a minute's consecutive firing supply.

That half minute represents anywhere from 8 to 15 bursts of fire, and anyone's guess how many enemy aircraft shot out of the sky. The fact is, many fighter planes have been forced out of combat or been shot down for lack of am-

munition. Obviously one cannot continue to load a plane down with excessive gun food. There is an optimum loading for each type of gun, each type of plane, and it is further dependent upon the type of combat and whether or not it is short-based.

What about safety factors in airplane shell-firing guns? Most 20-millimeter ammunition is made detonator-safe by the inclusion of an element or a device that aligns the contact point with the fulminate of mercury percussion element only when the shell has been fired and has actually left the barrel. Madsen ammunition has a clever device whereby the air pressure on the nose of the shell depresses a spring plunger, this plunger then releasing a cross pin which normally separates the contact point from the percussion element. The spin of the shell throws out the cross pin, and the shell is ready to explode on contact. Other makes employ similar safety devices, practically all of them depending upon the action of centrifugal force to "arm" the shell.

One disadvantage of the 20-millimeter shell is that it is too small to incorporate a bore-safe device as an additional safety factor. A shell may become stuck in a gun barrel which is heated to an extremely high temperature. This heat may explode the shell. This has happened, though in rare instances. In some cases, the steel being heated to such a high temperature, the barrel did not shatter but simply bulged like a balloon after the shell had exploded.

The 37-millimeter shell can and does contain both the detonator-safe and bore-safe elements. This 1½ pound shell has a much more devastating effect than the smaller ones, but guns of this caliber usually must be mounted in the nose of ships to fire through the propeller hub, thereby limiting the quantity to one, or as fixed nose guns on multi-engined aircraft.

On these large airplanes, they may also be employed in flexible fashion in power-driven turrets. An early example was the 37-millimeter Vickers cannon on a Blackburn Perth flying boat on a semi-flexible mount with limited field of fire. Usually 37-millimeter cannon fire no more than 120 rounds per minute, feeding being through fixed clips containing anywhere from 5 to 25 rounds.

Power turrets with 37-millimeter guns now are coming into use. Several are illustrated here.

Rubber Supply

(*Continued from Page 84*)

some synthetics are so impervious to gases that inner tubes made from them might be expected to hold pressure al-

most indefinitely. As far as elasticity is concerned, natural rubber still holds the premier place and it is easier to process than synthetics because it is softer. It is also superior in tensile strength when properly compounded with carbon black.

By way of summary we might say that the class of materials known generically as rubber possess a wide variety of physical characteristics, some varieties, including the natural product, being better adapted to some purposes than others. This much is certain—that out of our present predicament will emerge a wider and more specialized adaptation of the many hundreds of varieties with which the bounty of engineering science is steadily endowing us.

Eraser—First Rubber Product

A word here concerning the history and development of natural rubber may be of interest. The first notice we have of the use of rubber dates back to the second visit of Columbus to South America, where he observed the natives playing with a black, heavy ball, made of a vegetable gum. But more than 300 years passed before the new substance appeared on European markets in the form of lead pencil eraser (hence the name india rubber or rubber).

Since those remote days, the essential ingredient of this material has been found as a product of various vegetable species in many parts of the world. The modern rubber of commerce, however, is derived from the milky latex flowing in certain characteristically tropical trees, the purest and best coming from Hevea brasiliensis in the valley of the Amazon. Small globules of rubber float in this milky latex. When rubber milk is suitably treated, these globules unite and float in the serum as a soft doughy mass which, on being dried, assumes the firm and elastic solid form known as raw rubber.

The story of the artificial spread of Hevea brasiliensis at the hands of Sir Joseph Hooker, director of the Royal Botanical Gardens, London, and, later, Sir Henry Wickham, is of considerable interest. Out of a consignment of 70,000 seeds, 2000 germinated and most of the young plants were sent to Ceylon, where they throve. From this modest beginning, seeds and plants were distributed to other countries, the problem of transporting the former being simplified by the discovery that moist powdered charcoal assisted in the retention of their fertility over a considerable period. Those countries now producing the largest quantities of plantation rubber include Malaya, the Dutch East Indies and Ceylon; but lesser quantities come from India, Sarawak, Borneo, French Indo-China, Siam and Africa, and there are present indications that we may re-

turn to the valley of the Amazon to recoup our dwindling stocks.

Imports of natural rubber into the United States increased heavily from under half a million long tons in 1938 to some three-quarters of a million tons during the first nine months of 1941, more than 95 per cent of which came from British Malaya, the Netherlands East Indies and nearby islands. Normally some 75 or 76 per cent of this commodity is used for tires and tubes. With the growth of our war needs, military requirements began to absorb larger and larger proportions of the total for the same purposes.

Problems of transportation associated with shipping rates and other factors conspired with increased demands to prevent the accumulation of a sufficiently large stock pile prior to Pearl Harbor to go very far to ease our existing situation. Our stocks on hand at that time amounted to only some 600,000 odd tons, or only about a normal year's supply. How important rubber is to the people of the United States may be gaged from the fact that we normally use more than all the rest of the world put together.

Collected in Cups

Hevea brasiliensis, as shown growing in a Malayan rubber plantation, grows to a height of some 60 or 80 feet, but in the wild state may attain a height of 100 feet with a trunk about 4 feet in diameter. In the soft portion of the bark next to the cambium, or the layer separating the bark from the wood, are found the latex tubes which are no more than 0.0015-inch in diameter. It is these tubes which are cut in the tapping operation. This consists in the removal of a shaving of the bark around a quarter to a half of the circumference of the trunk and commonly at an angle of 30 degrees to the horizontal. The first cut is taken at from 2½ to 4 feet from the ground and a shaving taken every other day—preferably in the morning when the flow of latex is greatest.

As the latex seals the wound, the dripping ceases and the action must be reestablished by taking successive shavings from the cut at the rate of about 0.5 to 1.0-inch per month, right down to the ground, according to the practice of some plantations. Thereafter a new panel is started.

Cups are used to collect the latex, which is then transferred to a pail and taken to the factory as rapidly as possible, sodium sulphite sometimes being added to prevent premature coagulation.

While the modes of preparing plantation rubber differ, the basic procedures in nearly all cases are identical. The latex is first seived and diluted, then coagulated with acetic or formic acid, or perhaps sodium silicofluoride. This

causes the rubber to rise to the surface of the bath as a wet, doughy, coagulated mass, leaving behind in solution small quantities of mineral and organic matter. This coagulum is then pressed between rollers until of the required consistency, thickness and shape. Thereafter it is hung up to dry and eventually packed for shipment.

The two forms in which plantation rubber ordinarily appears are sheet and crepe, the former of a dark brown color as a result of drying in smoke; while the latter, being air dried, resembles straw in color.

The sheet is coagulated in shallow, compartmented tanks and pressed to the desired thickness. Crepe is rolled much more heavily, the coagulum being torn and pressed until it is sufficiently thin to dry in air without artificial heat. Drying is accomplished by hanging up in well ventilated sheds for about a week; while sheet, being thicker, requires exposure to the smoke of a wood fire for about a fortnight.

The rubber industry may be said to have had its beginning in the discovery of hot vulcanization by Charles Goodyear of New Haven, Conn., back in 1839.

This process involves heating the rubber with sulphur at temperatures ranging from 250 to 320 degrees Fahr. The result is a material which is stronger, more elastic and less affected by temperature changes than the raw material. Such changes may be controlled through alteration in the amount of sulphur and the temperatures employed; and to some extent by materials added in powdered form.

Reclaim Rubber: Apart from natural rubber and the artificial product, there still remains another source of supply which has been all too little publicized—namely, reclaimed rubber. While the rubber industry itself has been not unmindful of the commercial advantages of conserving waste material, it is not inconceivable that resistance might be encountered to the sale of an article containing "shoddy", as reclaimed rubber used to be called. As a matter of fact, reclaimed rubber has certain advantages over crude, including lower viscosity with a given amount of solvent. Then, too, adhesives made of reclaimed rubber-resin combinations cannot be duplicated with crude.

The process of recovery of rubber from discarded tires, inner tubes, rubber overshoes and indeed almost any article containing rubber is carried out chiefly by one of three processes—the "pan", "acid" or "alkali". In the pan process, occasionally referred to as the "heater" or "open steam process", scrap containing no fiber is chopped by high speed revolving knives or ground on a rubber

mill. Thereafter it is screened through a mesh which may vary from 1 to 50 per inch. At this point the screened stock is run over a magnetic separator to remove fragments of iron or steel, then washed and riffled to take out nonmagnetic particles, sand and other similar impurities.

The ground scrap is now mixed with oils or solvents such as pine tar, mineral oil, crude naphtha, dipentene or cetera and then loaded in an open steam heater holding some 5000 to 10,000 pounds, where it is "de-vulcanized" for 8 to 24 hours at 325 to 400 degrees Fahr. Actually this action is chiefly a plastication due to depolymerization rather than de-vulcanization. The ground scrap, now in cake form, is dried and milled into a sheet under heavy rolls or batched in internal mixers. Thereafter, it is forced through a fine screen and refined under heavy rolls until paper thin. These thin sheets are next built up in laminated form on a drum and cut off when the desired thickness is obtained.

Old Tires Chopped Up

If the scrap is in the form of used tires, the first concern is the removal of the wire bead. Then follows chopping by cutters or corrugated rolls and defiberization in a bath of sulphuric acid or caustic soda. In the former, or acid process, the stock is boiled in open lead-lined tanks, the cotton being converted into hydro-cellulose which is washed out.

Neutralization with alkali and mechanical squeezing renders the rubber ready for treatment by the pan process. By contrast, the alkali process consists in treatment of the scrap in a closed digester which "devulcanizes" and defibers at one and the same time. Although the latter is cheaper to operate, the acid process is sometimes preferred for certain purposes.

The reclaiming capacity of the United States is in the neighborhood of a third of a million tons annually. With a country-wide maximum speed limit, mileage limitations due to gas rationing and five tires per car, it is confidently anticipated that necessary civilian transportation for all purposes can be maintained.

After November, no civilian will be permitted to retain used tires in excess of the alloted five, as many are doing in fear of their present set's failing. When recapping becomes necessary, instead of waiting to have his own tires rejuvenated, he will be handed a recap as each tire reaches the limit of its useful life and before the fabric is damaged. All of this will involve compulsory inspection and the loyal co-operation of the possessors of used casings which can be recapped and reissued.

Management "Know-How"

(*Continued from Page 93*)

turing methods to double production in the same man-hours, to cut costs to half the original amount and to build additional quality into the gun. Through new processes, more plentiful materials were substituted for critical materials; *the number of special types of steels required was reduced by two-thirds.*

Co-operation with machine tool manufacturers resulted in the development of new machines which greatly shorten manufacturing time, releasing operators and tools for other assignments. For example, side plates originally milled individually were pressed nine at a time. This process was later improved by stamping the plates on a punch press, using five men for the operation instead of 40, thus enabling one division to transfer 35 men to other operations.

Vertical reamers and drilling machines now handle up to 12 gun barrels at one time. Electric riveting, replacing the conventional cold hammer method, halves the production time on the riveting operation while doing a much more satisfactory job.

Discussing the problem of maintaining war products at maximum effectiveness on the fighting fronts, Mr. Sloan says:

"Beyond the problem of production itself is that of maintaining equipment in satisfactory operating condition on the fighting fronts. To this end General Motors facilities and experience have been placed at the disposal of the military authorities for the training of Army and Navy personnel, for the planning for adequate supplies of parts and for the establishment of maintenance and repair depots in the combat areas. For many months the corporation and its divisions have conducted a series of schools for training technicians and instructors in the services, who become operating specialists or, in turn, conduct technical classes for the men in the armed forces.

Co-operate with Armed Forces

"The experience of many years in providing parts for automobiles and other peacetime products for world-wide markets has enabled the corporation to make suggestions as to required parts supply which have saved time, shipping space and millions of dollars worth of critical materials. General Motors service and maintenance experts likewise are co-operating with the technical officers of the armed forces to help keep General Motors war products operating at highest efficiency wherever they may be used on the widely scattered fronts."

A most important feature of this collaboration with the military services and a significant factor in product improvement concerns the maintenance of direct engineering liaison with the active fighting forces for the purpose of securing first-hand reports on the operation and performance of GM equipment. This facilitates making essential changes and improvements with the least possible delay. Thus many GM observers and technicians are now in overseas combat areas for the final proving ground for military equipment is the fighting fronts. Data on performance under varying conditions, stamina in combat and maintenance problems are made available to production engineers as completely and as rapidly as possible. It thus becomes possible to establish a broader basis for progressive technological advance in military production—a responsibility which the corporation is endeavoring to meet.

Modern implements of war must be specialized in order to meet specific needs. Mechanical equipment intended to perform a particular duty must be of highly intensified design in order to give maximum performance in that one special service. This means that for duties other than those for which it was designed, an item of equipment may render, in comparison, mediocre or even

inferior performance. In other words, a piece of equipment designed to operate at maximum effectiveness under certain conditions will not operate at the maximum under all conditions. For instance, an airplane may be designed for a high standard of effectiveness at 15,000 feet and possess all the characteristics required for superlative performance at that altitude, but fail to match at 30,000 feet a plane designed specifically for that altitude. On the other hand, the special qualifications required to meet certain operating conditions at 30,000 feet may actually detract from performance at lower altitudes.

This principle is illustrated in the utilization of the Allison liquid-cooled airplane engine, which, in certain designs of planes, is highly effective in medium-altitude fighting, while the same engine with adequate supercharging capacity, added, and in other designs of planes, is rendering equally effective service at very high altitudes. Yet the former combination would not perform effectively under the latter conditions, as any explosive type of engine loses power rapidly in the higher altitudes, which characteristic must be corrected for by some type of supercharger. In general, it may be said that in the engineering of military products, as in the engineering of automobiles and other peacetime products, the development, in a single unit, of superlative performance on all counts and under all conditions is impossible. Extreme qualities in some performance factors necessitate compromises and lesser qualities in others. Viewed from another angle, this principle of selection is, of course, the very thing that makes possible the engineering of superlative performance in the specific area desired.

