STEEL
The Magazine of Metalworking and Metalproducing

JULY 17, 1944

Volume 115—Number 3

NEWS

TECHNICAL

FEATURES

MARKETS

G-E ELECTRONIC TUBES for industrial applications

Now, G-E electronic tubes for industrial applications can be obtained from your local Graybar Representative. Graybar, as far as priority regulations permit, will maintain a diversified stock of these tubes, and our offices and warehouses in over 80 cities will serve as convenient sources of supply. Our information on delivery schedules will be specific and up-to-date. Twenty-four hour service can be provided for vital war production replacements.

This new service permits you to buy tubes, for initial equipment or replacement, from a man who makes *all* your electrical requirements his responsibility. Information and aid on the application of electronic tubes for industrial purposes is also quickly available via Graybar.

3548

THESE TUBE TYPES:

PHANOTRONS
THYRATRONS
PLIOTRONS
VACUUM GAGES
IGNITRONS
PHOTOTUBES
BALLAST TUBES
GLOW TUBES
VACUUM SWITCHES
KENOTRONS
VACUUM CAPACITORS

FOR INDUSTRIAL USES LIKE THESE:

ELECTRONIC HEATING
TEMPERATURE CONTROL
WELDING CONTROL
REGISTER CONTROL
SPEED CONTROL
POWER CONVERSION
COUNTING
SORTING
WEIGHING
INSPECTION
MEASUREMENT
VIBRATION TESTS
ANALYSIS
SAFETY DEVICES
ALARM SYSTEMS

GraybaR

GraybaR 75 YEARS OF Electrical Distribution

Executive Offices: Graybar Building, New York 17, N.Y.

STEEL
July 17, 1944

The Lesson of Russia

Feats of the Reds on the Eastern front have won high praise from all parts of the free world. The break-through west of Minsk, with real threats to the Reich, cause men in all lands to ask from whence comes the tremendous power of the Great Bear.

Does it come from faith in the code of Marx? Is the Russian creed of one-for-all and all-for-one the key to her sheer will to win? What is the true clue to the might of the U.S.S.R.?

Those from the United States who have been guests of the Soviets bring home news which shows that the zeal of Stalin's men stems not from blind faith in communism or social reform but from conviction as to the potency of industrial efficiency. Wendell Willkie, William Batt, Donald Nelson and Eric Johnston—all guests of the U.S.S.R. in past months—say that to turn out more work in less time and at less cost now is the first aim of the Reds. It takes the place of equalitarianism.

In "Barron's Weekly" of July 3, Paul Wohl points out three signs of moves to the right in Russia. These are: 1. The range in pay of the best and the poorest worker in a plant in the U.S.S.R. is greater than it is in the United States. 2. Each shop strives to lure skilled men through high wage rates keyed to work done. 3. New tax rates tend to give more of a break to the men who earn the most.

These three points in the Stalin plan give the man in the shop a real incentive to work hard. It is the same bright star of hope which in the United States through scores of years led man to strive hard to improve his station. It is the reward motive of the capitalistic system. Used by Stalin when Russia was in dire straits, it has helped to turn the tide of war.

Can we not still learn from Russia? We talk of "all-out" war in the United States, but how much of our war effort is of the "all-out" variety? We still wink at many work-restraining practices in our shops which have been banned by the U.S.S.R. We tend to pay more according to rank and to arbitrary yardsticks than according to work done. We coddle drones and try to curb those who want to work harder than the average. Sometimes we slacken the pace of the good and fast workers to that of the poor and slow.

Here at home we have permitted clever "intellectuals" to make us half-ashamed of the incentive system which has done so much to make this nation great. As a result we are far short of "all-out" in our war effort.

Yes, we can learn from Russia.

HIGH COST A MENACE: Operations Vice Chairman L. B. Boulware of WPB predicts that "production costs of civilian items in the hard goods field at the time of resumption will have in general increased from 25 to 35 per cent above those being realized at the time production was discontinued." Most manufacturers will agree that this estimate probably is not far out of line because it is obvious that numerous elements of cost have increased sharply during the war period.

The prospect of costs at this predicted level is disconcerting. Competition at home as well as in export markets will place high-cost manufacturing at a serious disadvantage. One may hope that the volume of demand plus efficiencies in manufacture and distribution may lower selling prices to reasonable levels. However, there are limits to the cost reducing potentialities of volume and efficiency. If we insist upon maintaining taxes that are too high and wages that are excessive in relation to

(OVER)

work done, we may impose handicaps so great that volume and efficiency cannot overcome them.

Economy in production, manufacture and distribution is one of the "musts" in a wholesome peacetime economy. Unfortunately, we have a long way to go before achieving it. —p. 82

* * *

HARDENABILITY BANDS: Encouraging progress is reported in a movement to introduce a new method of specifying steel. Experience with end quench hardenability tests has convinced representatives of steel producing and consuming interests that hardenability bands (the area between two end quench curves which represent the high and low hardness values obtainable from a number of heats typical of normal manufacturing practice) can be developed which may prove to be a more satisfactory basis for specifying steel than the present practice of relying entirely upon chemical analysis.

Study of the problem indicates that steelmakers can work to closer controls of hardenability without too much difficulty, but must be given more latitude in composition limits to permit the adjustment of individual elements at the time of melting.

Establishing hardenability as the basis of steel selection is an ambitious undertaking. The project still is in its infancy. However, the goal would seem to amply justify the time and effort involved. —p. 106

* * *

WAR WORK AT HOME: One day a mother called an official of Boeing Aircraft and asked if the company had any work which her invalid daughter could do at home. Every month about 20 tons of screws, bolts and rivets are swept up from the floors of one of the Boeing plants. Several sacks of these mixed fasteners were delivered to the invalid girl's home. In a few days she had sorted them according to type, size, thread, etc. and neatly packed them in small cloth sacks. Inspectors found she had done her work accurately.

This trial encouraged Boeing to discuss the problem with Goodwill Industries, which recruited 50 handicapped persons in Seattle to do sorting and similar work at home. Thus far the plan has worked well.

Perhaps other manufacturers will find this program of utilizing the spare time of shut-ins may be advantageous. There are thousands of persons—invalided or elderly—who would welcome the chance to do this kind of work. —p. 92

SPARE PARTS GALORE! It has been estimated that American vehicles used in war—trucks, jeeps, tanks, mobile guns, etc.—require from 15 to 20 times the volume of spare parts which the Germans require for equivalent vehicles. Manufacturers participating in the supply of these parts are amazed at the size of the orders issued by Army Ordnance.

There are valid reasons for this. First, Germany's war vehicles are on three fronts, all connected by land. Ours are on scores of fronts, few of which are connected by land now usable by us. Germany's lines from assembly plant to fighting front are short; ours are long and over water. Germany's vehicles are well standardized; we have scores of types, sizes and models—each requiring its complement of spare parts.

In short, our production of vehicles and parts has had to be on a scale big enough to overcome these serious handicaps. Perhaps Hitler thought we couldn't do it. —p. 89

* * *

TOO MUCH RED TAPE: Shortages of manpower continue to hamper war production. A representative of WPB told members of the Gray Iron Founders Society that the heavy truck program is 32 per cent behind schedule and that 75 per cent of this delay can be attributed to the shortage of gray iron and malleable iron castings. Gray iron and malleable foundries have sufficient capacity to meet schedules but they have not been able to get enough men to operate at or near capacity.

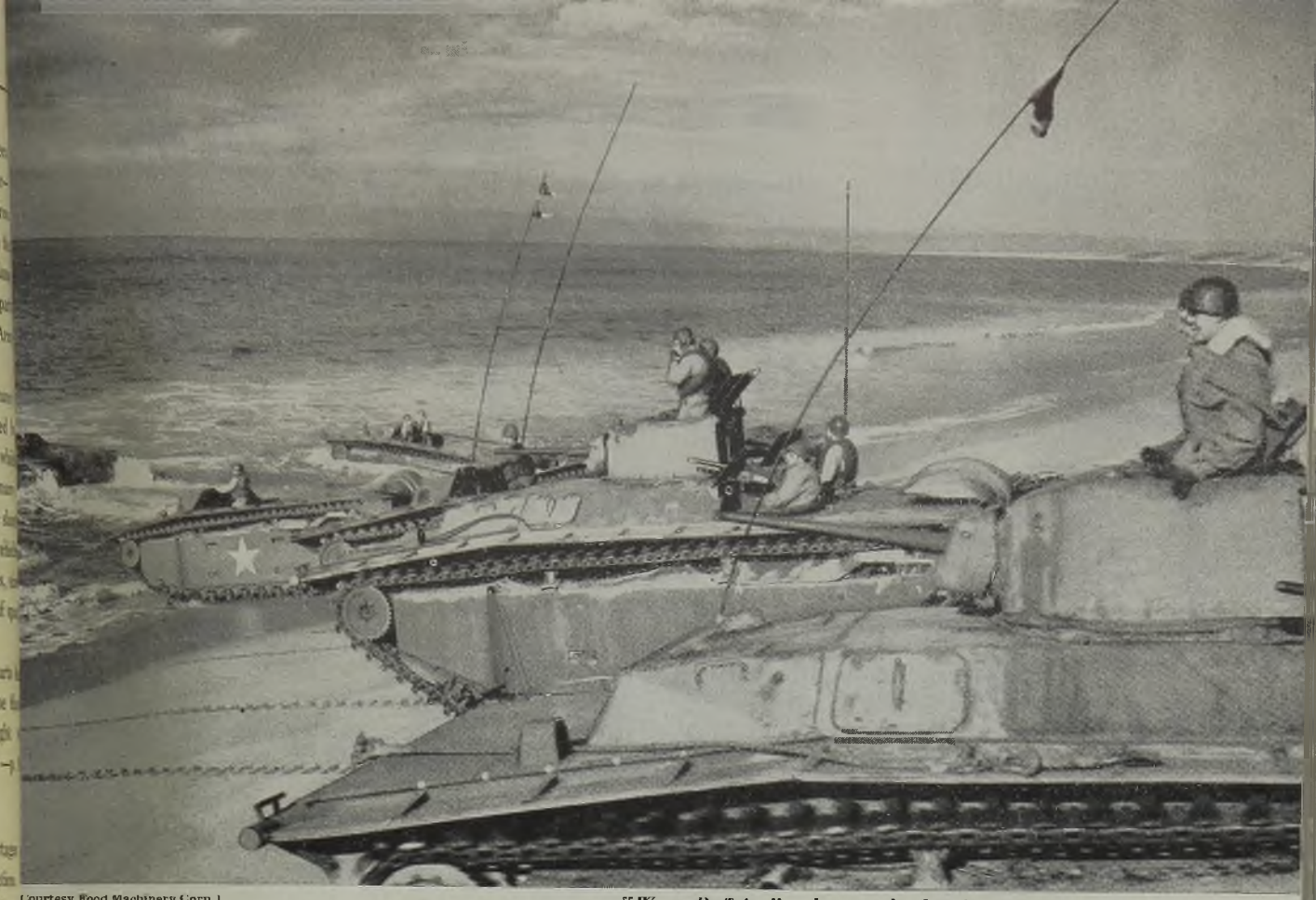
As a result of this situation, which has been growing steadily more critical for months, government officials now assure foundrymen that the employment situation in casting shops is receiving and will continue to receive A No. 1 attention.

Some items of bolts, nuts and rivets are in an extremely tight situation owing to manpower deficiencies in the fasteners industry. Although 90 per cent of the output of this industry carries AA-1 rating, employers find it impossible to get enough men.

Simplifying controls and cutting red tape in Washington might help the manpower situations in both industries. —pp. 78, 79

E. L. Shaner

EDITOR-IN-CHIEF



(Courtesy Food Machinery Corp.)

"Water Buffalos," at home on land and sea, aided in taking Makin Island. They have helped solve the problem of landing troops on enemy-held beaches.

Buffalos That Roam Land and Sea

At the extreme western end of Makin Island, the surf was too high for successful landing operations—so the Japs thought. They heavily guarded a small opening in the reef, where there was little surf. But the Allied forces, using amphibian tanks plunged through the high breakers, passed over the reef, crossed the lagoon and soon wiped out a superior Jap force.