Much of the progress described in the typical examples below would not have been possible had it not been for the co-operation of other manufacturers and of Army and Navy technicians.

Redesigning Reduces Cost: As redesigned by Pontiac, shoulder rests for Oerlikon guns have been made simpler and less expensive. Shoulder rests are now completely adjustable for every size gunner. This improvement saved $45.22 on each gun.

Substitution Saves Materials: Previously drawn from brass and then nickel and silver plated, headlamp reflectors are now drawn at Guide Lamp Division from less critical steel, enameled and coated with vaporized aluminum. Metal used per 100,000 vehicles:

Old Type, Pounds	New Type, Pounds
65,000 copper	78,000 steel
32,000 zinc	5 aluminum
275 nickel	
160 silver	

New Machines Do New Jobs: Cadillac craftsmen designed completely new machines for producing complex supercharger rotator vanes. Time per piece now is reduced from 125 man-hours to 10; material saved amounts to 496,000 pounds per year.

Castings for Forgings: "Armasteel" castings supplant steel forgings; save large quantities of vital materials and many man-hours of machining time because there is less excess metal to be removed.

New Materials Replace Rubber: Battery cases formerly made of hard rubber are now produced from asphalt and cotton linters at Delco-Remy Division.

Steel Replaces Aluminum: Aeroproducts division is now building stronger, lighter propellers by substituting hollow steel construction for solid aluminum blades. Saving is 100 to 200 pounds of aluminum per propeller. This is a saving of 75 pounds in weight of complete assembly.

Speeding Engine Production: At Allison Division new multiple spindle drills perform 14 lapping operations simultaneously, superseding single radial drill operation in these liquid-cooled aircraft engines. For this operation time was reduced 80 per cent; production was

increased 393 per cent and many machines were released for other vital work.

Weighs 1/5 As Much: Developed by General Motors Research Laboratories and produced by Electro-Motive Division, a newly designed "pancake" diesel engine weighs only one-fifth as much as and takes only one-third the space of any previous ocean-duty diesel of the same horsepower. It helps provide new Navy sub-chasers with increased speed and longer cruising radius.

Subcontracting: Of 132 parts in an aircraft cannon, Oldsmobile, as prime contractor, builds only three basic parts. Production of the remaining 129 parts is spread among 53 subcontractors, working under GM direction, who already had the necessary manufacturing equipment.

Twelve Times as Fast: At Buick, a newly designed electric welding machine makes it possible to weld diesel engine crankshaft balancers at a rate of 36 per hour instead of 3, as formerly.

Conserving Vital Materials: Chevrolet engineering ingenuity has developed satisfactory substitutes resulting in the following critical materials saved per 100,000 military vehicles: 5,000,000 pounds rubber, 200,000 pounds chromium, 1,200,000 pounds of nickel, 125,000 pounds latex, 500,000 pounds copper, 70,000 pounds tin.

Big Savings from Small Items: In tank manufacture at Fisher Body, *attaching a 3-inch piece of common steel for electrical connection at the end of each welding rod is saving an important amount of critical welding material. This scheme could be utilized by every arc welder.*

Molybdenum

(*Continued from Page* 96)

after molybdenite, which it commonly replaces. The color varies from white to gray and various shades of pale green. At best the mineral is obscure, and common limonite staining further confuses its identity.

Powellite frequently can be recognized by its relationship to molybdenite, as it is the only mineral, except molybdite, to replace flakes of molybdenite at their margins or along cleavage planes. Molybdite, as a rule, is easily recognized by its bright yellow color and fibrous structure when it is closely associated with molybdenite. Powellite and molybdite have not been observed occurring together even though powelite occurrences as an oxidation product are probably as numerous as molybdite; however, powellite may be less abundant.

The best and easiest way to identify powellite is by the use of a fluorescent light of the type used in prospecting for scheelite. Powellite fluoresces a golden yellow. About every third occurrence of molybdenite, not showing molybdite, examined by the author, showed powellite on or in the molybdenite grains, which was not recognizable before using the light. It is not uncommon to find powellite which has completely replaced molybdenite and in which the presence of molybdenum was not suspected until an examination was made under a fluorescent light.

It is fairly evident that powellite occurs as a primary mineral, and that it also is possibly a more common alteration product of molybdenite. Since powellite forms as a primary mineral, there seems to be no good reason why tungsten should be a prerequisite in its formation. Further work should be done to determine under what conditions powellite may form and what critical relation, if any, tungsten may play in the process.

Molybdite ($Fe_2O_3 3MoO_3 7½ H_2O$) (?) the yellow oxidation product of molybdenite, is easily recognized. It occurs as fine, needle-like crystals, usually evident under a hand lens and very conspicuous under a microscope. Some varieties are

earthy with a pale-yellow color, so that pale-yellow iron stain resulting from the oxidation of pyrite has been mistaken for molybdite. The association of molybdite and molybdenite is general; in fact the absence of molybdenite has never been noted where molybdite has been found. There are however, numerous occurrences of molybdenite without molybdite, which show powellite instead as explained in a paragraph under powellite.

Molybdite has never been a source of molybdenum, although apparently feasible methods for its recovery have been worked out. The chief difficulty in its recovery is its fine grain and the fact that as it is soft and brittle it becomes extremely fine even with moderate grinding. Also, since it is an oxide the flotation methods applied to the sulfide are not effective. Molybdenite resists oxidation so that molybdite is not developed in quantity except close to the surface. This limited development is against molybdite ever becoming an important source of molybdenum.

Deposits Producing Molybdenite in 1942: Molybdenite production, as previously stated, has come from relatively few mines, and a review of these deposits is of particular interest, because they have had considerable mine development in recent years. Readers interested in further detail than is given here can use the references included with the discussion and at the end of the paper.

The table of world production, Table 1, p. 86, Nov. 9 issue of STEEL, shows that since 1925 the greatest volume of production has come from the United States and Norway until 1934 and 1935 when Mexico and Morocco were added to the list. Since 1940 South America has become a potentially important producer.

The important producers have been the following:

In the United States: Climax, Colorado; Questa, New Mexico; Copper Creek, Arizona; Bingham, Utah; Chino, New Mexico; and Miami, Arizona.

Outside the United States: Cananea, Sonora, Mexico; Knaben, southern Norway; Azegour, French Morocco; and Braden, Chile.

The mine at Copper Creek closed down in 1940, leaving only five producers of molybdenite in the United States. Thus, there are only eight commercially important producers of molybdenite in the world and only four of these; Climax, Colorado; Questa, New Mexico; Knaben, Norway; and Azegour, French Morocco; produce molybdenite as the principal product. The other four are large producers of copper with molybdenite as a by-product.

These sources of molybdenite, except Knaben, Norway have been developed largely since 1923, and only Climax and Questa were known or attracted attention as early as the first World war; nor do these deposits represent what have been regarded as typical, that is, pegmatite and associated types; but instead they show a range of conditions represented by contact-metamorphic, hypothermal, and mesothermal deposits.

Deposits in the United States: A number of descriptions of the Climax, Colorado deposit have been published. Climax is about 100 miles west of Denver on Fremont Pass. Mining began in 1917 and was discontinued in 1919. In 1924 mining was resumed at a rate of a few hundred tons of ore per day, which had grown to about 10,000-15,000 tons per day in 1941 yielding some 20,000,000-25,000,000 pounds of molybdenum annually. Ore reserves are estimated at over 140,000,000 tons.

The Questa, New Mexico, molybdenite deposit is a typical vein and the only known vein of its kind to have produced large quantities of molybdenum. The total production from 1921 to the end of 1941 has been 13,711,661 pounds of molybdenite.

Questa is a small village in the western foothills of the Sangre de Cristo Range in Taos County, New Mexico. The

molybdenite veins are in Sulphur Gulch, a tributary of Red river, and they are about seven miles east of Questa. A little molybdenite was produced in 1918-19, when the mine closed down until 1921.

Mineralization is in fissure veins near the contact of a small stock of albite granite, probably of tertiary age intruded into pre-Cambrian schist, and a series of sedimentary and volcanic rocks of uncertain age.

Copper Creek, Arizona: The molybdenite deposit on Copper Creek, known as the Aldewinkle Mine was discovered incidental to exploration for copper during the first World war, but development of the molybdenite was not attempted before about 1933 or 1934, and mining was continued from then until 1939. The total production was several million pounds of molybdenite, with a minor amount of copper by-product.

Bingham, Utah: The large low-grade copper orebody of the Utah Copper Co., Bingham, Utah, needs no introduction; it is one of the largest low-grade copper mines of the world. Recovery of molybdenite began there in 1936, and since 1936 the Utah Copper Co. has been second only to the Climax Molybdenum Co. in the quantity of molybdenum produced every year.

Exact figures on production are not available, but the 1941 yield was probably 8,000,000-10,000,000 pounds of molybdenum content in concentrates. The molybdenite content of the ore is said to be .02-.04 per cent or 0.4-0.8 pound of molybdenite per ton. Recovery of so small a quantity is possible because of the ready flotability of molybdenite, which collects with the copper sulfide concentrate. Thus the copper concentrates become the molybdenite ore. The cost of recovering the molybdenite lies largely in its separation from the copper sulfides, which is not an overly difficult or complicated process.

Chino, New Mexico: The Chino orebody occurring near Santa Rita, New Mexico, is similar in many respects to that of the Utah Copper Co. mine, although the ratio of chalcocite to primary sulfides is somewhat higher at Chino. Molybdenite production began in 1939, and the annual production is probably under a million pounds. Very little has been published as to the occurrence of molybdenite. During a brief visit the writer found relatively pure molybdenite in small masses and grains, commonly in association with quartz. Some parts of the pit seem to show slightly more molybdenite than other parts, and the overall average of molybdenite content, based on values recovered, is said to be less than at the Bingham copper deposit.

A very interesting association observed in the Chino pit, which deserves mention, is native copper with molybdenite. The native copper is medium to fine grained, occurring in small quartz veins and masses and differs much in appearance from the larger masses of secondary copper commonly found. Small scattered grains of molybdenite occur locally in the quartz intermingling with the copper, but the molybdenite is not wholly coextensive with the copper. The evidence points to a primary native copper deposited almost contemporaneously with the molybdenite.

Miami, Arizona: Molybdenite as a by-product of copper production began at Miami in 1939. The amount of molybdenite produced is not known, but the grade of ore reported is 0.18 pounds of molybdenite per ton of ore.

Again the occurrence of molybdenite is similar to the occurrence noted for the disseminated copper in porphyry in Utah and New Mexico. The molybdenite appears widely distributed in quartz veinlets with pyrite and chalcopyrite deposited in the following order: molybdenite with quartz, pyrite and chalcopyrite with sericite forming last in vugs.

Other Copper Deposits: Molybdenite is found in all the important copper deposits in the southwestern part of the United States and probably in Mexico.

A search of the literature showed no exceptions. However, at Ajo, Ariz.; Ely, Nev.; Morenci, Ariz. and other places, the molybdenite content is said to be too small for production as a by-product, but Bagdad, Ariz., is a potential small producer. Molybdenite is reported at Cerro de Pasco, Peru, and at Chuquicamata, Chile. The copper veins of Butte, Mont., show little or no molybdenite, and the copper deposits of South Africa seem to have none.

Deposits Outside the United States: Cananea, Sonora, Mexico, was the first of the copper ore bodies to produce molybdenite as a by-product. The principal production from the Cananea district is copper, and early discovery was made easy by conspicuous outcrops of ore. After the exhaustion of the older mines a drilling program was followed to explore a large low-grade area of copper mineralization, and this resulted in the discovery in 1926 of the Colorado orebody beneath several hundred feet of relatively unmineralized rock. Since 1926 nearly all of the copper produced has come from the Colorado ore body. Recovery of molybdenite as a by-product did not begin until 1933 and has continued at an annual rate of about 1,250,000 pounds of molybdenum contained in concentrates.

Knaben, Norway: The important molybdenite deposits of Knaben are in southern Norway, west from Kristiana and north of Flekkefjord. Production dates as far back as 1880, but was irregular until 1910; and by the end of the first World war 15 larger and smaller deposits were being worked. The three most important were the Knaben mines, the A/S Kvina mines in Tjotland and the AS Dalen mines in Telemarken, each of which had produced over 100 metric tons of molybdenite by 1917. Production was resumed shortly after the war, and it has continued to the present.

Azegour, French Morocco: The first recorded production of molybdenum in Morocco was in 1933 and the last available report estimates a possible production of 250,000 pounds in 1938.

Braden, Chile: In 1939 the Braden Copper Co. made a small production of molybdenite in an experimental plant and 800-900 tons of molybdenite concentrates were reported in 1940. The Braden deposit is the most important of several copper-tourmaline deposits found in Chile.

Reports on NE Steel

(*Continued from Page* 107)

hardness or tensile strength is found to control the engineering properties of gear steels, it is obvious that the hardenability of the new NE steels is of primary importance. This is being given more consideration lately, and much of the information in NE steels is released in the form of hardenability data. Undoubtedly many engineers assume this information to be complex. However, the information is quite simple and capable of direct application. It is possible that during the present emergency steels might have to be ordered and delivered on the basis of hardenability rather than chemical analyses.

Early studies of hardenability involved the quenching of various sized bars and then sectioning these bars and exploring the hardness gradient in the cross section. The results were plotted as illustrated in Fig. 5. Research indicated that the hardness obtained at any point was proportional to the rate of cooling (degrees Fahr. per second through the critical temperature) at that point for the alloy under consideration.

A test was later developed called the "end quench" or "Jominy" hardenability test, consisting of impinging a stream of water on the end of a 1-inch bar as illustrated in Fig. 4. Naturally the cooling rate varies from a drastic water quench (200 to 300 degrees Fahr. per second) on the end surface to a slow

(4 degrees Fahr. per second) air cool at the opposite end. The tests of the cooling rate at various distances from the end produced values also shown on Fig. 4. Plotting the rockwell C hardness from the end of the water quenched face gives a measure of the response of the steel under test to hardening at various cooling rates.