These amphibian tanks, known as "Water Buffalos," or "Water Bronks," are built by the Food Machinery Corporation, and into them go many tons of steel supplied by Inland. They are hard hitting tanks, equally at home on land or in the water, that are making island hopping history in the Southwest Pacific.

Thousands upon thousands of tons of steel from Inland now are being used to build many types of fighting equipment —ships, tanks, guns, bombs, trucks, etc., that are used wherever men fight for freedom. Tomorrow, when Victory is ours, Inland will again supply steel for America's peacetime needs. We invite your inquiries.

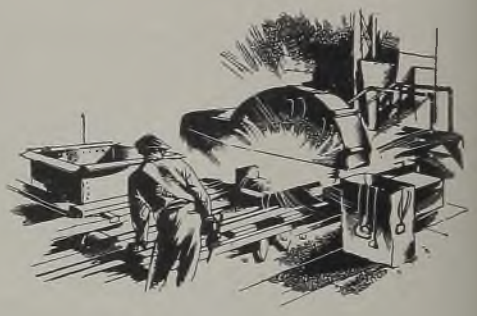
INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Illinois

Branch Offices: Cincinnati • Detroit • Kansas City • Milwaukee • New York • St. Louis • St. Paul

Can These Ryerson Skills Help You?

Steel Cut to Close Tolerance. Experienced crews working with modern high-speed friction saws, giant shears, powerful hack saws and other metal-working machinery can turn out steel quickly—cut, formed or otherwise prepared to your requirements. Steel that is cut to exact size and specification eliminates scrap and frees your man-hours for more production.



Any Shape Expertly Flame Cut. Skilled operators and modern equipment—combined with ever-present stocks of all types of steel—assure quick, accurate flame cutting and prompt delivery. Almost any shape, no matter how intricate, can be fashioned from steel plates or shapes. You save the time and expense of forging or casting and gain the added strength of rolled steel. Complete welded and riveted assemblies are also fabricated by Ryerson.

Metallurgical Help For Steel Problems. Our staff of engineers and metallurgists are experienced in serving customers in every branch of industry. These men have displayed a genius for solving problems pertaining to steel application, heat treating and fabrication. Theirs is the practical type of *know-how* and you can depend on them to work with you whenever a difficulty arises.

Speedy Delivery Without An Expediter. Every man and woman in our eleven strategically-located plants knows the meaning of the word *rush!* The Ryerson organization is geared to getting your steel delivered in the shortest possible time. Write for your copy of the Ryerson Stock List—complete catalog of steels in stock for immediate shipment including: bars, shapes, plates, sheets, structurals, tubing, carbon and alloy steel, tool steel, Allegheny Stainless and many others.

JOSEPH T. RYERSON & SON, INC., STEEL-SERVICE PLANTS AT: CHICAGO, MILWAUKEE, ST. LOUIS, CINCINNATI, DETROIT, CLEVELAND, PITTSBURGH, PHILADELPHIA, BUFFALO, BOSTON, JERSEY CITY.

RYERSON

By J. A. HORTON
British Correspondent, STEEL

Pressure for British Steel Eases

Demand appears to have definitely slackened in some directions. Industrial trend obscure with reaction to the invasion of the continent uncertain. Economic pressure on Germany growing

BIRMINGHAM, ENGLAND

WITH the Allied armies pressing forward in Normandy interest is centered on this, the greatest military venture of all history. News of the landings relieved the tension throughout Great Britain, and indeed in Europe itself. The industrial position has been completely overshadowed in the last few weeks and still seems rather obscure with no one knowing quite what the reaction on activity will be.

One fact stands out clearly, namely Britain and her Allies have been preparing for four long years for D-day and there is not likely to be any shortage of the equipment needed by her armies now battering the fortress of Europe.

Yet, in the last few weeks the demand for iron and steel has definitely slackened in Britain as far as some branches are concerned. No easing of the pressure for aircraft metals is apparent. This was hardly to be expected; neither is there any letup in the mills producing sheets. Plates, too, are still in strong request though here there has been some indication of a slower tendency in new bookings, and deliveries have been speeded up as the result of the overtaking of arrears of orders.

In these branches, very active conditions are likely to prevail in the second half of the year.

Vast quantities of material are being turned out by tubemakers, wire rollers, and the works supplying railroad and colliery equipment. Mining plant is being overhauled as opportunity permits, and the replacement of wood props by steel supports has made a noticeable difference in demand.

Production of basic steel is still considerable, though it has been heavier at other periods of the war than it is now. A slight decline in the output of alloy steels is a development of the past few weeks. A definite falling off in the new business accruing to the heavy iron founders is difficult to explain under present circumstances. It is significant that while production at the furnaces has been cut slightly in order to economize in fuel and transport, the needs of iron founders have been met without difficulty.

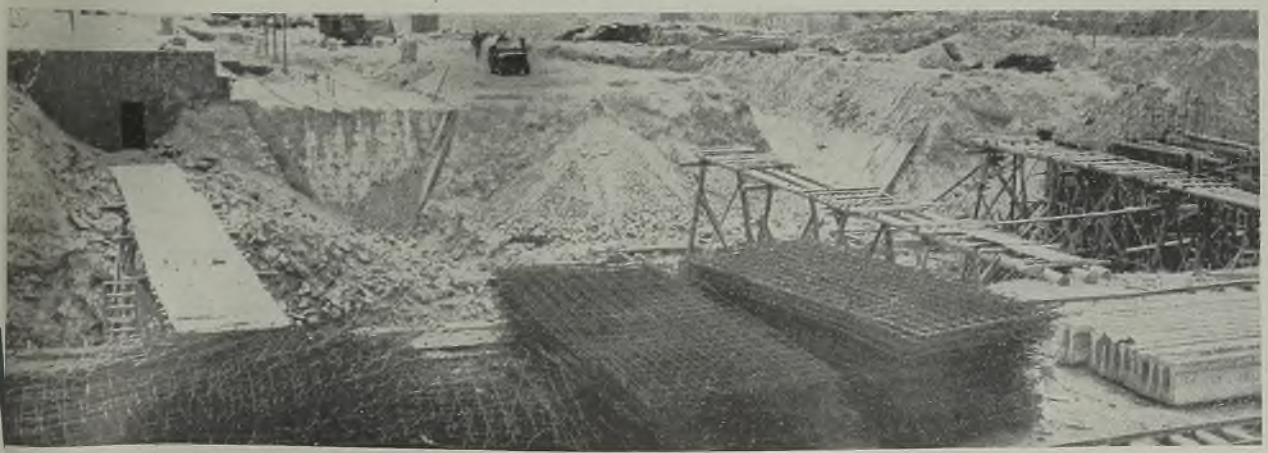
The government control is keeping a careful watch on stocks in pig iron users' yards, and restricting licenses if it is thought that such stocks are excessive.

For some time the call for heavy structural products has been limited and there is no sign of improvement in that respect. Very big demands come from rerollers, all of whom are actively engaged on war contracts. Not only do they absorb all that steel plants can supply in the way of semifinished, but they have also been drawing upon stocks of imported steel which the Control was able to put aside for such emergencies as the present one.

In some quarters there has been a feeling that the government might permit some relaxation in restrictions on the use of metals. After nearly five years of war, the shortage of commodities in the domestic market is acute. There is no indication, however, of any such diversion.

The economic pressure upon Germany grows in intensity daily as the onslaught upon her cities, factories and communi-

Tremendous size of Germany's rocket bomb launching facilities is shown in the accompanying illustrations. At top is shown a concrete tunnel, the size of which can be judged by comparison with the soldiers standing at the entrance Below is an unfinished launching platform found by Allied forces in Normandy. Row of unfinished foundation blocks which run the length of a 750-foot launching ramp can be seen. NEA photos



cations is continued by the nonstop offensive of Allied air forces. The Russian campaign in Finland threatens to cut Germany off from her nickel supplies from the Petsamo region. She has already lost much manganese ore in the Ukraine, and valuable quantities of other minerals are being debarred her by the activities of partisans in Jugoslavia. Turkey and Portugal are ceasing shipments of chrome ore and tungsten to Germany, and the parliamentary secretary to the British ministry of economic warfare stated in the House of Commons recently that Germany's shortage of tungsten was acute.

From the same source comes the news that Germany's transport problems are being intensified. Only high priority traffic is being accepted in France, such as coal and military material. Marshalling yards all along most of the Atlantic coast have been put out of action to a depth of 100 miles. A very considerable number of German railmen are now employed in France and Belgium. In Jugoslavia the rail situation is seriously affected by bombing and sabotage, and the transport of badly needed metalliferous ores from that region is undoubtedly being hampered. Rails are in short supply and in order to effect repairs some lines are being torn up.

Much Reconstruction Required

In his presidential address to the Iron and Steel Institute recently, Arthur Dorman said it was essential that Britain should have as a base a highly efficient heavy iron and steel industry capable of producing an adequate output of iron and steel under the most modern conditions. The industry must regain and expand its export trade, which would only be possible if all sections of the industry were equipped to meet world competition. There was no reason why the 1937 output of steel should not be exceeded. This would necessitate a great deal of reconstruction as war conditions had deferred many schemes of modernization. It was important that a commencement of this work should be made at the earliest possible moment and also that immediate steps be taken to overtake the arrears of repairs and maintenance which had inevitably accumulated through working at high pressure during the war.

A useful outlet for the British steel trade after the war would be the provision of material for houses. The prime minister himself recently disclosed that large numbers of emergency houses utilizing considerable tonnages of steel would form part of the postwar building program. Other schemes are said to be in the making for erection of permanent steel houses. So far, however, little seems to have been done toward the preparation of either temporary or permanent buildings. The labor position is, of course, tight throughout industry and the government has shown no willingness to release men for such work.

Sweden's position in the war has been a peculiar one. She has had many difficulties to contend with, not least an acute shortage of labor which is said to account for a slight decrease in iron output in 1943 as compared with 1942. Of the total production in 1943 about 60 per cent was iron and 40 per cent steel. In the preceding year, the proportion was the reverse. Imports and exports, according to Wiking Johnson, general manager of the Jernkontoret, were 20 per cent lower in 1943 than in 1942.

Speaking of production conditions Johnson declared that the works had adapted themselves very well to the use of firewood instead of coal and only about 30 per cent of the 1939 coal consumption had been made available this year. Wood fuel prices, however, had risen considerably and the cost of such fuel required for any production unit was about double the amount of the relative quantity of coal. The supply of alloy metals in 1943 was also very restricted, whereas the supply position of charcoal and charcoal pig iron had improved.

A decrease in the enormous orders for national defense is to be expected now that the most urgent requirements have been met. On the other hand, the iron consumption of the building industry remained almost unchanged. Wiking Johnson expects that Sweden's home consumption of iron in 1944 will amount to about one million tons, the same as in 1943; total production capacity, however, will be about 900,000 tons only, and the question of how this deficit of 100,000 tons is to be met will present a serious problem.

French civilians are now finding work with the Allied forces in Normandy. Here a group of workers helps sort ammunition at one of the huge dumps at a bridgehead. A roller stack speeds up the heavy work. NEA photo

German Economic Position Deteriorates With Metals, Munitions Shortages Seen

GERMANY today lacks the economic foundations necessary to meet the full scale of allied attacks on the eastern, southern and western fronts. Combination of blockade, the bomber offensive, fighting in the Mediterranean, in the West and on the Russian front, have left the Germans with a total supply of munitions today which must decline progressively during coming months. Allied leaders picture the German economic position as hopeless by the end of the year with substantial certainty of defeat in 1945, if not by the end of this year.

This analysis regarding the insecure economic foundations of the German war machine is presented in a report by William T. Stone, director, Special Areas Branch handling economic warfare analysis, Foreign Economic Administration.

Further reports from the front clearly indicate the shortage of munitions as well as metal by the Nazis. The Germans reportedly are using wooden bullets, fake gun emplacements and fake aircraft spotter signals to make our ships fire upon our own troops.

The FEA announces that in spite of a much heavier draft of manpower by the

Germans for the armed services than the United States has yet had, and in spite of much more limited supplies of many strategic and critical raw materials, the Germans succeeded in raising their war production in 1942 above 1941. And a moderate increase was accomplished in 1943 over 1942. It is believed that the bomber offensive in 1943 prevented a 25 per cent increase in German war production that year.

The war production crisis facing the Germans today is regarded by the FEA as "insuperable". Enemy production has until now succeeded in maintaining the equipment and supply of the German armed forces at a level near or slightly above that of 1941 but the bombing offensive is expected to continue to cut German production.

The FEA report makes it clear that the German inventories and raw materials supplies have reached "a bare hand-to-mouth basis" with no substantial stocks in some items. They have been deprived of Turkish chrome, nine-tenths of the tungsten formerly obtained in the Iberian peninsula, the manganese of the Russian Nikopol mines, and now the Russian drive to the Baltic sea threatens to cut off the sources of nickel, cobalt, and molybdenum.

Present, Past and Pending

■ JUNE PLATE PRODUCTION LOWEST SINCE SEPTEMBER

WASHINGTON—June plate shipments of 1,111,561 net tons represents the lowest monthly total since September, 1943 and compares with 1,056,085 tons for corresponding month last year.

■ HIRING AT CURTISS-WRIGHT TEMPORARILY SUSPENDED

BUFFALO—Pending a WMC labor utilization study, hiring of both male and female workers at the Curtiss-Wright Corp.'s Buffalo plant, except for replacement of skilled workers, has been ordered stopped temporarily.

■ PREDICT REDUCTION IN RAILROAD OPERATING EXPENSES

WASHINGTON—Operating expenses of Class I railroads will be reduced $23.4 million annually after 1948 through presently accelerated amortization practices, the Interstate Commerce Commission predicts.

■ SUBMIT PLANS FOR VAST CIVILIAN AND COMMERCIAL FLYING

WASHINGTON—Plans for vast expansion of civilian and commercial flying, along with maintenance of a formidable military air force after the war, have been placed before Congress by the aircraft industry.

■ FREY RESIGNS FROM WPB SURPLUS INVENTORY BRANCH

CHICAGO—Richard W. Frey, chief, Surplus Inventory Branch, WPB Steel Division, has resigned and returned to Steel Warehousing Corp., Chicago. Robert A. Stephens has been appointed acting chief of that branch.

■ RECORD DECLINE IN ELECTRIC POWER CONSUMPTION

NEW YORK—Mass holiday for the country's war plants and other industrial companies over the long Independence day weekend forced the sharpest week to week decline in electric power consumption in the industry's history.

■ WICKWIRE BUYS ASSETS OF SIRIAN WIRE & CONTACT CO.

NEW YORK—Wickwire Spencer Steel Co. has purchased the business and assets of the Sirian Wire & Contact Co., Newark, N. J. The new subsidiary, to be known as Wickwire Spencer Metallurgical Corp., manufactures fine drawn tungsten and molybdenum wire and rods in addition to various dies and tools of tungsten carbide.

■ WOODWARD IRON REPORTS FIRST HALF PROFIT

BIRMINGHAM, ALA.—Woodward Iron Co. reports six months net profit of $398,581, equal to $1.19 a share on capital stock. This compares with $552,098 or $1.64 a share in the like 1943 period.

■ PLANT EXPANSION MOUNTS AT CHICAGO

CHICAGO—Activity in essential plant construction in this area, in expansion of existing war plants, and in acquisition of vacant facilities by manufacturing firms new to the region, was valued at $6,127,500 in June. This brings total industrial development in the area to $48,678,246 for the first six months of this year, and to $1,029,573,083 since the beginning of the war program in mid-1940.

■ WYCKOFF DRAWN STEEL CO. CHANGES NAME

PITTSBURGH—Wyckoff Drawn Steel Co., effective June 30, changed its name to Wyckoff Steel Co. J. T. Somers, president, says the action involves no change in organization, service, personnel or objectives.

Labor Board's Steel Hearing Nearing End

Union completes rebuttal with plea by Murray in support of wage demands. Panel report expected by end of August

WASHINGTON

UNITED Steel Workers of America (CIO) completed its rebuttal testimony last week in the steel wage case hearing being held in Washington by a special panel appointed by the National War Labor Board.

Philip Murray, president of the CIO, completed the union's rebuttal with a plea for "more constructive thinking" by the industry in preparation for the era of peace.

Referring to the probability of a shortened work-week resulting from cutbacks in war contracts, Murray said the industry knows this country cannot provide anything like full employment if earnings of the workers are cut 30 to 35 per cent.

"It takes money—consumers' money—to keep the wheels of industry moving," he said.

The War Labor Board panel will begin preparation of a report as soon as industry's rebuttal, if any, is completed. The panel hopes to complete its report by the end of August.

The steel wage case has been under consideration since late last year. The union in its demands asks for a wage increase of 17 cents an hour and other advantages.

Development of Manganese Mine in Nevada Progresses

The Three Kids mine, near Las Vegas, Nev., owned by the Manganese Ore Co., subsidiary of the M. A. Hanna Co., Cleveland, has proved to be the largest open pit deposit of good grade manganese ore in America, Vice President M. C. Lake of the ore company said last week in a statement on manganese operations.

Mining operations have exceeded expectations both as to quality of ore and tonnage delivered, Mr. Lake said, but the Defense Plant Corp. beneficiation plant adjacent the mine is not yet in full scale production.

This plant, built for the government by the ore company and employing a chemical process never before attempted on a large scale, has produced several thousand tons of the highest grade manganese ever made. A. A. Hoffman is general manager and H. L. Hazen is plant superintendent.

Producers Putting Up Fight To Hold Output Near Peak

Meeting demands of armed services despite manpower shortage and lessened worker efficiency. Ingot rate fluctuating around 96 per cent but slow downward trend is indicated

Aircraft tubing being lowered into pickling tubs at Ellwood Works, Ellwood City, Pa., at National Tube Co., U. S. Steel Corp. subsidiary

STEELMAKERS are putting up a valiant fight in their efforts to maintain production as close to peak as possible in the face of an increasing shortage of manpower and lessened worker efficiency common to the hot summer months.

For some weeks past the ingot rate has been fluctuating between 94 and 96 per cent of capacity, but since April when the rate stood close to 100 per cent, a slow, gradual decline has been under way, and indications are a further drop will be experienced before the end of the summer.

Despite the decline in the ingot rate output of the mills, on a tonnage basis, is greater than ever before in history, this being attributed to the larger capacity now available.

New records for steel production were set during the first six months of 1944 when, despite increasing shortages of manpower, the industry produced 45,061,874 tons of ingots and steel for castings, the American Iron and Steel Institute reported last week.

That total was almost 1,200,000 tons above the 43,886,451 tons produced in the corresponding period of 1943 and exceeded by a narrow margin the previous record output of 44,949,915 tons produced in the second half of last year.

Most of the increase in production came in the early months of this year. In June, output of 7,217,232 tons, equivalent to 1,682,338 tons per week, represented the lowest weekly average in six months.

In May, steel production totaled 7,680,472 tons, or an average of 1,733,741 tons per week. In June 1943 a total of 7,039,333 tons was made, or 1,640,875 tons per week.

During June, the industry operated at an average of 93.9 per cent of capacity, which compares with 96.8 per cent in May and 94.8 per cent in June a year ago. Operations during the first half of this year averaged 96.7 per cent of capacity, as against 98.0 per cent in the corresponding 1943 period.

Steel industry payrolls and average weekly earnings of wage earners climbed to a new peak in May, according to the institute.

A total of $145,427,000 in payrolls was distributed during the month, as against $138,860,000 in April and $137,404,000 in May 1943. The previous record monthly payroll was $145,285,000 in March of this year.

Wage-earning employes received an average of 118.4 cents per hour in May and worked an average of 47.5 hours per week, indicating average weekly earnings of $56.25.

April Was Peak Wage Month

By comparison, in April steel wage earners received 119.0 cents per hour and worked 45.9 hours per week—indicating average weekly earnings of $54.60 per worker. The previous peak for weekly wages was March 1944 when average earnings of 115.9 cents per hour and a 47.7 hour work-week indicated average earnings of $55.30 per week.

In May a year ago, steel industry wage employes earned an average of 113.4 cents per hour and worked 41.9 hours per week.

During May 1944, the industry employed an average of 569,000 employes, compared with 573,000 in April. In May 1943 a total of 632,000 employes was at work.

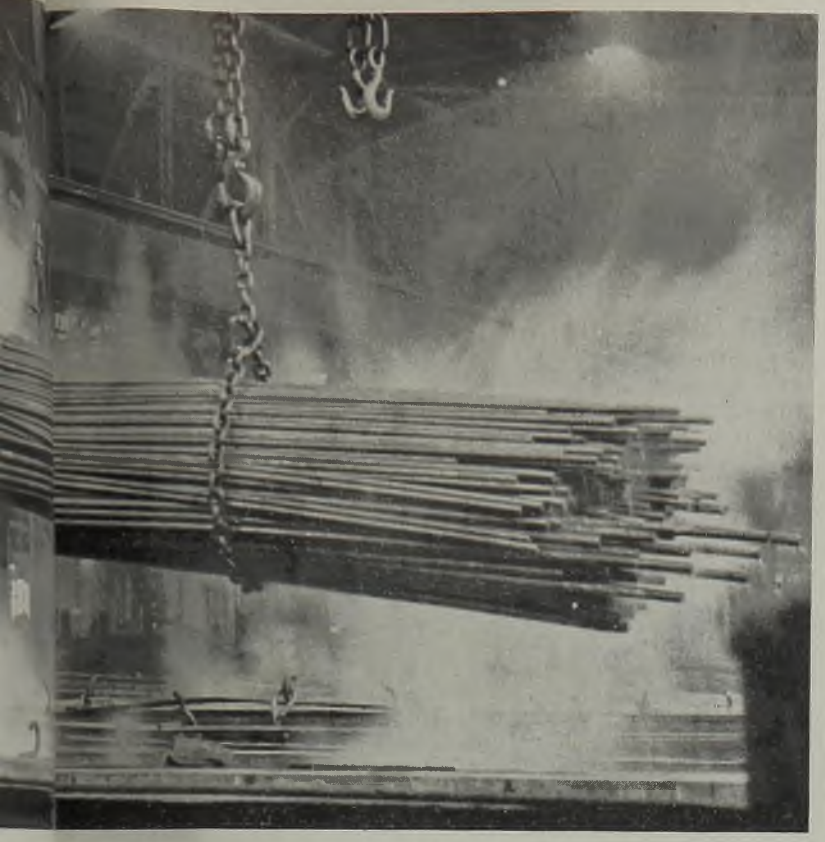
Lt. Gen. Brehon Somervell, commanding general of the Army Service Forces; Vice Admiral S. M. Robinson, chief of the Office of Procurement and Material, the Navy; and Rear Admiral Howard L. Vickery, vice chairman of the Maritime Commission, a week ago informed the Steel Industry Advisory Committee of the immediate and imperative needs for steel of their respective agencies, if the Allied forces in Europe are to be adequately supported.

While all said that to date none of their programs had been cut back because of the lack of steel, they emphasized their fear that the steadily declining production rate if not checked, would result in serious shortages.

Norman W. Foy, director of the Steel Division, WPB, and government presiding officer at the committee meeting, reported steel production had dropped from 100 per cent of capacity in April, to 94.3 per cent last week. This serious falling off has occurred during a time when demands of the armed services are probably at their highest point, Charles E. Wilson, WPB executive vice chairman, said. These requirements include increased emergency demands for heavy artillery ammunition, heavy duty trucks, tanks and naval and merchant vessels.

Mr. Foy said that while WPB had discounted a reduction in third-quarter production of five per cent below that of second-quarter output, as a result of manpower shortages and the effect of hot weather on the individual worker's productivity, it had not expected that this lowered percentage of operation for the third quarter would be encountered, as it has been, in the first week of July.

Mr. Foy estimated lost ingot produ



ion due to manpower shortages at approximately 500,000 tons a month, and xpressed fear that third-quarter output night fall short of providing for allotnents already made.

Industry members reported that the talling off is due basically to a manpower deficit in the industry of between 40,000 and 50,000 employes. Many of the present steel labor forces have been working 16-hour days, while, in the case of one company, the total force has been working an average of 57 hours a week. With the coming of hot weather, it is physically impossible for the men to continue at this rate, the industry members said, especially in view of the fact that the average age of the steel industry employe has increased materially since the outbreak of the war. A large majority of industry members reported that the existing labor force is working to the full limit of its physical capacity.