It is, therefore, possible to reconstruct the hardness gradient across any size section merely by plotting the hardness obtained from the end quench specimen to the cooling rate of the point in question. Several such plots are shown in Fig. 1 transposed on the hardenability curves. It is obvious that one test of this type is capable of giving results equal to many previously used tests involving the sectioning of several diameters with different types of quench.

The speed with which the test can be completed and the minimum material used is the reason why the hardenability of NE steels is so widely reported in the form of "end quench" hardenability tests.

High Alloy Content No Must

As a practical example of the usefulness of this information, a number of "end quench" hardenability curves are plotted in Fig. 3. The heavy solid lines show the range of "end quench" results secured with a low-alloy manganese-chromium-molybdenum steel successfully used for many thousands of gears and pinions.

The results are intended to illustrate that high alloy contents are not a necessity for gears if the material is properly treated. The hardenability curves are marked as good, fair, and poor, to identify heats which responded in like manner when subject to the standard oil-quench heat-treating procedures intended to obtain a maximum of 260 brinell for sections up to 8 inches in diameter. Included also are the hardenability curves for straight carbon and various NE alloy steels.

From Fig. 3 it is easily concluded that NE 8739 will undoubtedly cause trouble when substituted in large diameters because of insufficient hardenability. The solution lies in using a water quench for large sections. The NE 8744 and 8749 will be satisfactory, whereas the NE 8949, with a very high hardenability, must be carefully watched to prevent quenching cracks for pinions or gears having excessive changes in section and sharp fillets.

For small sections approximately 1½ inches when oil quenched and 2 inches when quenched in water represented by ½-inch from the quenched end, all the steels shown will be satisfactory when maximum tempered hardnesses of 360 brinell are used. If SAE 1045 or 1050 steel is used, obviously an ordinary water quench is not sufficiently drastic,

and a brine or other solution of faster cooling rate is required.

The "end quench" test and other hardenability data are particularly useful for bar sizes under 5-inch diameter which respond to a liquid quench. When larger sizes up to 30 inches are involved, liquid quenching is not utilized because of the physical impossibility of providing adequate liquid quenching and excessive danger of cracking and hazard of introducing too high an internal stress. To minimize these difficulties, a heat treatment involving a simple air cool is required. Under these circumstances, a single cooling rate is secured and the resulting hardenability is only dependent upon the alloy content.

The most popular normalizing steels were a 3½ per cent nickel with or without 0.20 to 0.50 molybdenum, and the chromium-nickel-molybdenum steels of 0.50 to 0.80 chromium, 1.50 to 2.00 nickel and 0.25 to 0.40 molybdenum. Carbon content usually ranged between 0.35 and 0.50 per cent.

It might appear that little could be accomplished toward conserving alloys under the conditions of the slow cool. However, an examination of the effects of the various alloys upon hardenability indicates definite possibilities. Nickel contents above 1.00 per cent do not contribute greatly to hardenability; in fact, the nickel could be reduced to 0.80 per cent minimum without great effect. *Falk Corp. has made this change in a chromium-nickel-molybdenum analysis to conserve nickel and found no difference in the resulting physicals with identical heat treatment.*

Production Heat Treatment: It is expected that the NE alloy steels will require greater care in heat treatment to produce uniform results. For example, an alloy range specified as 0.20 to 0.40 is subject to 100 per cent variation based upon the substantial percentage differences. The high alloys previously used were not subject to such variations within the given normal specification ranges. Hence, the old high-alloy steels could be abused in heat treatment by quenching within large variations in temperatures, etc., yet end with substantially uniform results. The use of high alloys was sometimes merited economically from the standpoint of production uniformity. *The new NE steels will demand greater attention, and provisions for such attention will provide adequate returns.*

Quality: A problem of concern to the metallurgist is that of "inferior quality" steels resulting from the pressure being placed upon the metal producers. As yet, this trend is not noticeable in the smaller sizes but does manifest itself in large ingots and forgings in the form of increased segregation and refractory inclusions. The problem is one of ascertaining just how many and what types of defects can be accepted with assurance of satisfactory service performance.

Cracks, forging bursts, seams and other discontinuities cannot be tolerated. Refractory inclusions or sulphide stringers which do not give definite indications when magnetically tested can be quite high in number without affecting the strength of the steels.

The problem of the effects of nonmetallic inclusions was studied extensively. Tensile, impact, torsional fatigue (because it is more sensitive to notch influence than a bending fatigue specimen) and roller tests were made in both the traverse and longitudinal direction. The specimens were taken from portions of forgings having refractory inclusions approximately 1/16 to ¼-inch long and containing as high as 50 to 100 such inclusions per square foot of area.

All the tests showed that the inclusions did not greatly affect the physicals. It is, therefore, necessary in the war effort that a careful check be made on all so-called "defective" material in order to minimize unwarranted rejections which might absorb considerable time for replacements.

Manganese sulphide and other non-

metallic inclusions produce sharply delineated stringers or less distinguishable "ghost lines". Although appearing somewhat harmful, they are acceptable for normal service when of small depth. At the Falk Corp., the materials inspectors touch these spots with a file, and if they disappear when a few thousandths of the surface is filed off, they are considered harmless.

Peterson of Westinghouse reports in *ASTM Proceedings*, Vol. 39, 1939, that tests on forgings with "ghost lines" showed no reduction in endurance limit when longitudinal to the test specimen and but 12 per cent reduction when transverse to the test specimen.

With present perfected welding technique, there is no reason why defective forgings of large size should not be repaired and salvaged by welding.

It can seemingly be safely predicted that as the war effort continues the gear engineer and his associates must face the possibilities of accepting so-called "subquality" steels, perhaps resulting from material rejected as unsuitable for the armed services and also caused by the pace of production. *It might be desirable to adopt the proper frame of mind pertinent to this problem.*

It appears that the main problem of the engineer or metallurgist when specifying or accepting substitute steels involves securing a material with comparable hardenability to the original material. If this cannot be secured, the heat treatment procedures must be revised to suit.

Substitutions: The Army, Navy and Air Corps have issued and are preparing lists showing allowable NE steels which can be substituted for their previously issued specifications.

The gear manufacturer is, however, faced with other problems of substitutions besides gear and pinion steels. Some of these and their solution will be discussed.

Bearings: With the present restrictions on the use of tin, all gear builders have been forced to adopt some form of lead-base babbitt. Lead-base babbitts were extensively used in the past. There are none but psychological reasons why they should not have expanded rather than diminished in use.

A survey of gear manufacturers indicates a very extensive use of lead-base babbitt over a period of 20 years or more. The usual elements ranged from 70 to 80 per cent lead, 10 to 15 per cent antimony, 5 to 10 per cent tin, 0 to 1 per cent copper. Applications ranged from small gear units to large marine and rolling-mill drives. Our own experience indicates a marked superiority for the lead-base babbitts for heavy-shock or high-temperature conditions. As expected, the intensive scientific research on the lead-base bab-

bitts during the past several years has resulted in substantial improvements. Alloys of silver or arsenic have been found to be particularly effective in improving bearing characteristics.

When using the allowable bearing pressures specified in AGMA practices, the substitution for tin-base babbitt of SAE 13, SAE 14 (5 to 10 per cent tin, 9 to 15 per cent antimony), the lead-arsenic (1 to 3 per cent arsenic) or silver-lead alloys will be found satisfactory.

Most commercial gear unit bearings of sizes smaller than 8 inches have been made with bronze backings. Undoubtedly restrictions will soon be issued preventing the use of any copper-base material. *Steel-backed bearings have been widely used of late and will be satisfactory for all cases.* However, the lack of finished steel might cause some delay in production. It would seem wise to adopt a cast iron backing because there is available cast iron founding capacity and because of the inherently higher heat dissipation.

The bond usually secured with cast iron is approximately 4000 pounds per square inch compared to 8000 to 10,000 for a tinned steel backing.

To increase the bonding between cast iron and lead-base alloys, methods have been developed involving salt baths which eliminate the surface graphite and decarburize the cast iron resulting in an actual steel surface with the voids formed by the removal of graphite acting as additional anchorage. The cast iron is coated with a low-surface-tension lead-antimony base alloy and then babbitted in the usual manner. Bond strengths equal to tinned steel are secured.

Oil Retainers: Most oil retainers or shaft sealing mechanisms for commercial gear units were made of aluminum or bronze because of the antiscoring properties required with the close fits used. Cast iron provides a suitable substitute. Iron castings of small size will be found to be considerably harder than customary when received from commercial foundries. This reflects the trend toward high-strength irons poured by iron foundries. To provide the maximum antiscoring properties and machinability not secured with a hard iron, an annealing treatment above the critical (approximately 1550 degrees Fahr.) should be applied to precipitate a maximum amount of graphite.

Diecastings previously made of aluminum-base alloys have had to be changed to a zinc-base alloy and undoubtedly will eventually have to be made of an antimony-lead alloy. For the purposes for which diecastings are used in gear units, such changes will have little effect upon the performance.

Bolting materials required to be heat

treated per AGMA specifications usually were of high-carbon steel. Shortages of such stock demand the use of low-carbon cold-rolled steel. Since this material cannot be heat treated, the relative factor of safety must be reduced for the duration.

Shafting: Except for unusual applications, the use of alloy steel is not warranted for commercial gear units. Carbon steel heat treated or "as rolled", depending upon loading, will be entirely satisfactory.

Springs: Alloy steel springs, previously made of the popular chromium-vanadium alloy used for equipment associated with gear units, can be changed to carbon-molybdenum, chromium-silicon, silicon-manganese and similar grades.

Plastics: The substitution of plastics for various parts of gear reduction units was, at one time, considered feasible. However, the priority restrictions and price considerations have prevented any substantial trend toward plastics.

Tools: The restrictions on tungsten high-speed steels appeared to be of serious concern to gear manufacturers, particularly as applied to the manufacture of hobs and cutters. Experience has indicated that the substitute varieties of molybdenum steels are quite satisfactory except for extremely unusual operating circumstances.

The necessity for substituting materials will continue for the duration. We cannot adopt a standardized NE steel with any assurance that it will be available when needed for the manufacture of any particular part. The whole system of NE steels is based upon a flexible system wherein changes can be made to conserve valuable alloys for either a greater length of time or for some necessary application in combat equipment.

The system used by the Falk Corp. in utilizing substitute materials starts with the specification of a desired material or property. Available material is acquired by the purchasing department upon approval of the metallurgist. The necessary information regarding heat treatment and production procedures is inserted in a form. The use of a flexible system obviates the necessity of revising drawings for each substitution thereby reducing drafting time.

Furthermore, accurate data are supplied the heat treating and production departments based upon available data or special tests by the metallurgical laboratory. These insure that the substitute steel will be properly treated and processed, thereby reducing delays and rejections caused by retreatments, etc.

It must be definitely re-emphasized

that the alloys used in steels for normal gear service conditions do not contribute any major properties not inherent in any carbon or low-alloy steel which can be treated to identical brinell hardnesses or tensile strengths. For gear steels, there are available NE low-alloy steels which will satisfactorily replace both in production and service the standard SAE and AISI high-alloy steels previously used.

Higher Alloys Out

Anyone using steel today is acquainted with the difficulties arising from attempts to procure specific steels. It can be reliably stated that the future holds no possibilities that the production of alloying elements will in any manner approach sufficient quantities to enable a return to the higher alloyed steels for the duration, nor is there any assurance that the quantities of alloys in the present NE steel will not be further reduced.

Nickel production will not be able to meet the demands of the NE analyses. Molybdenum will be further restricted since domestic and foreign needs can hardly be met by only our domestic supply.

Manganese and chromium are in a slightly better position if carefully husbanded. Vanadium, tin and copper are definitely on the "scarce" list.

It is, therefore, apparent that full cooperation between the engineer and metallurgist are required to expedite production by the fullest use of carbon and NE steels. Truly, the substitution of materials is considered a wartime necessity.

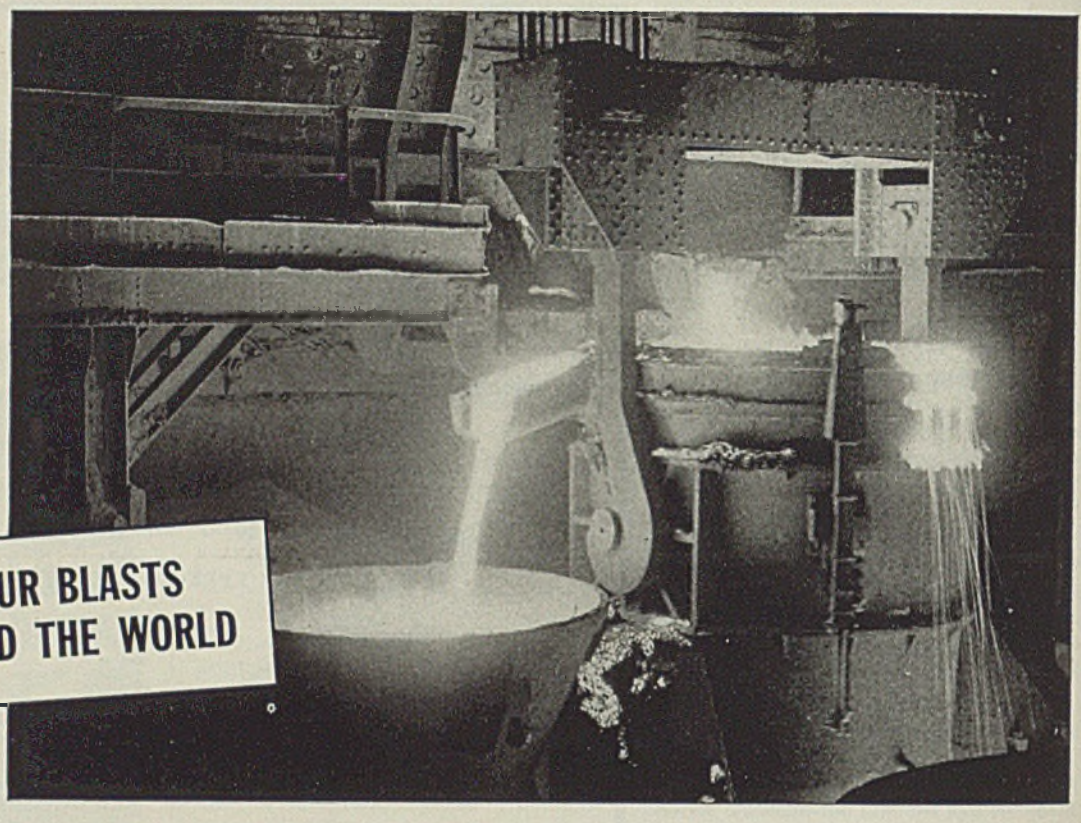
Pamphlet Depicts Army Ordnance Metals Problems

"Metalurgency," a two-color 16-page pamphlet discussing all phases of the metals emergency confronted by Army Ordnance, is just off the press.