(*Please turn to Page* 212)

Steel Industry Shipments in May Reported Heavy

Steel shipments of 5,859,786 net tons were reported in May by the American Iron and Steel Institute. This compares with 5,744,177 tons in April. Shipments for the first five months of the year totaled 29,218,912 net tons, which compares with 27,781,209 tons in the like period of 1943.

May production included 329,997 tons structural shapes, 1,153,043 tons of plates, 205,916 tons of standard rails, 9,825 tons of hot-rolled carbon bars, 265,289 tons of alloy bars, 154,689 tons of cold finished carbon bars, 33,446 tons of cold finished alloy bars, 201,113 tons of seamless pipe and tubing, 119,225 tons of butt weld pipe, 386,323 tons of wire rods, 306,055 tons of drawn wire, 166,808 tons of tin and terne plate, 67,445 tons of electrolytic tin plate, 1,098,379 tons of hot-rolled sheets, 326,391 tons of cold-rolled sheets, 111,909 tons of galvanized sheets, 233,745 tons of hot-rolled strip, and 99,783 tons of cold-rolled strip.

Steel Corp. Shipments Set Record for First Half

United States Steel Corp. shipments of finished steel in June totaled 1,737,769 net tons, a decrease of 39,165 tons from shipments of 1,776,934 tons in May and an increase of 185,106 tons over shipments in June, 1943.

For six months ended June 30, this year total shipments were 10,632,851 tons, compared with 10,040,016 tons in the corresponding period in 1943.

The six-months total was the highest on record for this period, the prior high being 10,503,507 tons in 1942.

(Inter-company shipments not included)

	Net Tons			
	1944	1943	1942	1941
Jan.	1,730,787	1,658,992	1,738,893	1,682,454
Feb.	1,755,772	1,691,592	1,616,587	1,548,451
Mar.	1,874,795	1,772,397	1,780,938	1,720,366
Apr.	1,756,797	1,630,808	1,758,891	1,687,674
May	1,776,934	1,706,543	1,834,127	1,745,295
June	1,737,769	1,552,663	1,774,068	1,668,637
6 mo.	10,632,854	10,040,016	10,503,507	10,052,877
July	.....	1,660,762	1,765,749	1,666,667
Aug.	.....	1,704,289	1,788,650	1,753,665
Sept.	.....	1,664,577	1,703,570	1,664,227
Oct.	.....	1,794,968	1,787,501	1,851,279
Nov.	.....	1,660,594	1,665,545	1,624,186
Dec.	.....	1,719,624	1,849,635	1,846,036
Total	.....	20,244,830	21,064,157	20,458,937
Adjustment	.....	.....	*449,020	*42,333
Total	.....	.....	20,615,137	20,416,604

*Decrease.

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								Calculated weekly production, all companies	Number of weeks in mo.
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	
Based on reports by companies which in 1943 made 98.3% of the open hearth, 100% of the bessemer and 87.9% of the electric ingot and steel for castings production										
1944										
Jan.	6,769,438	97.2	439,551	85.4	377,751	83.3	7,586,740	95.6	1,712,582	4.43
Feb.	6,410,338	98.5	409,781	85.2	368,555	87.0	7,188,674	96.9	1,736,395	4.14
March	6,976,450	100.1	455,368	88.5	388,408	85.7	7,820,226	98.5	1,765,288	4.43
1st qtr.	20,156,226	98.6	1,304,700	86.4	1,134,714	85.3	22,595,640	97.0	1,738,126	13.00
April	6,768,895	100.3	437,517	87.8	362,118	82.5	7,568,530	98.5	1,764,226	4.29
May	6,860,532	98.5	438,980	85.3	380,960	84.0	7,680,472	96.8	1,733,741	4.43
June	6,452,087	95.6	418,117	83.9	347,028	79.0	7,217,232	93.9	1,682,338	4.29
2nd qtr.	20,081,514	98.1	1,294,614	85.6	1,090,106	81.9	22,466,234	96.4	1,726,844	13.01
1st hlf.	40,237,740	98.4	2,599,314	86.0	2,224,820	83.6	45,061,874	96.7	1,732,483	26.01
1943										
Jan.	6,576,788	97.8	478,161	85.9	369,573	95.5	7,424,522	96.8	1,675,964	4.43
Feb.	6,031,605	99.3	447,810	89.1	345,189	98.8	6,824,604	98.5	1,706,151	4.00
March	6,787,902	100.9	503,565	90.4	383,111	99.0	7,674,578	100.0	1,732,410	4.43
1st qtr.	19,396,295	99.3	1,429,536	88.4	1,097,873	97.7	21,923,704	98.4	1,704,798	12.86
April	6,510,824	99.9	482,478	89.5	380,401	101.5	7,373,703	99.3	1,718,812	4.29
May	6,669,703	99.1	482,424	86.6	397,564	102.7	7,549,691	98.4	1,704,219	4.43
June	6,202,889	95.2	453,663	84.1	382,801	102.1	7,039,353	94.8	1,640,875	4.29
2nd qtr.	19,383,416	98.1	1,418,565	86.8	1,160,766	102.1	21,962,747	97.5	1,688,144	13.01

The percentages of capacity operated in first six months of 1943 are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943 as follows: Open hearth 79,180,880 net tons, bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116,494 net tons bessemer and 94,667 net tons electric ingots and steel for castings, total 1,742,950 net tons; based on annual capacities as follows: Open hearth 79,867,450 net tons, bessemer 6,074,000 net tons, electric 4,935,960 net tons. Data from American Iron and Steel Institute.

Percentages of capacity operated in 1944 are calculated on weekly capacities of 1,572,755 net tons open-hearth, 116,182 tons bessemer and 102,350 tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944, as follows: Open-hearth 82,223,610 net tons, bessemer 6,074,000 tons, electric 5,350,880 tons.

Manpower Shortage Getting Top Attention, Gray Iron Group Told

Foundrymen informed at Chicago meeting the industry has sufficient capacity to meet demands of the war program but manning of facilities to required levels is hampered by lack of labor. Truck program being delayed

THE MANPOWER shortage in the gray iron foundry industry is being given the greatest attention by government officials because the lack of gray iron castings is delaying important war production programs, William B. Murphy, deputy vice chairman for production, War Production Board, told approximately 200 gray iron foundry executives from the Central West attending the Manpower-Price Control Conference of the Gray Iron Founders' Society at the Stevens hotel, Chicago, July 6.

This was the third in a series of regional conferences held by the society. Walter L. Seelbach, president of the society and secretary of the Forest City Foundries Co., Cleveland, presided at the Chicago meeting.

Mr. Murphy, who is also co-chairman, National Foundry and Forge Shop Committee, WPB, pointed out that the foundry industry has the plant capacity for meeting the nation's war production needs. The main difficulty is manning that capacity, he said. Though considerable progress has been made in relieving the manpower shortage in the industry much more remains to be done and he indicated that the gray iron industry would be "hounded" until the current shortage of gray iron castings is relieved.

Castings Shortage Cuts Truck Output

He stated that in June the heavy truck program was 32 per cent behind schedule and that 75 per cent of this delay can be attributed to the shortage of gray iron and malleable iron castings. The July program for heavy trucks has been increased 25 per cent, further emphasizing the need for castings. The light truck schedule is 12 per cent behind, due mainly to gray iron shortages. Mr. Murphy indicated that the industry has made some headway during the past year to relieve the castings shortage by increasing production from 15 to 20 per cent. But an additional 25 per cent increase is needed if the truck, military tractor, engine and several other war programs are to be met.

Mr. Murphy stated that the War Manpower Commission is engaged in a strenuous drive to recruit labor for foundries. Field men have been told in no uncertain terms what must be done, and this will be followed up in order to see that available labor is directed toward the foundry industry.

The WMC, the WPB, and the Army and Navy have united in a program to render every assistance. The Office of Labor Production is concentrating its efforts on the problem. Mr. Murphy pointed out that the Office of Labor Production frequently can get at labor problems which may be difficult for management to solve.

GRAY IRON CASTINGS SHIPMENT DATA

Net Tons†

	1944
Jan.	765,423
Feb.	764,369
March	828,648
1st Quarter	2,358,440
	1943
Jan.	721,560
Feb.	683,277
March	796,618
1st Quarter	2,201,455
April	820,339
May	800,266
June	814,158
2nd Quarter	2,434,763
July	712,224
Aug.	744,347
Sept.	785,449
3rd Quarter	2,242,020
Oct.	786,614
Nov.	760,883
Dec.	792,065
4th Quarter	2,339,562

†Represents 93% of the industry on a tonnage basis.

According to Mr. Murphy, the Production Executive Committee, consisting of top men in the government agencies, has placed gray iron and malleable iron on the urgency list and ordered that the directive procedure be used on the procurement of castings needed for the war effort. Such directives will supersede the priority system.

In discussing the work of management in meeting the present critical shortage problem, Mr. Murphy stated that industry must handle the principal part of the job. In this connection, he suggested the following steps be taken by management: 1. Put first things first and make the critical castings before pouring the other jobs in the plant. 2. Undertake a more aggressive recruiting plan. 3. See that all new men are trained before being placed on the production line so that losses will be reduced and turnover will be held to a minimum. 4. Provide a better job of labor relations. 5. Use more women in the foundries. 6. Improve working conditions as much as possible under present circumstances. 7. Mechanize wherever such efforts will reduce the need for manpower or increase production. 8. Do a better job in preparing and selling cases before the Office of Price Administration. 9. Do a better job in preparing and selling cases before the War Labor Board. 10. Key the organization to the problems at hand.

Joseph D. Keenan, vice chairman for labor production, WPB, and a member of the National Foundry and Forge Shop Committee emphasized the need of human relations in solving the problem of foundry manpower.

Government Hampers Recruitment

In discussing the castings production problem from the viewpoint of industry, George W. Cannon, president, Campbell-Wyant & Cannon Foundry Co., Muskegon, Mich., and a member of the Gray Iron Foundry Industry Committee of the WPB, stated that the management of gray iron foundries has responded nobly whenever called upon to meet war production problems. He stated that recruiting efforts have been handicapped seriously by government restrictions and adverse publicity by various government officials and quoted statistics of the Bureau of Labor Statistics to show that in February, 1944, the average hourly earnings of all manufacturing were $1, while in the gray iron industry the average hourly earnings were $1.05.

William M. Caldwell, assistant to the executive vice president, Gray Iron Founders' Society, Washington, declared the difficulty in arriving at a definite solution to the present critical situation of castings production is caused by the lack of power on the part of government to co-ordinate various functions of the separate agencies which can help. Large scale improvements to help increase production entail a considerable expenditure of funds, and such funds must come either from surplus or borrowed capital.

Because of declining profits today, many foundries have exhausted surpluses to pay current bills. The Gray Iron Founders' Society has completed a survey of 96 critical foundries which indicates that the average wage increase has been 22 per cent. This would result in an increase of approximately 10 per cent in total costs, which should be considered in relation to an average profit margin of 4 per cent.

Further increases in labor rates can only come from advances in prices granted on application to the OPA, but this procedure is slow and costly and records generally show relief from that source to be inadequate and in many cases insufficient to cover wage increases.

The United States faces the largest tasks in history, that of saving the coun-

try and the rest of the world from power-maddened despots abroad, and equally as important, protect itself from foes within, according to Rep. Charles A. Halleck (R., Ind.) who addressed the luncheon meeting.

From the viewpoint of manpower, the next 3 to 6 months may very well be the most critical we have experienced since the beginning of the war emergency, according to Dean William H. Spencer, University of Chicago, and Chicago regional director, WMC. Dean Spencer stated that 15,000 to 20,000 men are needed now in foundries and forge shops.

Speaking on "Price Control of Gray Iron Castings" W. W. Welfling, chief, Gray Iron and Malleable Castings Section, OPA, Washington, outlined the basis upon which price control has been built.

In summing up the industry's view of the price control situation, C. B. Magrath, president, Greenlee Foundry Co. and North Western Foundry Co., Chicago, and a member of the Gray Iron Castings Industry Advisory Committee of the OPA, indicated one difficulty with price control comes with the fact that the industry is divided into several groups, such as mechanized foundries, production shops, short run shops or typical jobbing foundries and specialty foundries. Some make consumer goods where others produce castings for industries. Mr. Magrath deplored the lack of statistics on foundry costs. In his opinion the industry should not be exempt from price regulation but he does not agree with some of the policies of the OPA.