Produced under direction of Maj. Gen. L. H. Campbell Jr., chief of ordnance, it follows publication two months ago of "Tremendous Trifles," a booklet outlinline the Army Ordnance redesign and conversion program.

The pamphlet briefly points out the stringent need of critical metals, outlines problems confronted, and urges intensive thought and research by industry toward their solution.

Two pages are devoted to NE steels, with several examples of their use. New manufacturing methods are specifically discussed. Heat treating is covered; opportunities for redesign are portrayed with two practical examples, and constant review of a specification for potential savings is recommended.



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WHILE the situation in some steel products is as tight as ever, the overall position in steel appears somewhat easier, especially in shapes, plates, sheets and smaller sizes of bars. This does not mean that tonnage is easily available but that it can be obtained with less difficulty.

Better inventory balance, in steel supply and munitions, seems the major factor. Inventory controls have prevented unduly large accumulation of steel and those previously made are being reduced. Some programs are sufficiently advanced to require some limitation, including tanks, trucks and other motor vehicles for military use. Aviation and ship work are not so affected.

Recent rerating downward is a reflection of shift of emphasis and has the direct effect of giving top ratings more meaning and supports the idea that the steel situation is easier for those who have first need for tonnage. The principal shortage is seen in alloy steels, with alloy bar deliveries extended to 35 weeks or longer and large carbon bar flats and rounds available no sooner than second quarter on new orders, in the case of some producers, and scant attention given priorities under AA-2. In spite of curtailed semifinished exports AA-2 is necessary. Some accumulation of semifinished has resulted from concentration of shipping space in military movements, this being another factor in the easier steel position.

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Some confusion has arisen from discontinuance of end-use symbols required under the discarded Allocations Classification System, priorities regulation No. 10. Buyers still are required to furnish data as to ultimate use of steel, copper and aluminum and this is being overlooked frequently by buyers, requiring revision of their requests before they can be considered. Applications for alloy steel require more detailed data than those for carbon steel.

With steel producers exerting every effort to keep all equipment possible in action, changes in operations are slight from week to week, the national rate being maintained close to capacity. Last week a slight upward move increased it ½-point to 99 per cent of capacity. Scrap has ceased to be a factor and only necessity for repairing hard-driven open hearths causes delay. Wheeling moved up 2 points to 83 per cent, Cincinnati 3 points to 91, Detroit 5 points to 96, St. Louis 1 point to 94 per cent. Chicago dropped 1 point to 101½ per cent and Cleveland 4½ points to 93. Rates were unchanged at Pittsburgh, 98 per cent; eastern Pennsylvania, 96; Buffalo, 90½; Youngstown, 97; Birmingham, 89; New England, 90.

That the steel industry is extending itself in the war effort is evidenced by the American Iron and Steel Institute's report of steel ingot and castings production for October, 7,584,864 net tons, an all-time high, representing 100.1 per cent of rated capacity. This is 191,953 tons greater than the previous record made in March, 7 per cent more than September output and nearly 349,000 tons above tonnage made in October, 1941. Incidentally October output is about 385,000 tons greater than the entire annual rated capacity of Japan.

Shipments of finished steel by the United States Steel Corp. to Nov. 1 aggregated 17,548,977 net tons, the highest for that period in the history of the Corporation. This is 520,262 tons greater than in the comparable period last year. October shipments were 1,787,501 tons, an increase of 82,931 tons over September, but 63,778 tons below the all-time high established in October, 1941.

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Output of steel plates in October was up slightly from September, totaling 1,101,382 tons, but was below the record of 1,124,118 tons, the peak reached in July. About 80 per cent of October tonnage was for direct use by the Army, Navy and Maritime Commission. Importance of the contribution of converted continuous strip mills is shown by the fact that 536,981 tons were rolled on these mills, nearly half the total. Sheared plate mills provided 449,895 tons and universal mills 114,506 tons. Ten months' plate output was 9,736,000 tons, compared with about 6,000,000 tons in the same period last year.

Scrap shortage no longer is a factor in current steel production, sufficient tonnage being provided for immediate needs, some users being able to accumulate reserves for later use, though not equal to usual quantity at this season. Some allocations are still in force to supply less favored melters. Easing of the immediate situation has not lessened efforts to bring out more dormant tonnage and campaigns among industrial sources are being pushed vigorously. Preparation of yard stocks is slower than normal because of labor shortage and character of material.

Composite prices of steel and iron products are unchanged at levels prevailing for several months. Finished steel composite is $56.73, semifinished steel $36.00, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Nov. 14	Nov. 7	Oct. 31	One Month Ago Oct., 1942	Three Months Ago Aug., 1942	One Year Ago Nov., 1941	Five Years Ago Nov., 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	13.50

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Nov. 14 1942	Oct. 1942	Aug. 1942	Nov. 1941
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.49	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.22	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron

	Nov. 14 1942	Oct. 1942	Aug. 1942	Nov. 1941
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2 Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2X, del. Phila. (differ. av.)	26.265	26.265	26.265	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.54	31.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	17.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	21.50

Coke

Connellsville, furnace, ovens	$6.00	$6.00	$6.00	$6.25
Connellsville, foundry, ovens	7.25	7.25	7.25	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.

Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.50c; all rail 3.25c, (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced on its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del. 2.82c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	5100 Spr. flats	0.15
2100	0.75	5100 80-1.10 Cr.	0.15
2300	1.70	6100 Bars	1.20
2500	2.55	6100 Spr. flats	0.85
3100	0.70	Carb. Van.	0.85
3200	1.35	9200 Spr. flats	0.15
3300	3.80	9200 Spr. rounds, squares	0.40
3400	3.20	T 1300, Mn, mean 1.51-2.00	0.10
4100 .15-.25 Mo.	0.55	Do., carbon under 0.20 max.	0.35
4600 .20-.30 Mo. 1.50-2.00; Ni.	1.20		

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del 3.39c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.
Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.
Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

	Butt Weld Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	65½	56	1½	38	18½
1-3	68½	57½	2	37½	18

	Lap Weld Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	..	67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	36.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡1430F.	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.
Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.
Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1¼-inch	57	58
1⅜ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $6.50, effective Aug. 12, 1942.
† $12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls. to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.63	..	..	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	..	..
Baltimore, del.	25.67	..	..	..
Boston, del.	25.12	..	..	..
Chicago, del.	‡24.47	..	..	..
Cincinnati, del.	24.30	22.92	..	..
Cleveland, del.	24.12	23.24	..	..
Newark, N. J., del.	26.24	..	..	..
Philadelphia, del.	25.51	25.01	..	..
St. Louis, del.	‡24.12	23.24	..	..
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	..	26.53	26.03
Syracuse, del.	26.08	..	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	..	..	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	..	25.00	24.50
St. Paul, del.	26.76	..	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	..	24.50
Hamilton, O., base	24.00	23.50	..	24.00
Cincinnati, del.	24.68	24.68	..	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	..	..	..
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	..	..
Baltimore, del.	26.05	..	..	..
Steelton, Pa., base	..	24.50	..	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	..	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base).....$29.50
6.51-7.00...$30.50 9.01- 9.50 $35,50
7.01-7.50... 31.50 9.51-10.00. 36.50
7.51-8.00... 32.50 10.01-10.50. 37.50
8.01-8.50... 33.50 10.51-11.00. 38.50
8.51-9.00... 34.50 11.01-11.50 39.50

F.o.b. Jackson county, O., per gross ton. Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories:

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00

Second Quality

Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00

Malleable Bung Brick:

All bases $59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00
Fluorspar	

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail $21.00-25.00
Do., barge 23.00-25.00
No. 2 lump 23.00-25.00
(OPA May 11 established maximum at Jan. 2, 1942, level.)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36.

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%. Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents per pound higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ¼-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots 11.00c, less ton lots, 11.50c.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Soft Bars	Hot-Rolled Strip Bands	Hot-Rolled Strip Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.04	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	..	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Washington, D. C.	3.95	4.10	4.45	3.80	3.80	5.35	3.60	....	....	....	4.03	....	....
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	..	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.20	4.25	5.45	4.75	4.45	6.50	4.65	7.60	5.70	....	5.75	....	....
Los Angeles	4.35	4.90	6.70	4.90	4.60	7.15	4.95	7.15	5.95	....	6.60	10.55	9.55
San Francisco	3.95	4.50	6.25	4.65	4.35	6.35	4.55	6.40	6.10	....	6.80	10.80	9.80

*Not named in OPA price order.

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.45	9.80	8.80	8.65	9.05

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham, Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-10,000 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 500-999, Los Angeles, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro.	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (f.o.b. Columbus, Mont.)	
48% 3:1	43.50
less $7 freight allowance	

Manganese Ore

Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	96.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

Extras for Alloy Content

Designation	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Nickel	Chromium	Molybdenum	Basic Open-Hearth Billets, Bars & Strip	Basic Open-Hearth Blooms, & Bars & Slabs	Electric Furnace Billets, Bars & Strip	Electric Furnace Blooms, & Bars & Slabs
NE 8024	.22-.28	1.00-1.30	.040	.040	.20-.35	.....	.....	.10-.20	.45c	$9.00	.95c	$19.00
NE 8124	.22-.28	1.30-1.60	.040	.040	.20-.35	.....	.....	.25-.35	.85	17.00	1.35	27.00
NE 8233	.30-.36	1.30-1.60	.040	.040	.20-.35	.....	.....	.10-.20	.65	13.00	1.15	23.00
NE 8245	.42-.49	1.30-1.60	.040	.040	.20-.35	.....	.....	.10-.20	.65	13.00	1.15	23.00
NE 8339	.35-.42	1.30-1.60	.040	.040	.20-.35	.....	.....	.20-.30	.75	15.00	1.25	25.00
NE 8442	.38-.45	1.30-1.60	.040	.040	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8447	.43-.50	1.30-1.60	.040	.040	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8547	.43-.50	1.30-1.60	.040	.040	.20-.35	.....	.....	.40-.60	1.25	25.00	1.75	35.00
NE 8620	.18-.23	.70- .95	.040	.040	.20-.35	.40-.60	.40-.60	.15-.25	.75	15.00	1.25	25.00
NE 8630	.27-.33	.70- .95	.040	.040	.20-.35	.40-.60	.40-.60	.15-.25	.75	15.00	1.25	25.00
NE 8724	.22-.28	.70- .95	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8739	.35-.42	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8744	.40-.47	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8749	.45-.52	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8817	.15-.20	.70- .95	.040	.040	.20-.35	.40-.60	.40-.60	.30-.40	.90	18.00	1.40	28.00
NE 8949	.45-.52	1.00-1.30	.040	.040	.20-.35	.40-.60	.40-.60	.30-.40	1.20	24.00	1.70	34.00

Extras are in addition to a base price of 2.70c, per 100 lb., on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

				ELECTRIC FURNACE AND FOUNDRY GRADES										
				Low Phos. Grades										
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Cut Auto Scrap 3 ft. and less	Cut Auto Scrap 2 ft. and less	Cut Auto Scrap 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	....	13.85	13.85	....	....	....	....	....	....	....	....	....	....	....
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	21.00	22.00	23.50	24.00	24.25	24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. Blast Furnace Grades prices refer to mixed borings and turnings, shoveling turnings, and cast iron borings.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less; material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

Sheets, Strip . . .

Sheet & Strip Prices, Page 138

Sheet deliveries still run eight to 10 weeks on top rated tonnages, but are a shade easier. A better supply of ingots, due partly to lend-lease cancellations, is softening schedules. However, new orders are still in substantial volume, and these, combined with directives for landing mats and certain other urgently needed types of equipment, are still maintaining deliveries at almost, if not quite, the schedules reported recently. Firmness is particularly noted in the heavier gages of hot-rolled sheets, and galvanized sheets, for which substantial tonnages have been recently placed under high priorities. Galvanized sheets have been tight for some time, with some jobbers reporting that during October they received little or nothing.

Some tonnage has been re-rated downward to fit into revised war production program. A case in point includes a volume of cold-rolled for practice bombs, revised to AA-5 from AA-3. Mills in a few instances have booked slightly better cold-rolled tonnage. Cold finished shipments average around 10 weeks. Users in some cases are pressing for deliveries against AA-3 on hot sheets for war contract parts fabrication.

Narrow steel strip rerollers in some instances are booked full on quotas into January with first quarter commitments strong. On the other hand a somewhat spotty situation prevails as to new business and some mills could process more volume currently. Large contracts for high carbon link steel have been placed, but concentrated among few producers. The latter are engaging annealing capacity 100 per cent seven days a week, annealing being a bottleneck, while several smaller producers equipped to produce this grade, are not pushing heat-treating equipment beyond 70 per cent. Hot strip allocations, based on high-rated orders for rerolled material, are not sufficient to maintain capacity operations in most instances, with production schedules undergoing changes, some units operating full with others easier. More directives are included in current bookings.

Plates . . .

Plate Prices, Page 139

Plate production for November and December is being scheduled at about the same rate as in October but January allocations are expected to be increased. Plate output in October was 1,101,382 net tons, slightly more than September production but below the peak output of 1,124,118 tons in July. About 80 per cent of October production was for direct use by the Army, Navy and Maritime Commission. The remainder went to civilian and export destinations. Of October output 536,981 tons came from converted strip mills, 449,895 tons from sheared plate mills and 114,506 tons from universal mills. In the first ten months this year plate production totaled 9,736,000 tons, against about 6,000,000 tons in the corresponding period in 1941.

Easier situation in plates is confined largely to strip and universal mill rollings, sheared material being as tight as ever. Delinquent tonnage each month is largely in sheared plates and some volume scheduled this month will not be rolled until December. Ratio of total tonnage entering into ship construction direct or through subcontracting tends slightly higher and after these requirements are filled by allocation relatively little volume is left for fabricators with ratings below AA-2.

Exceptions are warehouses; deliveries to the latter are heavier and include specified tonnage, stock sizes and widths, whereas until recently jobbers received mostly over-runs, odds and ends.

Some producers, it is reliably understood, did not receive sufficient requests for tonnage to engage full rolling capacity for December. This is accounted for principally by the fact that consumer inventories are fast coming into balance. However, it is believed this situation will be remedied next month. Already there are indications that some mills will be called upon to handle some tonnage for other than their own customers, thus relieving certain pressure still running strong with other producers. Moreover, there is always the possibility that carry-overs may run heavier than anticipated, and these might tend to fill up whatever gaps appear. In any event, it seems certain all sheared plate capacity will be fully utilized.

Bars . . .

Bar Prices, Page 138

Small carbon steel rounds are in somewhat easier position and some producers can offer delivery in about four weeks on ⅜ to 17/32-inch diameter. In some instances bessemer stock can be delivered even sooner, on ratings down to A-1-b. Much the same can be done on small hexagons and squares.

On larger rounds the condition is tighter than before and little is available before late January and on the largest sizes deliveries are even later. Mills are studying the possibility of rolling large rounds for shells on structural mills, the question of tolerances being the principal difficulty. With heavy demand for shell rounds and considerable idle capacity on shape mills this seems a way out.

Slightly improved delivery is offered by some producers on round hot carbon bars up to 1 5/16-inch, especially bessemer, against higher priorities and directives. Larger diameters of open-hearth bars are more extended and cannot be offered for delivery before early next year. Demand for bessemer stock in general is below expectations, despite brighter delivery prospects. Deliveries of hot carbon bars against allocations to cold-rollers are expected to reach schedule by early December, although alloys are likely to lag beyond. December meltings will be shipped in January in most cases and for this tonnage directives should have been in by Oct. 15. Delays and late allocations, however, have tended to hold back full or substantial deliveries of both hot carbon and alloys for cold-finishing. Nevertheless, the outlook for improved bar deliveries is brighter, some relief in lend-lease demand, with smoother and heavier movement against directives likely. Most new volume is covered by directives or AA-1 ratings and an AAA order on hot-rolled is promised in five to six weeks.

Due to stringency in alloy steels deliveries on alloy bars range from 30 to 35 weeks and beyond in some cases. Large carbon bar flats and rounds run into priorities under AA-2.

Dropping of end-use symbols required under the revoked allocation classification system is causing some confusion from the fact that some WPB forms still require information on the ultimate use of material. Buyers still must furnish data required under various M orders covering steel, iron, copper and aluminum. Dropping of the end-use symbols has resulted in many users failing to indicate the use to which material will be put. Most difficulty is expected in orders for alloy steels, for which more information is required than in the case of carbon steel. Users of the former are being advised they must continue to indicate with their orders the general classification and specific part name for which the steel will be used.

Pipe . . .

Pipe Prices, Page 139

Small jobbers who have received little steel pipe in recent months are getting a car or two this quarter under directives. In the aggregate this represents 45,000 to 50,000 tons, temporarily burdening some mills which have limited allocations of semifinished. As a result deliveries against re-extended higher ratings are more extended, 10 to 12 weeks on butt weld. Most larger distributors in the defense areas have been securing replacements largely by extending high ratings, which many smaller jobbers lack, the latter benefiting by directives, at the expense of longer deliveries on ratings for the time being. While some have been shipped 75-80 per cent of quotas on ratings, demand, notably from shipyards has been keeping distributor inventories down. To fill an inquiry for 10,000 feet of one-inch, five jobbers contributed.

Boiler tubes are among the tightest of tubular products, top rated volume, mostly AA-1, filling mills into February at current production schedules. Heavier allocations of hot and cold strip are expected to ease the jam in electric welded tubing with some mills shortly; allocations recently around 75 per cent of capacity have been increased in some cases. Deliveries against highest ratings extend into first quarter. Shipment on rail structural carbon tubing used for scaffolding, stanchions and berths, can be made in less than three weeks by at least one producer.

Cast pipe and fittings deliveries are improving, six to eight weeks being possible on 12-inch and under against AA-5. Buying is light for normal needs and requirements for government installations have slackened.

Rails, Cars . . .

Track Material Prices, Page 139

No domestic freight car orders were placed in October, the third month this year drawing a blank. Total orders for ten months total 25,893 units, compared with 110,761 in the comparable period last year. Further comparisons follow:

	1942	1941	1940	1939
Jan.	4,253	15,169	360	3
Feb.	11,725	5,508	1,147	2,259
March	4,080	8,074	3,104	800
April	2,125	14,645	2,077	3,095
May	822	18,630	2,010	2,051
June	0	32,749	7,475	1,324
July	1,025	6,459	5,846	110
Aug.	0	2,668	7,525	2,814
Sept.	1,863	4,470	9,735	23,000
Oct.	0	2,499	12,195	19,634
10 mos.	25,893	110,761	51,465	55,080
Nov.		2,222	8,234	2,650
Dec.		8,406	7,181	35
Total		121,499	66,889	57,775

Carbuilders still await word from Washington as to the program for 1943. With construction limited under government orders, many shops are operating at a low rate despite fairly substantial buying recently by the government for export.

An order for fifty 70-ton ore cars for the Chile Exploration Co. has been placed with Pressed Steel Car Co., Pittsburgh, subject to government approval. Private locomotive buying continues quiet and various lists of trolley coaches and street cars are under consideration but are slow to close. Railroad repairs are being kept up, supply of steel being somewhat easier for this purpose.

Efforts to relieve demands on locomotive power by substitution of diesel switchers for lighter road engines now employed in yards have not worked well. A leading diesel builder has had its entire capacity taken over for marine service and another is building exclusively for government use.

Car builders have been asked by the transportation equipment branch of WPB to confine construction of gondola, hopper and flat cars to seven approved designs recently discussed by builders and government officials. The seven designs include two 50-ton composite gondolas, 70-ton composite gondola, 50-ton composite hopper, 70-ton composite hopper, 50 ton and 70-ton flat car. Designs for composite type box cars will be announced soon.

Allotments of steel rails for American railroads for 1943 are expected to be worked out within the next few days. This year 1,260,000 tons of rails were allowed the carriers, compared with a normal annual consumption of 1,370,000 tons, as determined by WPB authorities. These experts hope to be able to allow more rails than in 1942 and feel fairly certain the tonnage will be no less.

Missouri Pacific railroad has been authorized by federal court to place orders for 1600 seventy-ton hoppers and 100 fifty-ton flat cars.

Wire . . .

Wire Prices, Page 139

Directives are spreading wire rod production over a broader range of nonproducing mills, enabling the latter in more cases to increase schedules on high-rated output. This is taking some needed tonnage from integrated producers, but concentrates on more important tonnages to a greater degree. While some AA-1 orders on rods are met, more directives are applied to semifinished operations. Quotas covering semifinished in relation to important war volume are being assigned independent mills.

For some specialties, bookings are heavy with quotas for the remainder of the quarter and most of next filled to the point some producers can accept little additional tonnage and keep within allotments. In this transition of production schedules, pressure has eased on some equipment, but maintained with others. High carbon round wires are in strong demand, most departments operating at capacity with heat-treating a choke point.

Structural Shapes . . .

Structural Shape Prices, Page 139

Structural shape producers are in receipt of considerable tonnage for shipbuilding but lack of building construction cuts deeply into schedules and in some instances deliveries can be promised in four weeks. Mills are seeking methods to increase their orders and experiments are being made in rolling large shell rounds on shape mills. Principal difficulty in this is to meet tolerances. Further curtailment of orders is expected after the first of the year, a reflection of the diminished volume of war construction using steel.

Little delay is encountered in shipments of shapes, orders with ratings down to AA-3 and AA-4 being promised within four weeks. A still easier situation may develop unless limitations on steel are further tightened.

An eastern shipyard has placed 400

tons of hatch covers with the Bristol, Pa., plant of U. S. Radiator Corp.

Plain structural material deliveries have improved, notably angles, channels and bar sizes of flats. On higher priorities shapes are now available in five weeks and even less with some mills. Demand, however, has slackened except for shipbuilding. Regular inquiry for fabricated steel for buildings and bridges has all but disappeared. Co-operative efforts of fabricators for ship part subcontracts are meeting some success and shops sharing in this business are largely engaged in welding, with considerable other shop equipment idle. On most contracts sublet by shipbuilders, the prime contractor regulates the flow of material to shops through WPB and the mills. While some structural steel is required for crane runways, columns for some units are specified of wood.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 139

Producers of reinforcing bars are much concerned over their situation as they have been unable to turn to other production in war work and volume of orders has shrunk materially under government restrictions. Such orders as are current usually are for lots of less than 100 tons, with an occasional larger order for some preferred project.

Competition for this business is keen. With a WPB limitation of consumption to 50,000 tons monthly, compared with close to 150,000 tons a month during the past year, distributors are obliged to compete for each job to hold their organizations intact. To minimize the use of bars, many jobs are being designed for plain concrete.

Pig Iron . . .

Pig Iron Prices, Page 140

Distribution of pig iron will continue under the present allocation system, without interference by the Controlled Materials Plan of the War Production Board, as it is not included in the materials to be governed by the new plan. Steel, copper and aluminum at present are the only materials designated, though the list may be expanded later. Allocation of pig iron has worked out successfully, with few complaints by users, urgent needs for war work being filled steadily. Supplies available for less important use have been curtailed and only a small percentage of shipments in November will apply on orders below A-1-k.

Shipments to small users whose needs are less than a full carload per month are being adjusted to make most efficient use of cars. A full carload is shipped in one month and no material is shipped the next one or two months. Foundry stocks generally range from two to four weeks, occasionally getting down near the danger point before the next shipment arrives.

Pig iron producers in some districts, after completing their reports for the War Production Board for December allocations, find a slight decrease in demand from gray iron foundries. An eastern producer of machine tool castings reports a slackening in demand, repeat orders being slow to appear as an original order nears completion.

A Buffalo pig iron producer will deliver approximately 500 tons less in New England in December compared with November, month by month allocations varying slightly with inventories worked down to a margin of safety. The trend toward higher ratings continues, but at a less rapid rate, AA priorities increasing within that range. In spots the total melt appears off slightly, with scattered instances of lack of war contracts. Within the overall allocation program, considerable juggling of specifications with revised deliveries based on available analysis develops each month. This frequently holds up one grade or analysis a few days without seriously affecting production schedules.

Scrap . . .

Scrap Prices, Page 142

Scrap has ceased to be an important consideration as far as current needs are concerned, sufficient being furnished in all cases, though some allocation orders still are in force to assure supply to some melters not fortunately situated. Though progress of preparation of the mass of household material assembled in the recent drive is slow in fact of labor shortage, yards are getting out good tonnage and moving it to mills. In some cases reserves are being built but in no case sufficient for winter and usually well below usual accumulations at this time of year.

Efforts to bring out more dormant

scrap in industrial plants and other sources are not lessening and results are fairly good. This scrap is of superior quality and is much needed to mix with the less desirable light scrap from the household drive.

Yards are receiving scrap tonnage faster than they can handle it with present labor force. Low phosphorus scrap continues scarce but cast grades are in much better supply.

Some steel scrap in the New York and New Jersey district has been allocated recently to western Pennsylvania melters. An eastern Pennsylvania mill with limited storage facilities has been compelled to hold up shipments for lack of space.

Detroit melters are improving backlogs, the leading melter having the best inventory in several months. Supplies for the Ford steel foundry, where melting will be by the triplex process, cupola, converter and electric furnace, are being built up slowly but low phosphorus scrap for this use is scarce, indicating likelihood of some dephosphorizing steel being required.

In the Chicago district the situation has improved to the point that production no longer is affected and some reserves are being built up. Relining has taken a blast furnace out of operation and more scrap will be required to make up for smaller supply of direct pig iron.

St. Louis melters are in more comfortable position as scrap receipts increase, one being able to lay down 2000 tons in its stock pile in recent weeks, with others adding smaller tonnages. Quality is improving as yardmen are able to get through the accumulations from the recent collection. Included in current receipts is a larger proportion of heavy scrap from rails, machinery and heavy building steel. St. Louis and its county provided 39,981 tons in October, leaving 32,019 tons to be gathered in November and December to meet the quota.

Scrap supplies in the Cincinnati district are distinctly better and foundries have built reserve stocks for several weeks. Search for industrial scrap is well under way with prospects for good returns. A broker is exhibiting in a park near the center of the city artillery pieces from former wars, contributed by patriotic organizations.

Household iron and steel scrap collected in New England in the recent drive is moving to yards slowly, dealers paying $7 a ton delivered, in the Boston district and slightly higher in other areas. While some has been allocated in northern New England, most moved thus far has followed usual procedure. Better supplies of heavier scrap from obsolete equipment and industry are coming out.

Allocations of heavy melting steel from the New York area to the Valley district and other points where freight brings the delivered price over the ceiling are frequently revised, consumers objecting to paying over the ceiling with scrap available at points from which delivery is possible under the ceiling. Some tonnage already allocated to the Valley and Farrell, Pa., from that district, has been diverted. Some steel scrap normally going to eastern Pennsylvania is now going to Johnstown, Pa. Barge shipments to Buffalo by way of the canal have been halted for the season.

Manganese Ore . . .

Ore Prices, Page 141

With OPA ceiling prices on manganese ore effective Nov. 9 private importers generally are planning to suspend operations for the present. Under the maximum price established only the Metals Reserve Co., Washington, a gov-

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types	
(For each 1% tungsten contained)	
Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.60
Do., 5 to 12%	1.40
Turnings, millings, solids under 5%	1.25
Molybdenum Types	
Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 1% vanadium	13.50
Turnings, millings, same basis	11.50
Mixed Scrap	
(Molybdenum and Tungsten Types)	
Solid scrap, each 1% contained tungsten	1.60
Solid scrap, each 1% molybdenum	.80
Millings, turnings, each 1% tungsten	1.40
Millings, turnings, each 1% molybdenum	.70

ernmental agency which does not have to pay duty, can afford to make sales. At present federal administration circles are giving consideration to the proposal of allowing importers of vital materials the right to bring them in duty free, but at least until some such action is taken, manganese importers believe they will be unable to carry on.