Bolt, Nut, Rivet Production Cut Threatened by Lack of Labor

Manufacturers under heavy pressure of demand from war industries with 90 per cent of output carrying AA-1 rating. Order backlogs average 10 to 12 weeks with special items in extremely tight position

CLEVELAND

PRODUCTION curtailment of as much as 20 per cent is threatened in the fasteners industry as the manpower shortage becomes more acute, industry spokesmen declared last week. Manufacturers of bolts, nuts, rivets and screws so far have been able to meet the sustained heavy demands from the war industries, but their task is becoming increasingly difficult, and early relief must be forthcoming for their problems if a serious situation is to be averted.

Cite Importance of Industry

Members of the WPB industry advisory committee have asked that the War Manpower Commission field representatives recognize the importance of the industry to the war effort, pointing out that 90 per cent of the industry's production carries an AA-1 rating. It is too early to determine whether WMC's priority referral program, which was placed in operation July 1, will improve the situation to the extent expected by government officials.

DESTINATION KNOWN: These two Americans of Japanese parentage are shown loading scrap metal which will be used to blast the Axis. They are among 25 Japanese-American employes of U. S. Foundries Inc., at Denver. NEA photo

Shipyards are still taking large tonnages of bolts and nuts required for Navy landing craft and similar vessels. The campaigns on the European continent have required expansion of these and other programs, such as those for signal and transportation equipment, requiring increased tonnages of various fasteners. Delivery is an important factor now in making awards, so contracts are being distributed widely.

In addition to the heavy demands for the industry's products from manufacturers of trucks, tanks, ships, and construction and agricultural equipment which carry high priorities, the aircraft industry has superimposed huge and new requirements for fasteners. To meet the exacting specifications of this industry, the Aircraft Fasteners Division of the American Institute of Bolt, Nut and Rivet Manufacturers has been organized as a co-operating body in developing standards as to dimensions, tolerances, materials, physical properties, and inspection procedures. The technical staff of this new division has the support of a strong engineering and technical committee from the industry which will aid the armed services, aircraft manufacturers and fasteners producers in solving their problems.

As an indication of the pressure under which the industry is operating, bolt and nut order backlogs average about 10 to 12 weeks with a slightly tighter situation prevailing in special items, such as hexagon bolts.

Industry representatives are urging that an effort be made to keep current the excess material lists distributed by the institute and the War Production Board. They also say that a great amount of special material produced by the industry for the war effort "must be and should be scrapped."

Office of Price Administration has issued a revised price regulation covering the industry's products. The changes are concerned chiefly with clarification of several industry practices not specifically included in the original regulation. A new provision, dealing with producers' minimum charges on small orders, has been added.

Warehouses, jobbers and retailers have been unable, as a result of war demands, allocations and limitations, to maintain their usual stocks of standard items with the result that consumers are going increasingly to producers for their require-

(*Please turn to Page* 214)

Start on Reconversion Ordered

Nelson's program for resumption of civilian goods production on limited scale approved with some modification. Little increase in output likely in near future

START—nothing more—toward resumption of civilian goods production on a limited scale got under way last week after the full War Production Board, including its military members, on July 12 ratified WPB Director Donald Nelson's program to prepare industry for reconversion to peacetime manufacture.

Announcement of the plan followed a reported critical inter-agency dispute in which the War and Navy Departments and the War Manpower Commission vigorously opposed the Nelson plan, originally scheduled to go into effect July 1, on the ground it might interfere with war production. Agreement between the various factors was worked out when War Mobilization Director James F. Byrnes stepped into the argument and ordered that a quick settlement of differences be effected.

Essentially Nelson's original proposal went through. However, a concession was made to the Army and Navy in that the program will be put into effect on a staggered schedule over a period beginning July 15 extending through Aug. 15.

Agreement on the plan was announced by Charles E. Wilson, WPB executive vice chairman; Donald Nelson is convalescing from a recent attack of pneumonia.

In substance the plan adopted involves four orders, effective date of the most sweeping of which, that permitting WPB field offices to authorize the manufacture of prohibited or restricted civilian goods in plants which have labor and machinery not needed in the war effort, being deferred to mid-August. This deferment, it is said, will give the War Manpower Commission more time in which to perfect its organization and administrative controls.

Effective dates for the four orders are: July 15, restrictions on the use of aluminum and magnesium will be lifted, permitting these metals to be used to replace other materials in goods which already are being manufactured. The light metals are in surplus supply. However, their use in civilian goods will not increase the total output of civilian products now.

On July 22 an order will be put into effect permitting the manufacture of working models of postwar civilian products for experimental purposes. Building of these models will be given priority aid where such does not interfere with war or essential civilian production.

On July 29 an order will be issued permitting manufacturers to place orders for machine tools and equipment required for reconversion to peacetime production. These tool and equipment orders will carry low priority ratings, or none at all, and may be filled only after war needs are taken care of.

HIGHWAY CONFUSION: This huge 20-ton steel stack is shown on the last stage of its six day journey to the Philadelphia navy yard. Traffic was halted on the highways while electricians took down and replaced telephone and electric wires on the road. Because of such interference the stack required six days to go only 60 miles. NEA photo

Specific WPB Authorization Required

On Aug. 15, WPB will issue an order permitting manufacturers who have facilities and manpower not needed in the war effort, and where material is available, to secure WPB field officials' permission to produce civilian products, manufacture of which now is restricted or prohibited.

In his announcement, Mr. Wilson said the schedule was agreed upon "after extensive review to assure safeguards that would be needed to prevent any possibility of interference with military production."

Actually the program holds little promise for any substantial resumption of civilian goods production in the near future. In view of the accelerated demand for certain types of war materials and the acute labor shortage in some divisions of war industry, there is little prospect that anything other than a start on the reconversion job will be possible on a very limited scale.

When the authorization order goes into effect, it will require manufacturers to give preference to 124 groups of civilian items which WPB considers of "such importance in civilian requirements as to warrant preferred treatment."

When a manufacturer applies to WPB to make a civilian item, WPB will ascertain first whether he can make one of the listed articles. If he can do so but refuses, WPB's field offices will be authorized to deny his application entirely.

It will be recalled that when Mr. Nelson first announced the plan he said there would be "precious little in the way of expanded civilian production in the immediate future," and that is still true.

Opposition of the armed forces to Nelson's plan was said to have been chiefly centered on the order now scheduled to go into effect Aug. 15. The Army and Navy are said to have objected to giving control of industrial reconversion to field officers of WPB, fearing such would take authority too far from official Washington. Nelson's original plan in this regard, however, apparently went through, the only concession made the armed services being a delay in the effective date of the order for a month and a half.

At a press conference early last week Maj. Gen. Lucius Clay, director of production of the Army Service Forces, said the War Department is fully sympathetic to the start of civilian production at any time it can be done without harm to the war effort.

Army Expanding Heavy Shell Production

Places contracts with 60 companies and expands present facilities. Machine tools, presses to cost $100,000,000

AN IMMEDIATE increase in heavy artillery ammunition production of several hundred per cent is underway as the Army placed contracts with 60 companies and ordered an increase in production at all Army Ordnance loading plants in order to step up the production of 155-millimeter, 8-inch, and 240-millimeter shells, Brig. Gen. R. E. Hardy, chief, Army Ordnance Department's Ammunition division, announced last week.

This step was taken to meet the Army's greater needs as unprecedented quantities of heavy artillery ammunition were being used by American troops in Italy, Normandy and the Southwest Pacific. It was revealed that the Fifth Army in Italy used 64,750,000 pounds of heavy artillery ammunition during one month of the battle to crack the Cassino line.

General Hardy estimated the cost of machine tools, presses and furnaces alone will reach approximately $100,000,000. He said that the War Production Board has granted the highest priority on equipment and material and the War Manpower Commission has similarly granted a high priority on labor referrals because of the importance of the expanded shell program to the continued success of the war effort. A similar expansion is taking place in chemical and explosive works.

Bethlehem Shell Forging Plant

One entirely new plant will be located at Johnstown, Pa., and operated by Bethlehem Steel Co. under contract from the government. This will be a shell forging plant to be built by Rust Engineering Co., Pittsburgh, and will employ more than 1500 workers. The plant is expected to get into production by the end of this year. Ground was broken last week on its construction.

Demonstration of the first 8-inch shell production program in the country, plus a conference on shell production, was held last week in Pittsburgh. A group of industrialists and Army personnel interested in the shell program inspected the shell plant of Jones & Laughlin Steel Corp., McKeesport, Pa., and in a technical session discussed the problems involved in meeting the Army's demand on the expanded shell program.

Maj. Gen. Levin H. Campbell Jr., chief of ordnance, and General Hardy, joined with Col. S. R. Stribling, chief of heavy shell section, in discussing the various problems with representatives of twenty-odd industrial concerns located from coast to coast.

Metal companies taking a leading part in this enlarged program are: Altorfer Bros., East Peoria, Ill.; War Supplies Ltd. (Northern Engineer & Supply Co.), Port Arthur, Ontario, Canada; Pullman Standard Car Mfg. Co., Butler, Penna.; American Mfg. Co., Fort Worth, Tex.; Babcock Ptg. Press Co., New London, Conn.; National Cast Iron Pipe Co., Birmingham, Ala.; Willys Overland Motors Co., Toledo, O.; W. F. & John Barnes, Rockford, Ill.; Giddings & Lewis Co.; Fond du Lac, Wis.; Minneapolis-Moline Power Implement Co., Minneapolis; Atlas Imperial Diesel Engine Co., Mattoon, Ill.; General Motors Co., Oldsmobile Division, Lansing, Mich.;

Omaha Steel Works, Omaha, Nebr.; Mueller Co., Decatur, Ill.; Treadwell Construction Co., Midland, Pa.; Goslin Birmingham Mfg. Co., Birmingham, Ill.; Gullett Gin Co., Amite, La.; Rockwood Alabama Stone Co., Russellville, Ala.; Central Foundries, Holt, Ala.; G. I. Case Co., Racine, Wis.; General Motors Co., Body Division, Grand Rapids, Mich.; General Motors Co., Pontiac Motors Division, Pontiac, Mich.; Rheem Mfg. Co., Danville, Penna.; United Engineering & Foundry Co., New Castle, Penna. U. S. Hoffman Machine Co., Syracuse, N. Y.; Kaiser Co. Inc., Shell Division, Oakland, Calif.; National Tube Co., McKeesport, Pa.; Reed Roller Bit Co., Houston, Tex.; Hughes Tool Co., Houston, Tex.; Le Tourneau Co., Toccoa, Ga.; Pottsville Casting & Machine Co., Pottsville, Pa.; York Electric & Machine Co., York, Pa.; Lehigh Foundries Inc., Eastern, Pa.; American Well & Prospect Co., Corsicanna, Tex.; General Power Co., Quapaw, Okla.; Unit Rig Co., Tulsa, Okla.; Long Reach Machine Co., Houston, Tex.; Bagley-Sewall Co., Watertown, N. Y.; Florence Stove Co., Kankakee, Ill.; Fred I. Getty, Jennings, La.; Leach Machine & Boiler Works, Houma, La.; Ridgewood Steel Co., Cincinnati.

Navy Bureau of Ordnance, Crucible Steel Co., Harrison, N. J.; U. S. Pipe & Foundry Co., Chattanooga, Tenn.; Jones & Laughlin Steel Corp., McKeesport, Penna.; Pet oleum Heat Power Co., Stamford, Conn.; Kaiser Industries, Denver; Batavia Metal Products Co., Batavia, Ill.; Struthers-Wells, Titusville, Penna.; War Supplies Ltd., Sorel Industries, Sorel, Quebec, Canada; American Type Foundries, Elizabeth, N. J.; Kelly Springfield Tire Co., Cumberland, Md.; Oil Well Supply Co., Oil City, Penna.; National Steel Corp., Weirton Steel Co., Weirton, W. Va.; Harrisburg Steel Corp., Harrisburg, Penna.; American Car & Foundry Co., Buffalo; Watertown Arsenal, Watertown, Mass.; E. G. Budd Mfg. Co., Philadelphia; McGraw Construction Co., Newport, Ky., and Rheem Mfg. Co., Williamsport, Pa.

POSTWAR PREVIEWS

BRITISH HOUSING— Large numbers of emergency houses, utilizing considerable tonnages of steel, will form a substantial part of postwar building program in Britain where extensive modernization of steel industry is believed necessary to meet future world competition. See page 73.