The trade is interested to note that prices have been set up on 50 and 51 per cent Caucasian ores and also on 50 per cent Philippine ores. As there have been no shipments from these two sources in many months, the explanation apparently lies in the fact that Metals Reserve Co. has these ores in stock.

On the other hand, it is noticed that no prices have been listed on manganese ore from the Gold Coast, West Africa, although schedules apply naturally where any such ore is brought to this country for resale. Under the new ruling consumers can buy abroad and pay as much as is necessary, even if prices exceed the OPA ceiling, but they cannot sell it in this country at prices above the maximum figures.

The absence of definite prices on Gold Coast ore is attributed to the fact that Metals Reserve Co. has no such material in stock. There have been, it is understood, substantial shipments of Gold Coast manganese over months past, but practically all has been for private account, particularly for one large consumer.

In general, the country is in fairly comfortable position on manganese, and as a result, it is said, ships returning from the Near East and India of late have brought back relatively little. Rather they have returned with cargoes of other materials regarded as being more badly needed at the moment.

Warehouse . . .

Warehouse Prices, Page 141

Increasing flow of steel from mills to warehouses under the new directive gives encouragement to distributors and they are able to take a larger portion of current business. Demand has also increased and while a larger volume is being moved inventory is not improved, assortments still being broken and stocks light. Consumers depending on warehouses, however, are being better served and as the directive plan is continued the situation is expected to improve materially.

Most warehouses have fairly satisfactory business, with material picked up from frozen stocks and tonnage from overruns and off specifications. By these means tonnage is in reasonably satisfactory volume. Some products are difficult to obtain, especially galvanized sheets, though the new directives on galvanized will improve this situation.

Recent elimination of end-use symbols has relieved buyers in general and warehouses particularly of considerable time and paper work. The symbols, in use only a few weeks, are believed to have served a useful purpose in giving Washington detailed insight as to how tonnage was being consumed. Group classifications will continue to serve as an index, along broader lines.

Warehouses are expected to play a major part in distribution of idle steel inventories. Steel Recovery Corp. has mailed its first questionnaire, covering stainless steel, which will be followed by 15 other product programs. The plan is that steel inventories discovered by Steel Recovery Corp. will be placed in a stock list distributed to warehouses and buyers. The latter may buy from this list or if it has a customer for any items his needs may be met. Priority ratings and ceiling prices will prevail.

Through revision of Form PD-83, steel warehouses will furnish WPB end-use information covering monthly shipments on a new basis beginning Dec. 1. Steel warehouses, like steel producers, will be required to analyze their shipments according to the agencies established under the Controlled Materials Plan. These claimant agencies include: War Department, Navy Department, Maritime Commission, Aircraft Scheduling Unit, Office of Lend-Lease Administration, Board of Economic Warfare, and Office of Civilian Supply. In addition to these agencies, the warehouse report form PD-83 will contain one additional classification, warehouses and dealers.

Canada . . .

Toronto, Ont.—Despite further sharp reduction in use of steel on civilian, nonessential and in some instances essential war account, improved shipments from the United States and increased output by Canadian mills, supply of steel is below actual pressing war needs in this country. This has resulted in further

tightening of priority shipments in the past couple of weeks, and while practically all steel orders must be approved by the steel controller, only the more vital war producers are given priority.

Representatives of Canadian mills report a brisk flow of inquiries, covering a widely diversified list of steel products, but they can accept only a limited portion of the new business. Backlogs already cover practically all proposed output for several months and there is nothing definite as to delivery dates on new commitments. On special request from the steel controller, however, the more important war plants are given special preference and even current orders from these sources are given fairly prompt delivery.

There is no indication of easing in demand for plates and sheets. All domestic output continues under strict control and mills are robbing other departments of steel in an effort to meet growing demand for plates for the enlarged merchant ship construction program. In some instances Canadian plate mills have attained production records recently of as much as 75 per cent above rated capacity, and plate output in Canada is definitely at its maximum. Plate imports from the States in the past couple of weeks have shown improvement but government officials are not releasing figures in this respect.

While mills are accepting orders for sheets, approval of shipments must first be obtained. Sheet orders are fairly numerous, but only those directly associated with war are being accepted. Electric equipment makers have been heavy buyers recently, and many other less important war contractors have difficulty in obtaining sufficient sheets for immediate needs. Mills report enough sheet business on books to absorb all scheduled output until about the middle of next year.

While bar mills are producing to the limit of steel supply, output is not running to the capacity of these units. Demand for bars continues in large volume. Carbon and alloy bars, have specially heavy call on war account, and available supplies are being handed out in small quantity to cover as many jobs as possible. Mills are accepting considerable bar business but prospects for delivery are remote, and many less important consumers are put off from month to month in order to provide critical war consumers.

Improvement in supply of scrap has been reflected in tapering in merchant pig iron sales recently. Sales during the past week fell to approximately 6000 tons against the former 8000-ton average, with basic iron accounting for about 800 tons and the balance fairly evenly divided between foundry and malleable grades. Decline in sales, however, does not indicate curtailment in daily melt, which has been showing some improvement.

The new salvage campaign started in rural Ontario at the beginning of the month is responsible for sharp gain of scrap iron and steel offering and dealers state that receipts are increasing. Pressure now being put on salvage drives is primarily for the purpose of building large stocks against winter requirements when most sources of supply, especially in the rural and mining fields, are closed.

Offerings from local sources continue in good volume and a collection campaign carried out in the city last week netted about 4000 tons.

Steel in Europe . . .

Foreign Steel Prices, Page 141

London—(*By Radio*)—Prices of steel and iron have undergone no change in Great Britain in spite of recent wage increases. Demand for structural, railroad and colliery steel continue heavy and requirements are being met.

Let Contract for First Large Detinning Plant

H. K. Ferguson Co., Cleveland, engineers in charge of designing and constructing the new detinning plant to be located in Long Island City, N. Y., last week announced the award of a subcontract to the Ahearn Contracting Co., Bronx, for excavation work.

The plant will be operated by Metal & Thermit Corp., and is being built in conjunction with the nationwide program for the recovery of tin and scrap from used tin cans. The plant will be capable of detinning 60,000 tons of tin cans per year. Similar plants will be constructed by the company in Chicago, Buffalo, Birmingham, Dallas and Los Angeles.

Nonferrous Metal Prices

Nov.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures
1-12	12.00	12.12½	11.75	52.00	52.00

Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper and brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, l.c.l.	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices
(In cents per pound, carlots)

Copper

No. 1 heavy	9.25-10.00
Light	7.25- 8.00

Brass

No. 1 composition	8.50- 9.00
Yellow brass castings	5.50- 6.00
Auto radiators	6.12½-6.62½
Red brass, borings & turnings	8.00- 8.50

Zinc

Old	4.75- 5.00
New clippings	6.00- 6.50

Aluminum

Clippings	9.75-10.25
Cast	8.75- 9.25
Pistons	8.50- 8.75
Sheet	8.75- 9.25

Lead

Heavy	4.75- 5.25
Mixed babbitt	5.35- 5.50
Electrotype shells	5.00- 5.50
Stereotype, Linotype	6.00- 6.75

Tin and Alloys

Block tin pipe	44.00-46.00
No. 1 pewter	32.00-36.00
Solder joints	7.75- 8.50

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	12.50
Standard No. 12 aluminum	14.50

MAGNESIUM

(12 pound rod, 4 in. diam.)

99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb. Carlots	32.00
100 lb. to carlots	34.00

Nonferrous Metals . . .

New York—Government officials and industry representatives are co-operating in efforts to improve distribution of nonferrous metals so that all war needs will be satisfied promptly. Pending the full operation of the Controlled Materials Plan, revisions are being made in existing orders controlling the use of metals. Many companies are producing at least 25 per cent above the rated capacity of their plants and this pace could be extended if raw materals to support it were available.

Restrictions on the use of lead have been eased to permit a number of essential uses which previously had been restricted by conservation order M-38-c. Restrictions have been removed on the use of lead in certain building supplies, in foil for industrial babbitt, in certain food packaging, in lead-sheathed cable, in caskets, and in name plates for industrial machinery. It is the purpose of the order to encourage the substitution of lead for other more critical materials wherever possible.

In the sixth Material Substitution and Supply List, lead is placed in Group III which consists of "materials that are available in significant quantities as substitutes for scarcer materials. Among the widely used metals placed in Group II which consists of "materials that are essential to war industries but the supplies of which are not as limited as those in Group I," are: Mercury, antimony, silver, bismuth, platinum and calcium.

Metals in Group I which consists of materials whose supply "is inadequate for war and essential civilian uses and, in many cases, for war purposes alone," include: Magnesium, aluminum, copper, tin, bronze, brass, cadmium, zinc, beryllium, nickel and cobalt.

Mirrors of Motordom

(*Concluded from Page 62*)

longing to the MESA union were called on strike in protest over failure of the WLB to act on a grievance which had been submitted weeks previously. The dispute was settled quickly but the lost time cannot be recovered.

Russian representatives were at the tire plant of the Ford Motor Co. here last week arranging details of the transfer of the plant's equipment to Russia. The plant is a complete tirebuilding installation, put in operation in 1938 and capable of making 16,000 tires a day. It includes mixers, mills, calendering equipment, beaders, curing molds and other machinery involved in the processing of tires from raw rubber. Sale of the plant was concluded by William M. Jeffers, rubber co-ordinator, working in co-operation with Ford officials. No sale price has been mentioned, but the plant originally cost several million dollars. Presumably it is being transferred under terms of Lend-Lease.

In trying to get a picture of the volume of war equipment now being produced by the automotive industry, dollars are of little help, but George Romney, managing director of the Automotive Council for War Production, does a little pencil work and comes up with the graphic conversion of one year's production at the present rate in terms of actual equipment. "It would result," he says, "in shipments of aircraft equivalent to 71 squadrons each of 15 heavy bombers, 30 medium bombers and 90 fighters (that's 9600 combat planes), plus tanks and armored cars and trucks equivalent to the needs of 72 armored divisions of men, plus guns of all types to supply 40 armored divisions."

This perhaps explains in part the shutdown in various types of ordnance, some ranging as high as 40 per cent, which has been applied in recent weeks to numerous plants, and it again raises the question of whether the military services may not have drawn up plans for too much of everything, particularly when it is realized that the automotive industry is shouldering only a part of the overall war production job.

Passenger Train Schedules Lengthened by ODT Order

Arrangements with the Eastern railroads to lengthen passenger train schedules, wherever necessary to accord with present service requirements, as a means of minimizing delays and improving utilization of locomotives and passenger cars, have been announced by the Office of Defense Transportation.

For example, the running time of the Twentieth Century Limited and the Broadway Limited between New York and Chicago will be lengthened one hour.

New schedules will become effective not later than Dec. 6.

This action will make it possible to add more coaches to the trains and thereby provide for a heavier volume of passengers for each train. By lengthening of schedules, the railroads will be better able to maintain schedules.

In addition to enabling through trains to carry more passengers, it is anticipated that some secondary trains, heretofore operated in support of the faster trains, can be withdrawn in the interest of motive power and car conservation.

Arrangements also have been made with the railroads to load all freight trains moving in the direction of heavy traffic to the maximum practicable capacity at which the assigned locomotive can operate at reasonable speed.

Elimination of high-speed competitive freight schedules in both directions also has been arranged. ODT officials pointed out that this lengthening will permit more efficient performance of locomotives and prevent delays to heavy freight trains carrying vital materials

NEW BUSINESS

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES

Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.

Boston office, Contract Distribution Branch of WPB, 17 Court street, is seeking contractors for the following:

SC 16: General machine facilities required for a variety of small parts. Single and multiple-spindle automatic screw machines, turret lathes, internal and external grinders and small milling machines in various combinations; thread milling for jack screw ⅜-inch diameter and 7 inches long, other sizes ranging from 1¼ to 4½ inches diameter, up to 2¼ inches long. Tolerances, close. Quantities, 2500 to 100,000. Material, aluminum, bronze and alloy steel. Prints at Boston office. Reference, 1-A-291.

SC 17: Dipping facilities, suitable for handling units weighing 500 pounds, approximate dimensions 48 x 36 x 18 inches. Involves degreasing, acid bath, dipping in alkali neutralizer and thoroughly drying. Twelve units a day required. Facilities near Cambridge, Mass., preferred. Reference, 1-A-293.

SC 18: Thread-rolling facilities for producing studs of two lengths, ⅛-inch diameter, 2¼ and 2 11/16-inch long, 6 x 32 threads. Material, brass. Quantity, 10,000 each. Reference, 1-A-304.

SC 19: Machine and tool companies suitable for making jigs and fixtures of various sizes for a large Boston company. Large quantities wanted.

New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-71-4862: New York manufacturer requires subcontracting facilities to forge steel rings of SAE 1020 steel, 12 inches in diameter, weight approximately 4½ pounds, 10,000 pieces per month. Machinery necessary, 3000 to 3500-pound hammer.

S-71-4889: Rochester, N. Y., manufacturer requires open capacity on four 1½-inch Cleveland automatic screw machines to machine gear blanks, four to six weeks run. Materials, steel, bronze and copper. Tolerance, .002. Cutting tools for the Cleveland automatic furnished by prime contractor.

S-71-5057: A procurement agency requires foundry facilities for steel castings to meet federal specification QQ-S-681B for class 2 and 4A2 steel castings. Weight, 2 to 500 pounds. Quotations accepted from 2 pounds as high as foundry can produce. Delivery in 15 to 60 days after receipt of patterns. Castings will be subjected to D.C. magnaflux inspection at arsenal.

Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:

S.O. No. 276: Minneapolis manufacturer needs capacity on 4 or 6-spindle automatic to machine 150,000 trunions from 1¼-inch round stock. Tolerance, .001.

S.O. No. 277: Several small screw machine parts in quantities from 2000 to 50,000. Material, brass. Closest tolerance, .001. Sizes from .09 to .75-inch diameter. Prints and samples at Minneapolis office.

S.O. No. 261: Eastern manufacturer wants to sublet considerable automatic screw machine work on commutator parts from ¼ to 2⅝-inch. Prints at Minneapolis office.

S.O. No. 283: Forging five parts for five-ton snatch block from 1 to 8 pounds. Material 1025 or 1030 steel. Quantities 50,000. Also forging of hub, approximately 6½ inches long at hub by nine inches largest diameter of flange. Quantities, 100,000. Drawings at Minneapolis office.

S.O. No. 204: Complete machining of diesel cylinder heads. Approximate dimensions 5 x 10 x 34 inches. Iron castings furnished. Quantities 600 to 1000. Drawings at Minneapolis office.

S.O. No. 270: Manufacturers wanted for variety of generator parts, gears, pinions, bushings, housings, shafts, bearing assemblies, etc. Turning, boring and drilling capacity required. Parts and drawings at Minneapolis display room.

S.O. No. 260: Sources needed for aircraft engine parts, valves, tappets, studs, piston pins, bushings, etc. Grinding operations on most parts. Close tolerances. Samples at Minneapolis display rooms.

Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

Job No. 2732: Spray whirler. Allegheny metal, 18-8-EZ, type No. 303, ¼-inch O.D. Material is furnished. Equipment, hand screw machine, centerless grinder, gear generator, colleted work, mill with index head. Order is for 500 with AA-1 priority.

Job No. 2734: Check valve seats. Stainless steel, Carpenter's No. 2. Material is furnished. Equipment, hand screw machine, sensitive drill, mill, heat treat, internal and external grinder, hone. Order is for 500 on AA-1 priority.

Job No. 2735: Nozzle check valves: Allegheny metal, 18-8-EZ type No. 303, ¼-inch O.D. Material is furnished. Equipment, hand screw machine, mill two operations, external grinder, sensitive drill. Order is for 1000 on AA-1 priority.

Job No. 2736: Inner valve seats. Stainless steel, Carpenter's No. 2, ⅞-inch O.D. Material is furnished. Equipment, hand screw machines, sensitive drill, heat treat, internal and external grinders, hone. Order is for 500 on AA-1 priority.

Jobs No. 2859 to 2878: Prime contractor desires production facilities on 20 jobs. As quantities are not large he desires that contractors be capable of handling several jobs. Material, stainless steel, is furnished, on AA-1 priority. Requirements are 4000 to 5000 on each job, deliveries 1000 per month. Equipment required is screw machines or turret lathes ⅝ to 1⅛-inch, centerless grinders, sensitive drill, external grinder.

Job No. 2891: Cylinder end. SAE No. 1020, X-1112 or Hymo steel, 1⅛-inch O.D. Equipment, automatic hand screw machine, sensitive drill 9 holes, coining press, zinc plate. Order is for 50,000 on AA-1 priority. Sample at exhibit room.

Job No. 2892: Piston rod. SAE No. 1120 steel or equivalent, 1 3/32-inch O.D. Equipment, hand screw machine two operations, sensitive drill, external grinder, chromium plate. Order is for 10,000 on AA-1 priority.

Job No. 2893B: Base, machining operations only. Forgings are furnished. Equipment, chucking machine or hand screw machine, sensitive drill four holes, H.D. drill two-spindle head, burrhead. Order is for 10,000 on AA-1 priority. Sample at exhibit room.

Job No. 2895: Hub bearing upper support. WD No. 1112 steel or steel tubing, WD No. 1015 welded type 111 C.D., 2⅝-inch O.D. Hand screw machine. Order is for 10,000 on AA-1 priority. Sample in exhibit room.

Job No. 3307: Anvil. WD No. 1314 C.D. steel, which is furnished, ½-inch O.D. Equipment, automatic screw machine, cadmium plate. Order is for 835,000 pieces. Delivery schedule 35,000 in January and 100,000 per month thereafter.

Jobs No. 3252 and 3253: Wet and dry planer tables. Material is furnished. Equipment required, planer 42 inches wide table, horizontal mill 67-inch table travel, radial or H.D. drill, H.D. tapper, surface grinder 40 x 75-inch table, horizontal mill 40-inch travel. Initial order is for 15 on both jobs. Priority is AA-2X.

Job No. 3242: Spacer for propeller shaft thrust bearing. AMS 6470 steel, which is furnished. Equipment, turret lathe 4¾-inch swing, lathe, sensitive drill, internal and external grinder, tin plate, nitriding. Order is for 1000 per month on AA-1 priority.

Job No. 3243: Spacer for crankshaft oil seal ring. AMS 6290 steel, which is furnished. Equipment, turret lathes 5 1/16-inch O.D., lathe, sensitive drill, tapper, heat treating, internal and external grinder. Order is for 1000 per month on AA-1 priority.

Job No. 3244: Washer valve spring, upper. AMS No. 6332 steel, which is furnished, 2 1/16-inch O.D. Equipment, hand screw machine, internal grinder, speed lathe, cadmium plate. Order is for 25,000 monthly on AA-1 priority.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

Roystuart-59-1: A government agency requires large quantities of bevel gears for aviation engines, various sizes, 20 to 30-degree stub tooth, Fellows and Gleason forms, 1.375 to 2.479 O.D. Carbonize and harden. Tolerance close.

Roystuart-59-2: A government agency requires large quantities of spur gears for aviation engines, various types from 20 to 30-degree stub tooth, Fellows form, 1¼ to 5¼-inch O.D., 3/16 to 2-inch width. Carbonize and harden. Tolerance close.

Roystuart-59-3: A government agency requires large quantity of herringbone gears for aviation engines, two types, 4⅜ to 6¼-inch O.D., 2¼-inch width, 6-inch pitch, 20-degree pressure angle, Sykes form. Carbonize and harden. Tolerance close.

Roystuart-59-4: A government agency requires a large quantity of internal gears for aviation engines, 5 13/16-inch O.D. x 23/32-inch width, 20-degree stub tooth, Fellows form, pitch 3.667. Heat treat.

Roystuart-59-5: A government agency re-

quires additional facilities for machining two sizes of six-throw aviation engine crankshafts. Production requirements starting at 37 and 51 units per month, increasing progressively. Equipment required, heavy duty lathe 24-inch swing 10 inches center to center, crankshaft grinder, thread grinder, heavy duty drill press, milling machine, balancing equipment. Heat treating required. Dimensions, overall length 37 and 48 inches, main bearings 2½ and 2¾ inches. All forgings furnished.

Keefer-59-1: Pennsylvania manufacturer seeks subcontracting facilities for body and end cap on a certain fuze. Body is 2.317-inch long and diameter is 1.25-inch. Made from steel, DDX 1112, 1314 or 1315, cold drawn. External and internal threading operations. End cup is 2 inches long and 1⅜ inches diameter. Made from steel, WDX 1020, 112, 1314, 1315 or 1335, cold drawn, Internal threading operation. Quantity, 50,000 to 100,000 pieces monthly for each part. Prime contractor to furnish materials. Equipment multi-spindle automatic screw machines. Prints at Philadelphia office.

Keefer-59-2: Pennsylvania manufacturer desires subcontracting facilities for adaptor. Length ½-inch, diameter 2⅛-inch. Made from cold or hot-rolled steel, WD 1115. Internal threading operation. Prime contractor needs 1000 pieces per day. Equipment, multi-spindle automatic screw machine. Prints at Philadelphia office.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

Display No. 202: Bory and cap. Part is cadmium plated. Quantity, 1000. Size, 1 x 2 inches. Material, steel tubing. Equipment required, four-spindle automatic screw machine with 2-inch bar capacity, turret lathe with 1½-inch bar capacity.

Display No. 74: Heater baffle. Requires milling of slots only. Material furnished by prime contractor. Quantity, 5000. Material, copper. Size, 2 x 15 inches. Equipment required, No. 2 universal horizontal milling machine.

Display No. 43: Barrel, trunion, barrel spring case assembly. Quantity, 5000 each of three items. Material, steel tubing and forged steel. Equipment needed, turret lathes, 4½-inch and 5½-inch bar capacity.

Display No. 172: Taper shanks. Quantity, 5000. Size ½ x 3 inches. Material, C. R. D. Equipment required, four-spindle automatic screw machine with ⅝-inch bar capacity; No. 1 vertical milling machine.

SHAPE AWARDS COMPARED

	Tons
Week ended Nov. 14	500
Week ended Nov. 7	2,630
Week ended Oct. 31	190
This week, 1941	15,617
Weekly average, 1942	16,640
Weekly average, 1941	27,284
Weekly average, Oct., 1942	1,279
Total to date, 1941	1,252,390
Total to date, 1942	765,450

Includes awards of 100 tons or more.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

400 tons, hatch covers for eastern shipbuilder, to U. S. Radiator Corp., Pacific Steel Boiler Division, Bristol, Pa.

100 tons or more, steel caisson, navy yard, Puget Sound. Wash., to Ames Shipbuilding & Drydock Co., Seattle, $330,000.

REINFORCING BARS . . .

REINFORCING STEEL AWARDS

900 tons, United States Engineer, Panama Canal, to Calumet Steel Co., Chicago.

400 tons, bridge, S.N.-FA-176-B, Pulaski county, Mo., to Sheffield Steel Corp., Kansas City, Mo.

200 tons, to Laclede Steel Co., St. Louis, through Peden Iron & Steel Co., Houston, Tex.

200 tons, powerhouse, Indiana Public Service Co., Edwardsport, Ind., to Jos. T. Ryerson & Son Inc., Chicago; J. L. Simmons, Indianapolis, contractor.

REINFORCING STEEL PENDING

1975 tons, Panama, sch. 6656; bids Nov. 16.

STEEL PIPE PENDING

Unstated tonnage, 32,400 feet carbon steel pipe and 18,000 feet galvanized, Panama, sch. 6647; bids in Nov. 13.

CAR ORDERS PENDING

Chile Exploration Co., fifty 70-ton ore cars, to Pressed Steel Car Co., Pittsburgh; subject to government approval.

BUSES BOOKED

A.c.f. Motors Co., New York: Thirteen 37-passenger for Santa Fe Trail Transportation Co., Chicago; two 37-passenger for Pennsylvania Greyhound Lines, Cleveland; ten 44-passenger city type Brill trolley coaches for Denver Tramway Corp., Denver.

CONCRETE BARS COMPARED

	Tons
Week ended Nov. 14	1,700
Week ended Nov. 7	231
Week ended Oct. 31	700
This week, 1941	10,814
Weekly average, 1942	7,516
Weekly average, 1941	13,609
Weekly average, Oct., 1942	958
Total to date, 1941	659,434
Total to date, 1942	345,706

Includes awards of 100 tons or more.

Hand-Drawn Coke Ovens Permitted Higher Ceilings

Official list of high cost producers of beehive oven coke in Pennsylvania who quality for a special delivered ceiling price of $6.50 per ton f.o.b. cars at ovens plus transportation charges from Connellsville has been published by OPA.

The special price was established Aug. 12 by OPA to avert a threatened shortage of the coke. The ceiling price for the balance of all the production is $6 per ton.

To qualify for the extra price, producers must be operating hand-drawn ovens and must necessarily receive their entire supply of coal by truck from the mines.

Following is the list of ovens which have qualified:

Blaney & Strawn Coal & Coke Co., Star Junction; Sterling Coal & Coke Co., Dawson; Leckrone Coal & Coke Co., McClellandtown; Calumet Coal & Coke Co., Scottdale; King Bros. Coal & Coke Co., Scottdale;

Old Home Fuel Co., McClellandtown; Oliver Coke Co., Oliver; Beatty Coal Co., Latrobe; Burkay & Harris Coal & Coke Co., Smithton; Coal Hollow Coal Co., West Newton; Eberly Coal & Coke Co., Uniontown;

Harris & Sager Coal Co., Smithton; Latrobe Coal & Coke Co., Latrobe; East Fayette Coal Co., Scottdale; H. L. Sager Coke Co., Smithton; Saxman Fuel Co., Latrobe;

North Union Coal Co., Lemont Furnace; Tremont Coal Co., Belle Vernon; Galiardi Coal & Coke Co., Connellsville; C. W. Dillon Coke Co., Calumet;

Carpentertown Coal & Coke Co., Uniontown; Parshall & Crow Coke Co., Uniontown; Southern Connellsville Coal & Coke Co., Lake Lynn; Clarissa Coke Co., Uniontown;

Lemont Coal & Coke Co., Uniontown; United Coke Co., Scottdale; Byars Coal & Coke Co., Scottdale; Weimer & Leonard Coke Co., Connellsville; Gilleland Coke Co., Brownsville; Leo Duncan Mining Co., Uniontown;

Virginia Coke Co., Gray's Landing; Keystone Coal & Coke Co., Greensburg; Thornbottom Coal & Coke Co., Connellsville; Atlantic Crushed Coke Co., Greensburg; Fayette Fuel Co., Uniontown;

H. R. Sackett Coal & Coke Co., Uniontown; Unity Coal Co., Latrobe; Coral Coke Co., Greensburg; Mt. Braddock Coal & Coke Co., Mt. Braddock.

CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—Borden Automobiles Inc., Karl Borden, president, has obtained permission from zoning board to operate a light machinery shop at 2111 West Market street. (Noted Nov. 2).

BOWLING GREEN, O.—Daybrook Hydraulic Corp. will install electric power equipment in one-story addition costing close to $100,000, with machinery. S. P. Stewart & Son, 135 West Wooster street, Bowling Green, architect.

CANTON, O.—Union Metal & Mfg. Co., 1432 Maple street, is starting remodeling program at office and factory building.

CANTON, O.—Hercules Motor Corp., 211 Eleventh street Southeast, is starting work on $150,000 extension of factory building at 924 Market street.

CLEVELAND—Cleveland Steel Barrel Co., 9612 Meech avenue, will add extension to factory.