CIVILIAN GOODS— Production costs of civilian items in the hard goods field will have increased generally at the time of resumption 25 to 35 per cent above the prewar level, War Production Board official forecasts. See page 82.

AUTOMOBILES— General Motors Corp. plans construction of ten new auto plants as part of a $500 million postwar program to permit an overall increase of 50 per cent beyond previous peak production level. Ford expected to put up a sharp fight to regain No. 1 sales position by early resumption of production and possible reduction in prices. See page 89.

RUSSIA— Soviet Union, potentially the world's richest nation in natural resources and in process of building a vast industrial empire east of the Ural mountains to supplement her western industry, will be powerful factor in international trade in postwar period. See page 96.

PACIFIC COAST— Industrialists formulate program to prevent an unbalanced industrial pattern on Pacific Coast from the standpoint of peacetime production. See page 99.

STEEL BUYING— Work now in progress under aegis of American Iron and Steel Institute apparently will lead to revolution in steel buying methods through use of hardenability bands in specifying grades as opposed to complete reliance on chemical analysis. See page 106.

HYDROGEN WELDING— Speed, smooth welds resulting from full development of atomic hydrogen welding process make it ideal medium for joining light-gage metals, a class of materials whose popularity for civilian goods may reach flood proportions in years immediately following end of war. See page 114.

HEAT TREATING TREND— Significance of a recent change in the order and method of heat treating long torsion bars carries far beyond the present exigencies of war. Reversal of practice, whereby high-carbon stock is hardened, quenched and drawn before machining and grinding, is highly successful, with no scale or decarburization resulting. See page 130.

Civilian Goods Production Costs To Be 25-35% Above Prewar Level

Pricing will be difficult job when production is resumed, L. R. Boulware, WPB operations vice chairman, warns. Sees solution to problem in greater volume and in the reduction of distribution costs

L. R. BOULWARE

PRICING of civilian goods is going to be a "tough job", according to L. R. Boulware, operations vice chairman, War Production Board, in a recent speech before the American Marketing Association in Philadelphia.

"The current estimates by the industry advisory groups coming to Washington," he said, "are that production costs of civilian items in the hard goods field will at the time of resumption have in general increased from 25 to 35 per cent above those being realized at the time production was discontinued.

"There is presumably a vast sellers' market for most of these products, but not at prices that are far out of line with old conceptions of value. If greater than former peacetime volume can be attained quickly on individual products, it will aid some in getting the overall costs down. Two great contributions can be made in this connection by marketing executives. One is getting the volume itself, and the other is getting the cost of distribution down.

"I realize that cost of distribution must be to sales managers what the weather is to everyone—something everyone talks about, but no one ever does anything about. Yet this time something must be done about it—first by the industry to make people willing to buy its products and second by the individual sales manager to make people buy his company's product in the proper proportion to that of his competitors.

"I believe the private enterprise system which with all its faults has done so much for us, has never been so weighed in the balance as it will be, and is now, in this matter of prompt absorption in peacetime activities of the facilities and personnel released from war work. It is a colossal job. Between now and the end of war production, American business to accomplish this end must gradually or precipitately, as the character of the cutbacks make necessary, increase its output of peacetime goods and services to a point two-thirds to three-fourths above the 1935-39 average. This is after taking into account those who will voluntarily leave the labor market with the disappearance of the war need for their services. It is obvious that we must set our volume sights higher than most do now.

"Full employment, an adequate standard of living for all, security, choice in jobs and purchases, the preservation and improvement of the private enterprise system that has made us great—in fact, the winning of the peace—all depend in great measure on how accurate is the market information on which we act, how clear is our judgment, how prompt and bold and vigorous our action as to products and plans, how honest and thorough and persuasive our selling. Yet there is nothing in the size or nature of the task that will not respond to the experience, ingenuity and energy American marketing executives have proved so often they possess."

Contract Termination School Opened to Businessmen

All eligible businessmen, engaged in war production, may apply to attend the three-day courses in war contract terminations, given exclusively at the University of Pennsylvania, Philadelphia.

Procurement agencies of the Army, Navy, Maritime Commission, War Production Board and Smaller War Plants Corp. are co-operating with the university in the courses, which include 21 hours of classroom work and lectures. A new course in war contract termination procedure begins every Monday and Thursday.

Application for permission to attend a course may be made in writing to Dr. Victor S. Karabasz, director, Joint War Contract Termination School, University of Pennsylvania.

Schmidt To Head Up New Economic Research Body

Dr. Emerson P. Schmidt has been appointed director of the newly created Economic Research Department of the Chamber of Commerce of the United States, Washington. Dr. Schmidt also will continue as secretary to the chamber's Committee on Economic Policy and will have charge of the chamber's work in the field of social security.

Senate Group Recommends Change In Unemployment Compensation

SENATE Committee on Postwar Economic Policy and Planning has recommended the unemployment compensation law be amended:

1—To provide for payments to federal workers through the state unemployment agencies and under the state laws;

2—To guarantee the solvency of state unemployment compensation funds, through the setting up of a revolving loan fund, to make loans to the states at any time the compensation reserves of a state prove to be inadequate.

3—That the Unemployment Tax Act be amended, through legislation initiated in the House, to provide for the imposition of unemployment taxes on employers of maritime workers and employers of one or more employes.

So far as the committee has been able to ascertain, says the report, the state laws have worked satisfactorily and smoothly, so that there is no reason for attempting to federalize unemployment compensation. The various state laws provide for compensation payments of from 50 to 60 per cent of regular wages, up to maximum payments ranging from $15 to $22 per week and for periods ranging from 14 to 24 weeks. Those benefits, both as to amount and duration, have been steadily increasing under state enactment for the past 6 or 7 years, and there is every prospect that the trend toward improvement will continue. Furthermore, with wages at present increased by overtime payments, the average weekly benefits under unemployment compensation are rapidly approaching the maximum permitted payments in the various states. Steady employment now prevailing is also greatly increasing individual wage credits so that payments are approaching the maximum duration allowable.

By agreement, the report notes, the states have worked out provisions for pooling wage benefits so that a worker who moves from one state to another does not lose the benefits he has accumu-

lated in the state of his previous residence. This makes the problem of migration of workers much less serious.

The report points out that witnesses appearing before the committee in some cases recommended more liberal benefits under the state laws, whereas the state unemployment compensation directors who testified insisted that present unemployment compensation benefits are adequate. The committee inclines to the view that benefits must be adequate from the standpoint of subsistence but that they must not be large enough to make employment unattractive. In any event, with both houses having passed S. 1767, with benefits to soldiers fixed at $20 a week, the committee held that Congress would not be justified in exceeding this figure for civilians.

"The evidence before the committee," says the report, "leaves little doubt as to the adequacy of the unemployment compensation funds to meet any probable drain on them, but, because of the dislocations caused by the war, the committee feels that this adequacy cannot be left to any possible chance. The impact of worker migration, for which the states are not responsible, will not hit each with equal severity. Furthermore, while as a national average maximum benefits could be paid from present funds to 60 per cent of the covered workers now employed, the funds of several highly industrialized states are sufficient to pay benefits to only 38 or 39 per cent of covered workers now employed. The committee, therefore, feels that it is right and proper that the federal government guarantee the solvency of the state unemployment funds to each state, provided those funds are distributed in strict accordance with the state law, for the period of the transition."

At present, says the report, state unemployment compensation funds are increasing at a rate of more than $1,000,000,000 a year, and if the war should continue through 1945, they would reach a total of $7,000,000,000.

"There seems little likelihood of these funds being exhausted, under existing law, unless unemployment reaches an unprecedented high over a long period," states the report.

Master Airport Plan Calls For 248 West Coast Fields

The Civil Aeronautics Administration's master airport plan, details of which are to be released soon, calls for 248 new landing fields on the West Coast, according to announcement by CAA Administrator Charles I. Stanton. Their construction would bring the number of West Coast fields to 626.

All but 19 of the new fields will be smaller airports, suitable for private flying or feeder line operations.

Mr. Stanton predicts there will be 300,000 civil aircraft in the United States within three years of the war's end, of which 90 per cent will be privately owned.

Lack of Co-ordination Assailed

Senate subcommittee says program for production, purchase and stockpiling of nonferrous and strategic metals "extraordinarily" lacking in overall direction

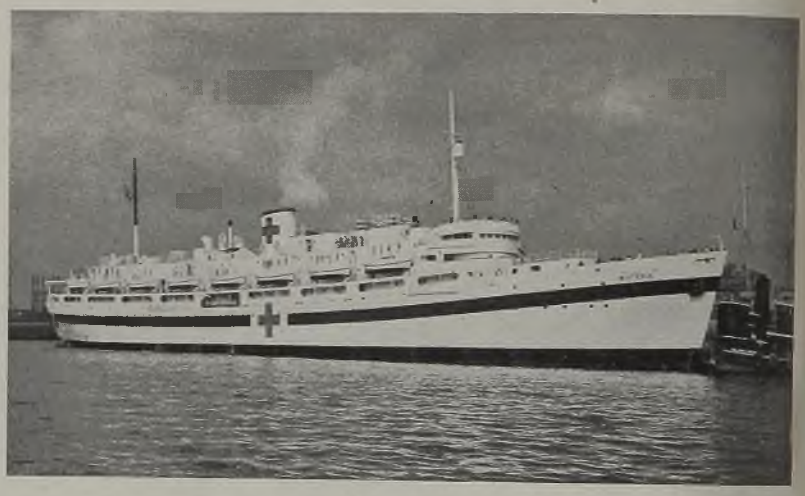
SUBCOMMITTEE on Mining and Minerals Industry, of the Senate Special Committee to Study and Survey Problems of American Small Business in a preliminary report, declares one of its first and most basic discoveries was "the extraordinary lack of overall direction and co-ordination in the production, purchase, and stockpiling of nonferrous critical and strategic minerals and metals, and the complete lack of any high official policy statement which would be binding on the multitudinous agencies engaged in these activities."

Among these agencies it includes the War Production Board, the War Manpower Commission, the Reconstruction Finance Corp., the Board of Economic Warfare (now the Foreign Economic Administration), the Metals Reserve Co., the Smaller War Plants Corp. and others which "were, and largely still are, operating independently and with a vast disregard of each other." While a good job has been done and necessary minerals obtained, this too often has resulted from "luck, main strength and awkwardness, whereas much waste and friction could have been avoided by properly integrated organization," says the report.

Every effort should be made to procure the full benefit of maximum marginal small-mine production, says the subcommittee. It points out that manpower problems are not identical for small and large mine operations, and that there are sources of labor available to the small mines which make their operation feasible.

"The administration of the premium price plan long ago should have been streamlined, policies clarified, and the case-handling time appreciably shortened. Constant attention to this problem still is imperative," says the subcommittee. It recommends that "the life of B, C, and special additional copper premiums should be announced as co-extensive with A premiums, subject to necessary individual adjustments; or, it should be announced that no cancellations of any premiums will be made prior to July 31, 1945, where such cancellations will close a mine in which there is an unrecovered wartime investment. If it should be found necessary to extend the life of the entire plan to July 31, 1946, even though applications covering new operations are no longer authorized, this should be done without hesitation."

Intent to cancel Metals Reserve Co. contracts should be announced at least 90 days in advance, and necessary cancellations should be made as gradually as possible so as not to demoralize the industry, recommends the subcommittee. The small-lot-purchase stockpile program should be continued intact for the duration of the war. Purchase contracts should not be terminated by taking advantage of technical flaws or breaches beyond the control of the contractor simply because the need for the particular mineral or metal no longer is as crucial



HOSPITAL SHIP: An ultra-modern six-storied floating hospital, the United States Army hospital ship WISTERIA, is shown leaving the Bethlehem Steel Co.'s Brooklyn, N. Y., yard, where it was converted. The ship is 441 feet long, has capacity for 597 patients

as was the case at the time the contracts were entered into.

The Reconstruction Finance Corp., it says, should continue independently the long-range program authorized by the Congress and should not be unduly influenced by the uncertainty and fluctuations of the War Production Board program.

The mine access roads program, it says, should be continued in force for the remainder of the war, and additional funds should be provided to the Public Roads Administration for this purpose.