CLEVELAND—Vanderhorst Co., Olean, N. Y., care of D. Murdock, 12500 Berea road, Cleveland is converting building here into manufacturing plant. Cost over $100,000.

CLEVELAND—Steel & Tubes Division of Republic Steel Corp., Republic building, plans expansion of plant at 224 East 131st street.

CLEVELAND—Ohio Tool Co., Lester E. Butzman, manager, is erecting $15,000 training school at 3112 West Sixty-third street, and a $2500 addition to factory at 3160 West 106th street.

CLEVELAND—Brown & Gold Mfg. Co., Charles Gold in charge, is desirous of tak-

ing over additional space in a building back of its present location at 10543 St. Clair avenue. The firm makes aircraft parts.

CLEVELAND—Weldon Tool Co., 3000 Woodhill road, has received authorization of a contract with Defense Plant Corp., under which machinery and equipment will be provided for a plant in Ohio.

MASSACHUSETTS

WORCESTER, MASS.—Wyman-Gordon Co., 105 Madison street, has let contract for one-story manufacturing unit to E. J. Cross Co., 140 Madison street. (Noted Oct. 19).

CONNECTICUT

STAMFORD, CONN.—Norma-Hoffmann Bearings Corp. has let contract for one-story addition to Vuono Construction Co., Estimated cost $55,000.

NEW JERSEY

EAST RUTHERFORD, N. J.—E. C. Chapin Co. has let contract for two-story factory to F. & C. Haerter, 6507 Dewey avenue, West New York. Estimated cost $55,000.

JERSEY CITY, N. J.—National Bearing Metals Corp., 364 Ninth street, has let contract for two-story addition to Brown & Matthews Inc., 122 East Forty-second street, New York. Estimated cost $50,000.

RINGWOOD, N. J.—Alan Wood Steel Co., Conshohocken, Pa., plans installation of electric power equipment in connection with expansion and improvements in iron ore mining plant near here. Estimated cost over $1,000,000. (Noted Oct. 19).

PENNSYLVANIA

ERIE, PA.—Aluminum Forgings Inc. will operate aluminum drop forging plant here. J. H. Williams Co., 400 Vulcan street, Buffalo, is the owner. Defense Plant Corp. will finance and supervise alteration and enlargement of the former Nagle boiler plant. (Noted Oct. 26).

MICHIGAN

DETROIT—Greenfield Machine & Tool Co. will build addition to tool shop at 14527 Greenfield. Estimated cost $15,000.

DETROIT—Douglas Tool & Engineering Co., corner of Rivard and Congress streets, has been incorporated with $50,000 capital to deal in machinery, dies, parts and tools. Agent, Marvin H. Goldberg, 3047 Tuxedo avenue.

FARMINGTON, MICH.—D. A. Y. Gauge Co., 19275 Farmington road, has been incorporated with $25,000 capital to do gauge and toolmaking, by Nicholas Young, 19275 Farmington road.

SAGINAW, MICH.—Severance Tool Inc., P. O. Box 150, Saginaw, has been incorporated with $50,000 to engage in general manufacturing business. Agent, Rollin M. Severance, 3418 Sheridan road, Saginaw.

ST. CLAIR SHORES, MICH.—Strato Tool & Die Co., 22411 Mack avenue, St. Clair Shores, has been organized to manufacture and sell tools, dies and jigs. Agent, Ralph E. Covert, 3272 Van Dyke avenue, Detroit.

ILLINOIS

CHICAGO—John Wood Mfg. Co. Inc., 4435 South Western avenue, has begun erection of $200,000 addition to its plant.

CHICAGO—Commonwealth Edison Co., Chicago, plans alterations and improvements in power substation at Evanston.

DE KALB, ILL.—Defense Plant Corp., Washington, will soon award contracts for hangar and remodeling present furniture manufacturing plant into factory to be operated by Interstate Aircraft & Engineering Co., 105 West Adams street, Chicago.

LOCKPORT, ILL.—Texas Co., 332 South Michigan avenue, Chicago, has let contract to Foster-Wheeler Corp., 165 Broadway, New York, and M. W. Kellogg Co., 225 Broadway, New York, for addition to refinery to cost about $2,000,000.

ROCKFORD, ILL.—Ebaloy Foundries Inc. has started construction of two 1-story foundry additions.

ROCKFORD, ILL.—Thayer Action Co. has awarded contract to Frank S. Pearce Co. for remodeling and altering factory.

MARYLAND

BALTIMORE—Westinghouse Electric & Mfg. Co., 4015 Foster avenue, has taken bids for addition to plant.

FAIRFIELD, MD.—Air Reduction Sales Co. Inc., 60 East Forty-second street, New York, has taken bids for acetylene plant here. United Engineers & Constructors Inc., 1401 Arch street, Philadelphia, architects.

LOUISIANA

SHREVEPORT, LA.—Atlas Oil & Refining Co., Jewella road, will manufacture by-products of petroleum used in making synthetic rubber. Present facilities will be converted at cost of several hundred thousand dollars.

WEST VIRGINIA

WHEELING, W. VA.—Plans are being completed for rehabilitation of manufacturing plant on Thirty-sixth street, Wheeling. Owner, United States government, Navy Aeronautical Division, Washington. Lessee and operator, Wheeling Bronze Casting Co., Wheeling.

MISSOURI

JACKSON COUNTY, MO.—Aluminum Co. of America has let contract to Fogel Construction Co., Lathrop building, Kansas City, for additions to foundry and other buildings.

WISCONSIN

ASHLAND, WIS.—Ashland Shipbuilding Co. has been incorporated with capital stock of $65,000 for the manufacture of barges.

MADISON, WIS.—Scanlon-Morris Co., 1902 East Johnson street, has been granted permit for $70,000 addition to its factory.

MILWAUKEE—Moser Machine Tool Sales is remodeling factory and office.

MILWAUKEE—Wehr Steel Co. has let contract to Klug & Smith Co. for one-story factory addition.

MILWAUKEE—Crucible Steel Casting Co. has awarded general contract to Hunzinger Construction Co. for one-story foundry to cost about $500,000. Max McCotter is purchasing agent. Giffels & Vallet Inc., Detroit, architects.

WAUSAU, WIS.—D. J. Murray Mfg. Co., manufacturer of saw mill, paper mill and special machinery, plans to remodel and make alterations to its plant.

TEXAS

LINDEN, TEX.—Arthur G. McKee & Co., Commerce building, Houston, Tex., has contract for iron ore mining unit near here, estimated to cost $500,000, for Sheffield Steel Corp., R. H. Startzell, Box 3129, Houston, district manager.

MINNESOTA

MINNEAPOLIS, MINN. — Diamond Iron Works Inc. has given contract to August Asp for remodeling factory.

MINNEAPOLIS, MINN.—Crown Iron Works Co., E. L. Anderson, president and manager, has given contract to Dean L. Witcher for two additions to foundry.

ST. PAUL—Great Northern Railway Co. has let contract to William Baumeister Construction Co. for one-story warehouse.

ST. PAUL—Auto Engine Works, J. D. Mooney, president, plans addition to factory. Larson & McLaren, Foshay Tower, Minneapolis, architects.

ST. PAUL—Villaume Box & Lumber Co., manufacturer of millwork and gliders, is expanding factory on Indiana avenue.

ST. PAUL—General Truck & Equipment Co., 2535 University avenue, has been organized

to take over the net assets of the GMC Truck Division of the Motor Power Equipment Co., and will act as distributor for GMC trucks and special truck equipment in the northwest. W. F. Lynch is president.

STILLWATER, MINN.—Highway Safety Appliances Corp., St. Paul, has leased space in factory here to be used for additional manufacturing facilities.

KANSAS

WICHITA, KANS.—Carwell Mfg. Co. will soon start construction of one-story factory.

NEBRASKA

LINCOLN, NEBR.—Chicago, Rock Island & Pacific Railway Co. plans construction of engine house.

IOWA

CEDAR RAPIDS, IOWA—Iowa Electric Light & Power Co., Frank C. Chambers, general manager, has given contract to Paulson Construction Co. for two-story addition to turbine and switch plant to cost about $1,200,000 with equipment. Abell-Howe Co., 53 West Jackson street, Chicago, structural engineer.

NEWTON, IOWA—Matthews Mfg. Co. has been incorporated by J. S. and F. M. Matthews, to manufacture paint sprayers, buffers and air compressors.

WATERLOO, IOWA—Waterloo Valve Spring Compressor Co. has been granted permit to erect two-story factory addition.

CALIFORNIA

HAWTHORNE, CALIF.—Plans are being prepared for erection of new buildings at the plant of Northrop Aircraft Inc., 1001 East Broadway. Estimated cost, including equipment, $2,500,000.

LOS ANGELES—Herring Machine & Tool Works, 4230 Bellingham avenue, has been organized by W. Edward Herring.

LOS ANGELES—Timm Aircraft Corp., 7731 Havenhurst avenue, is erecting an addition to its factory.

LOS ANGELES—Pacific Vise Co. has been incorporated by H. H. Crawford, J. G. O'Hara and A. W. Larson. The new corporation is represented by Mr. Crawford, 6331 Hollywood boulevard.

LOS ANGELES—Hydraulic Press & Engineering Co. is the firm name under which Jack I. Bantz has obtained a certificate to conduct business at 5543 Alba street.

LOS ANGELES—Micro-Machine Products is the firm name under which Harry Kolmanson and John K. Venard have obtained a certificate to conduct business at 4116 Tivoli avenue.

LOS ANGELES—Los Angeles Screw Machine Products is the firm name under which Ernest Steiner Jr. has obtained a certificate to conduct business at 3003 North Main street.

LOS ANGELES—Calmo Welding & Machine Co., 6625 Stanford avenue, has been organized by Richard C. Jones, Wilhelm Seiker, Guy W. Patterson and Bruce E. Baland.

LOS ANGELES—Contract has been let for an addition to factory of Century Metalcraft Mfg. Co., 6000 South Avalon boulevard to cost about $15,000.

OAKLAND, CALIF.—Western Pacific Railroad Co., T. L. Phillips, chief engineer, 526 Mission street, San Francisco, has let contract for electric shop to H. J. Christenson & Co. and W. E. Lyons Construction Co., 2009 Pacific avenue, Alameda, Calif.

SAN PEDRO, CALIF.—Union Oil Co., 1501 Wilmington-San Pedro road, has been granted permit to erect refinery buildings, costing over $400,000.

SANTA MONICA, CALIF.—Olympic Machine Co., 1223 Olympic boulevard, Santa Monica, has been organized by Alfred C. Jelkman and Cecil C. Spiller.

OREGON

ARLINGTON, OREG.—Grain Products Inc., recently organized, care of Edward M. Hulden, president, Port Commission, plans installation of electric power equipment in proposed industrial alcohol plant. Cost estimated over $250,000.

PORTLAND, OREG.—Pacific Power & Light Co. has authorized expansion and improvements in hydroelectric power plant, including installation of 750-kilowatt hydraulic turbine generator unit and auxiliary equipment.

CANADA

WINNIPEG, MAN.—Dominion Wheel & Foundries Ltd., Messier street, has plans for plant addition to cost about $25,000 with equipment.

AMHERST, N. S.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, Montreal, will soon start work on addition to foundry and forge buildings and other extensions here, to cost about $30,000.

HALIFAX, N. S.—Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, has given general contract to E. G. M. Cape & Co. Ltd., 620 Cathcart street, Montreal, for railway dry dock to cost about $1,000,000, including equipment.

HAMILTON, ONT.—Dominion Foundries & Steel Ltd., Depew street, has received bids through Prack & Prack, architects, Pigott building, for plant additions to cost over $1,000,000 with equipment.

LEASIDE, ONT.—Metals & Alloys Ltd., 1 Wilshire avenue, has given general contract to Dickie Construction Co. Ltd., 17 Yorkville avenue, Toronto, for plant to cost about $100,000 with equipment. Govan, Ferguson & Lindsay, 515 Jarvis street, Toronto, architects.

OTTAWA, ONT.—Ottawa Iron Works Ltd., Nelson street, has given general contract to William D'Aoust, 212 Montreal road, Eastview, for erection of plant addition.

TORONTO, ONT.—Toronto Shipbuilding Co. Ltd., foot of Spadina avenue, has completed plans and will start work on plant addition to cost about $25,000 with equipment. Desmond A. Clark, president.

WELLAND, ONT.—Toronto, Hamilton & Buffalo Railway Co., Hunter street, Hamilton, has given general contract to W. H. Cooper Construction Co. Ltd., 306 Medical Arts building, Hamilton, for engine house to cost about $25,000.

FASSETT, QUE.—Standard Chemical Co. Ltd., 67 Yonge street, Toronto, has given general contract to H. L. Gomoll, 243 Jane street, North Bay, for plant here to cost about $20,000.

LAUZON, QUE.—Davie Shipbuilding & Repairing Co. Ltd. is proceeding with construction work and has awarded additional subcontracts on plate shop to cost about $100,000 and other work at $45,000. Foundation Co. of Canada Ltd., 1538 Sherbrooke street West, Montreal, general contractor.

MONTREAL, QUE.—Noorduyn Aviation Ltd. has given general contract to Richard & E. J. Ryan Ltd. for further plant additions to cost about $300,000 with equipment.

MONTREAL, QUE.—Montreal Tramways Co. Ltd., 159 Craig street West, is taking bids for substation at Decarie and Garland streets to cost about $40,000 with equipment.

MONTREAL, QUE. — Montreal Armature Works Ltd., S. D. Sweetman, president, 276 Shannon street, will start work soon on plant addition estimated to cost about $15,000 with equipment.

ROUYN, QUE.—Dome Exploration Co. Ltd., subsidiary of Dome Mines Ltd., Excelsior Life building, Toronto, has given general contract to Hill-Clark-Francis Ltd., Noranda, Que., for erection of 15 mine buildings, in connection with development of molybdenite property, to cost about $200,000 with equipment.

SHERBROOKE, QUE.—Canadian Ingersoll Rand Co. Ltd., Des Forges street, has given general contracts to Newton Construction Co. Ltd., 151 Victoria street, and Hormidas Rousseau, 37 Aberdeen street, for additions to plant here. Estimated cost about $50,000 with equipment.

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