There should be less delay on the part of the Bureau of Mines in approving exploration and development programs and in getting work started on such programs.

The subcommittee calls on the Office of Price Administration for special attention in making adequate food available to miners under the rationing system. It calls on the Securities and Exchange Commission to simplify forms and procedures and recommends that "venture capital should be encouraged to invest when the enterprise frankly admits its promotional nature and states the facts accurately in its prospectus." It calls for a study of freight rates on ores and concentrates, "with particular emphasis on the possible adverse effect upon the mining industry of freight rates as now graduated according to the value of product."

Mine taxation, says the subcommittee, should be planned so that the operator can receive an adequate return on his investment commensurate with risk, depreciation, and depletion. "Full consideration should be given to the short life of most mines. Venture capital should be encouraged. Volume capital losses should be deductible to a greater degree than is now possible."

Subcommittee Makes Recommendation

The gold mine closing order L-208, says the report, should be under continual review "with a view of rescinding it the moment the labor and material situation so permits."

The subcommittee recommends that domestic mineral and metal production be given preferential treatment by the government over imports, "even when the cost of the domestic raw material appears to be somewhat higher than imported raw material. Taxes, consumption of materials, and jobs are the outcome of expenditures within the United States. Raw materials should be imported by the government only when there is a real shortage of domestic products and when such importation is necessary for the conduct of the war.

"It is imperative that the Congress as soon as is possible pass an adequate strategic and critical minerals and metals stockpiling act which will assure future national security and protect industry against the wholesale dumping of surpluses."

The subcommittee is comprised of Senators James G. Scrugham (Dem., Nev.) and C. Douglass Buck (Rep., Cal.), with Mr. Scrugham as chairman.

NAM Committee Announces 6-Point Plan To Expedite Terminations

SIX-POINT plan to expedite settlement of terminated war contracts has been released by the National Association of Manufacturers' Advisory Group on War Contract Termination of which four industrialists from the metal trade are members.

The four members who represent the metal trade are Norman R. Althauser, Aluminum Co. of America; W. S. Bowser, Blaw-Knox Co.; Howard E. Isham, United States Steel Corp. of Delaware, all of Pittsburgh, and E. W. Ackerman, Thompson Products Inc., Cleveland.

Outline Termination Points

The six points are:

1. Termination control centers: Today 85 per cent of the dollar value of all war contracts flow through a few hundred major war contracting centers. Insofar as possible these should be converted to control centers for termination purposes.

2. Direct settlement of subcontracts: If suitable releases between buyers and sellers can be arranged without destroying contract identifications, a by-pass would be provided for direct settlement with the subcontractor by the procurement agency.

3. Settlement teams: Banded units of accounting, disposal, legal and technical officers would be stationed at the control centers as required. The Baruch-Hancock Report recognizes this necessity.

4. Designated settlement agencies: "Contract centers" companies would be assigned to a Designated Settlement Agency which would conduct negotiations, certify claims, authorize payments and perform other related functions.

5. Contractor settlement of limited subcontract claims: Prime contractors and qualifying subcontractors would be authorized to settle nuisance, small or simple claims and thus eliminate unnecessary red tape, expense and delays.

6. Grouping of individual claims for single negotiations: This would permit grouping of properly identified individual contract claims for purposes of renegotiation but would be restricted to situations where grouping is a short cut in paper work, in elimination of duplication and a reduction of negotiation and settlement time, agreed to by settlement parties.

AWARDS . . . .

Additional war plants honored with Army-Navy-Maritime emblems for outstanding achievement in the production of war materials

General Electric Co., Erie Works, Erie, Pa., adds second gold star to "M" pennant.

Kewanee Boiler Corp., Kewanee, Ill., adds second white star.

Inland Steel Co., Chicago, adds second white star at Indiana Harbor plant.

Studebaker Corp., South Bend, Ind.

Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., receives third star.

Fansteel Metallurgical Corp., North Chicago, Ill., adds white star.

Tantalum Defense Corp., North Chicago, Ill., adds white star.

Falk Corp., Milwaukee, fourth renewal.

Skilsaw Inc., Chicago, adds second white star.

Manhattan Rubber Mfg. division, Raybestos-Manhattan Inc., Passaic, N. J., adds white star.

Mid-West Forging & Mfg. Co., Chicago, adds white star.

Vendo Co., Kansas City, Mo., adds third star.

American Steel Dredge Co. Inc., Ft. Wayne, Ind.

Associated Spring Corp., Raymond Mfg. Co., Corry, Pa.

Atlas Powder Co., Giant, Calif.

Automatic Signal Corp., East Norwalk, Conn.

Behr-Manning Corp., Norton Pike Co., Littleton, N. H.

Chromium Process Co., Shelton, Conn.

Cole Laboratories Inc., Long Island City, N. Y.

Commercial Solvents Corp., Dixie Ordnance Works, Sterlington, La.

Davison Chemical Corp., Baltimore, Md.

Eastern Heat Treating & Brazing Corp., New York.

Goodyear Tire & Rubber Co., Cedartown, Ga., and Rockmart, Ga.

Mansfield Tire & Rubber Co., Mansfield, O.

Markem Machine Co., Keene, N. H.

Miller Mfg. Co., Detroit.

Milwaukee Stamping Co., Milwaukee.

New Haven Screw Machine Products, New Haven, Conn.

North Terminal Machine Co., Boston.

Oak Rubber Co., Ravenna, O.

Plastic & Die Cast Products Corp., Los Angeles.

Scaife Co., Oakmont, Pa.

Stewart-Warner Corp., Dixon, Ill.

A. B. Stoves Inc., Battle Creek, Mich.

Ward Products Corp., Cleveland.

Welch Allyn Co., Auburn, N. Y.

Wesley Steel Treating Co., Milwaukee.

Marshall Stove Co., Lewisburg, Tenn.

Powers Regulator Co., Chicago.

Rocky Mountain Arsenal, Chemical Warfare Service, Denver, Colo.

Sheldon Machine Co. Inc., Chicago.

Shell Oil Co. Inc., Wilmington, Calif.

Studebaker Corp., Los Angeles.

Weldon Tool Co., Cleveland.

Wolverine Brass Works, Grand Rapids, Mich.

York-Shipley Inc., York, Pa.

York Oil Burner Co., York, Pa.

Electro-Voice Mfg. Co. Inc., South Bend, Ind.

Ethyl-Dow Chemical Works, Chicago.

General Engineering Works, Chicago.

General Motors Corp., Bay City, Mich.

Goodyear Tire & Rubber Co., Decatur, Ala.

Analysis Extras Revised by OPA On Four Grades of Alloy Steel

Decrease of $2 a ton on NE 8600 and 8700 steels and increase of $3 a ton on AISI 4100 and 3100 steels effected to stimulate increased use of the NE grades. Forged axles and car wheels removed from coverage of price schedule No. 6

DECREASES of $2 a ton in analysis extras for NE 8600 and 8700 grades of alloy steel and increases of $3 a ton for AISI 4100 and 3100 grades were made effective July 12 by an amendment to price schedule No. 6, issued by the Office of Price Administration.

The maximum analysis extras for basic open hearth grades of alloy steel bars, bar strip, and cold-rolled alloy strip are on a 100-pound basis: NE 8600, 65.00 cents; NE 8700, 70.00 cents; AISI 4100 (molybdenum, 0.15 to 0.25 per cent), 70.00c; and AISI 3100, 85.00c. Maximum analysis extras for basic open hearth blooms, billets, and slabs on a per gross ton basis are: NE 8600, $13; NE 8700, $14; AISI 4100 (molybdenum, 0.15 to 0.25 per cent), $14; and AISI 3100, $17.

The customary differentials for electric furnace quality and for variations from the standard analysis range still apply to these extras.

With respect to sales of alloy steel mechanical and pressure tubing (except aircraft tubing and bearing tubing) the maximum analysis extras for the following basic open hearth grades, NE 8600, NE 8700, AISI 4100 and AISI 3100, shall be the bar extras stated above, converted to a percentage "base" in accordance with the "Analysis Extras and Deductions" tables filed with the OPA by producers of alloy steel tubing.

OPA said that this adjustment in the alloy grade extras does not constitute an overall price increase, as the proportion of the individual grades to the total of the four grades at present levels of production are such that the decreases required are about balanced by the increases allowed.

It is expected that this action will stimulate greater use by steel consumers of the NE 8600 and 8700 grades. By lowering the ceilings on these grades and increasing the ceilings on the AISI 4100 and 3100 grades, OPA expects many buyers now using the latter to change their specifications to these NE grades. The AISI grades are now priced at a level equal to or slightly higher than the NE grades.

The War Production Board has been endeavoring to increase the use of the NE grades of alloy steels, but had found it difficult to induce consumers to shift from the AISI to the NE grades as it meant changing to a higher-priced grade.

Increased use of the NE steels is desirable in order to conserve ferroalloys to provide a market for surplus alloy scrap and to reduce the amounts of carbon steel scrap used in the production of alloy steels.

Two other changes in the iron and steel products price schedule are provided. One removes from the schedule's coverage the pricing of forged axles and car wheels. These commodities will be covered by maximum price regulation No. 188, Machines and Parts and Machinery Services. Their previous coverage by two regulations had caused confusion.

The other change adds to schedule No. 6 the standard adjustable pricing provision found in many OPA regulations by which the agency may authorize a seller to sell iron and steel products at prices which are in effect after delivery when a request for a change in the applicable maximum price is pending.

Expansion of Veterans Hospital Facilities Asked

Veterans Administration has recommended that the Federal Board of Hospitalization approve new building projects, costing $70,000,000 and totaling 16,000 additional veterans' hospital beds, to be constructed in 20 states. Recommendations for additional beds will be made as fast as the need for them develops. The administration now has about 88,000 beds in its 94 facilities and has authorized 17,000 additional to be completed within 18 months. It is estimated that about 300,000 beds will be required eventually to meet the needs of veterans of all wars.

Tungsten Allotments Fail To Meet Needs Fully

Molybdenum allotments to incandescent and fluorescent lamp manufacturers for July and August represent 100 per cent of the amount requested by them, but tungsten allotments, owing to increased military demands, are about 8 per cent below the quantity requested for July and an estimated 13 per cent below that requested for August, according to a recent report by the War Production Board.

Surplus Maritime Commission Materials To Be Centralized

Unrequired and surplus material from Maritime Commission shipyards and termination inventories from plants of contractors having Maritime contracts will be centralized in open storage spaces, one of which will be at Reading, Pa. Many Maritime Commission shipyards are changing to new-type vessel construction and are reporting considerable quantities of unrequired material originally intended for use in the construction of other type vessels.

War Agencies Appointments-Resignations

William A. Murphy has resigned as director of the Division of Administrative services, War Production Board. He has been succeeded by C. Sterry Long, formerly administrative officer, Steel Division.

* *

S. D. Schell has been designated executive deputy administrator for the War Shipping Administration and will continue to serve as executive director of the United States Maritime Commission.

* * *

Mrs. Ethel B. Gilbert has been appointed director of the newly established Office of Industry Advisory Committees, Office of Price Administration.

* * *

Arthur J. McComb has been appointed director of the Office of Industry Advisory Committees, War Production Board, effective July 15. He will succeed John C. Whitridge Jr., who has resigned to return to International Business Machines Corp. Mr. McComb is vice president of Otis Elevator Co. Mr. Whitridge's resignation represents the first change in the top 14 executives reporting directly to L. R. Boulware since he became operations vice chairman seven months ago.

* * *

Sterling Smith, chief, Refrigeration and Air Conditioning Section, General Industrial Equipment Division, War Production Board, has resigned, effective Aug. 1, to assume managership of the Commercial Refrigeration division, Mills Industries, Chicago. Charles M. Stuart, who has been deputy chief of the Special Equipment Branch of the division, is succeeding Mr. Smith.

* * *

Lieut. Col. John K. Collins, chief, Labor Branch, Headquarters, Army Service Forces, became director of the Bureau of Placement, War Manpower Commission on July 1. Colonel Collins will be inactivated by the Army.

* * *

Charles B. Bryant, Alexander, Va., has been appointed director of the Transportation Equipment Division to succeed George M. Betterton who is returning to the Southern Pacific railway from which railroad he has been on leave of absence.

PRIORITIES–ALLOCATIONS–PRICES

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

INSTRUCTIONS

ALUMINUM POWDER, PAINT: Favorable consideration will be given by the Aluminum and Magnesium Division, WPB, to requests of distributors of aluminum powder and paint to accept late delivery of unrated orders for pigments from a person other than a producer who received but did not ship the distributor's order between May 15 and June 30. Stocks of aluminum powder and paint in distributors' inventories on March 15, 1944, may be sold without preference ratings or limitations as to end use.

CONSTRUCTION: The following kinds of installations are considered construction under order L-41: Any piece of equipment or fixture which is attached to the plumbing system of a building, which involves putting new wiring in a building, for which a base or foundation must be built; which is cemented to a floor or wall of a building; or furnace or stoker connected by pipes or flues or wiring to the building.

The following kinds of installations are not considered construction under L-41: Counter, table or booth which is attached to the building only by nails or screws and which can be removed as a unit and will only make necessary to fill up the holes left by the nails or screws; piece of equipment or fixture which requires only making a connection to an existing wiring outlet.

CHAINS: Chain manufacturers must disregard preference ratings, other than AAA, to the extent necessary to fill orders for farm chain from suppliers and dealers who serve the farm trade. Farm chain includes only the following types and preference ratings are to be disregarded only up to the stated percentage of total weight production of each type during 1940 or 1941, whichever was greater: Harness chain (including breast, butt, heel and trace chains), 50 per cent; wagon chains, 50 per cent; cow ties, tie outs and halter chains, 50 per cent; log chains under ½-inch, 30 per cent; repair and lap links, 75 per cent.

If any chain manufacturer is unable to fill all orders from such suppliers and dealers out of the stated percentages, he may prorate deliveries among them on the basis of normal shipments regardless of preference ratings, other than AAA. Orders from such suppliers and dealers in excess of the stated percentages are to be filled only in accordance with priorities regulations.

L ORDERS

CAN OPENERS, GARMENT HANGERS: Manufacturers of can openers now are permitted to use, per quarter, for the household type of opener 100 per cent as much iron and steel as they averaged per quarter for the same purpose in the year ended June 30, 1941; for the institutional type, 35 per cent.

Permission has been granted to resume the use of zinc for all types of can openers. Size and weight restrictions have been removed.

Manufacturers of garment hangers now may use, per quarter, 35 per cent as much iron and steel as they averaged per quarter in the year ended June 30, 1941. Size and weight restrictions on wire for hangers also have been removed. (L-30-d)

HEATER CORD: A new electric heater cord set now may be bought without turning in the old set. Each manufacturer will receive authorization on form GA 1850 for the number of units he may produce in each quarter, based on the manufacturer's total 1940 production, available facilities, manpower and controlled materials. Manufacturers may ship heater cord sets only on purchase orders rated AA-5 or higher. Heater cord sets may be manufactured only in six-foot lengths and the type of wire that may be used is specified in the order. Control has been transferred from L-65 to L-277. (L-65, L-277)

WATER HEATERS: Limited production of electric water heaters for civilian use has been approved at an annual rate not to exceed 37 per cent of total production by the industry during the year ended June 30, 1941. Quotas have been established for the production of electric as well as nonelectric heaters, exclusive of production for the armed services.

Production will be limited to three sizes, based on water storage capacity, and only one model in each size will be allowed.

Restrictions on manufacture or fabrication of metal jackets for water heaters have been eliminated. They may be made from allotted materials or from aluminum which is specifically authorized for jackets by WPB under order M-1-i. In addition, manufacturers may use materials in inventory on May 8, 1944, and those obtained from frozen idle and excess inventories. Control over electric water heaters has been transferred from order L-65 to L-185. (L-65, L-185)

SPECTACLES: Restrictions on the use of nickel and nickel-bearing alloy in the manufacture of corrective spectacles have been eased while former restrictions on the use of all other metals have been removed. Production to fill orders for the Army or Navy are exempt from restrictions of the schedule, provided their production meets applicable specifications. Permitted uses of nickel and nickel-bearing alloys are specified in the order. (L-214)

INDUSTRIAL TYPE INSTRUMENTS: Prohibition on the incorporation of scale or chart illumination in pyrometers and resistance thermometers has been removed. (L-272)

INDEX OF ORDER REVISIONS

Subject	Designations
Ammunition	**M-9-c**
Bismuth	**M-276**
Can Openers; Garment Hangers	**L-30-d**
General Scheduling	**M-293**
Heater Cord	**L-65, -277**
Heaters, Water	**L-65, -185**
Instruments, Industrial Type	**L-272**
Pigments, Zinc Sulphide	**M-353**
Spectacles	**L-214**
Telephones	**U-8**
Tin	**M-43**
Price Regulations	
Aluminum Scrap	**No. 2**
Furnaces, Warm Air	**No. 188**
Imports	**Import Price Reg.**

M ORDERS

AMMUNITION: Manufacturers of civilian ammunition no longer are required to file appeals under order M-9-c to use the necessary copper and copper-base alloys. (M-9-c)

TIN: Order restricting use of tin has been revised as follows: Raises from 21 per cent to 30 per cent the tin content of solder which may not be used, except as specifically permitted by the order; requires the prescribed certification in the purchase of all solders; adds radio, radar and electrical appliances to the list of products in which solder containing not more than 35 per cent tin may be used; adds fabrication of terne plate tanks to the list of operations in which 35 per cent tin solder may be used. (M-43)

BISMUTH: Changes in controls of metallic bismuth have been made as follows: Redefines bismuth to include primary alloys containing bismuth; raises from 50 to 100 pounds the amount of bismuth which may be delivered to any one consumer in any one month; requires WPB authorization for the use of any amount of bismuth in excess of 100 pounds; requires a report on form WPB-2278 from a distributor or consumer who, on the first day of any month, has in possession or under his control more than 100 pounds of bismuth or who has received or used during the preceding month more than 100 pounds. (M-276)

GENERAL SCHEDULING: Radiators, internal combustion engine connecting rods, exhaust and intake valves and seats, generators, voltage regulators and finished cast crankshafts for internal combustion engines of 750 revolutions per minute and up have been added to table 4 of general scheduling order M-293, making these items subject to the reporting provisions of the order. The amended table also includes for the first time a column of freezing times that are set at three months for all the items listed. (M-293)

ZINC SULPHIDE PIGMENTS: Control of order M-353 has been extended to include zinc sulphide pigments as well as titanium pigments. All ratings for zinc sulphide pigments below AA-2 have been made ineffective, with the exception of material required to fill orders for the armed services. Nonmilitary orders rated below AA-2 may be filled only as unrated orders to the extent permitted by priorities regulation No. 1. (M-353)

U ORDERS

TELEPHONES: Production of 800,000 civilian type telephone sets has been authorized. Production quotas are being assigned to companies normally engaged in the business of manufacturing telephone instruments, on the basis of their capacity to absorb them without interrupting their war work or drawing upon labor required in war plants. Each telephone company will be permitted to order new instruments only up to 1 per cent of the number of telephones it had in service on Dec. 31, 1943, with the further restriction that none may be ordered for inventory. (U-8)

PRICE REGULATIONS

ALUMINUM SCRAP: Maximum price of 16.00 cents a pound for clean scrap aluminum foil (including light gage aluminum sheet not exceeding 0.006 of an inch in thickness) has been established. Contaminated or uncleaned foil must sell at a price that reflects its value relative to the 16-cent price for clean foil. Each seller of low grade aluminum residues, such as drosses, skimmings, grindings and sawings, will be given a price upon application to the Nonferrous Metals Branch of OPA. This price will take into account the buyer's special requirements and the additional cost to the seller in preparing the material to meet these requirements. (No. 2)

WARM-AIR FURNACES: Manufacturers of cast-iron gas-fired and wood-fired warm air furnaces and repair parts for both cast-iron and steel warm air furnaces must take their published list prices of Aug. 3, 1943, rather than of Aug. 4, 1943, as their maximum prices. (No. 188)

IMPORTS: Importers who had purchased industrial materials before July 6, 1944, and who are caught in a severe "squeeze" because their sales of these materials to government agencies, government contractors or subcontractors have been brought under price control, effective July 15,1944, may apply for an adjustment of their maximum prices to the Export-Import Price Branch, OPA. (Import Price Reg.)

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

MOLY

500 Fifth Avenue · New York City

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Ten new auto plants planned by General Motors as part of huge postwar expansion program. Ford seen putting up fight to regain No. 1 spot as automobile builder. Mobile equipment replacement needs staggering

TEN new automobile plants have been announced as definite elements of the postwar production picture for General Motors Corp. They have not been identified either as to division which will operate them or the type of work to be done in them. It has been revealed they will be part of a 500 million dollar program to balance out the various phases of car production and permit an overall increase of 50 per cent beyond the previous peak level. The corporation now operates 117 plants in the United States, of which all but 12 are owned by GM, these being DPC facilities.

Inadvertently the news has leaked out that the Fisher Body Division is preparing plans for a new $18,000,000 plant at Cincinnati, employing around 5000. It came about when the Pennsylvania railroad filed application with the city council for permission to construct an underpass in one section of Cincinnati's east end to serve the new plant. The site apparently is not at the moment an industrial zone and property owners in the vicinity have been protesting the plant's location there.

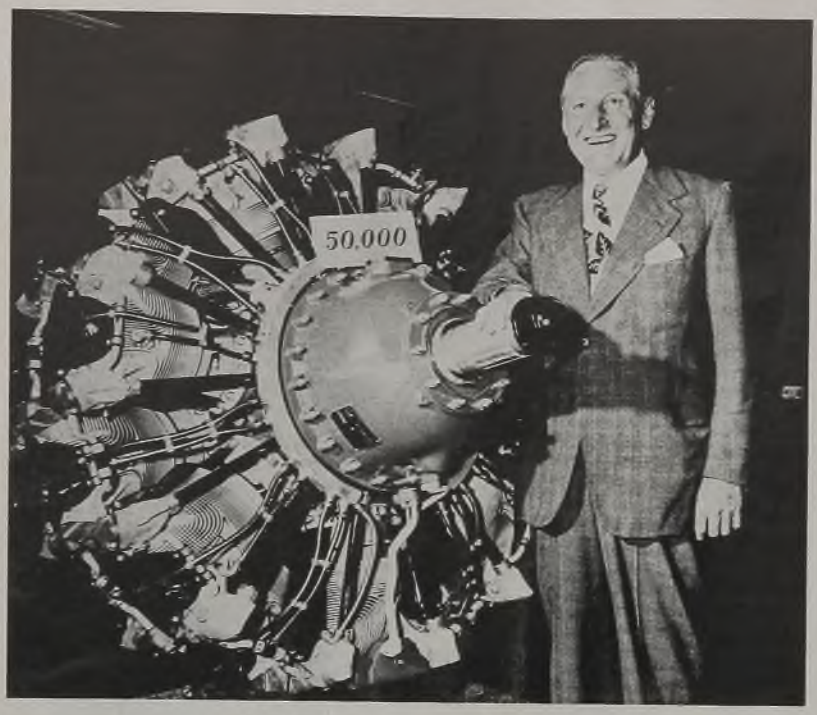
News dispatches identified the undertaking as a war plant, but it seems fairly obvious that at this stage of the game there will be no new $18,000,000 war plants going up. The proposed expenditure indicates something more than an automobile assembly plant, of which General Motors doubtless will avail itself postwar, the probability being that the project involves a complete body building operation, with sheet metal fabrication, welding, assembling and finishing lines and the necessary auxiliary equipment, such as Fisher No. 1 plant in Cleveland. Cincinnati is a logical choice for a plant of this type, being handy to water transportation to the South, close to essential materials suppliers and in a good labor market.

Consider Six Major Points

Last Friday the scheduled meeting of the automobile industry's advisory committee, made up of top officials from each of the various producers, with the WPB in Washington packed into a single day consideration of six major points on an agenda leading to reconversion: 1. Problems of building experimental and pilot models; 2. Procurement of new machine tools, dies, jigs, fixtures and other equipment needed to resume a minimum rate of production; 3. Procurement of government-owned tools in automotive plants; 4. Termination of contracts and removal of war production materials and machinery; 5. Allocation of quotas for resuming limited production; and 6. Problems of placing orders for materials and components sufficiently ahead of the date of initial production to minimize delays in getting started. The meeting occurred too late in the week to permit any consideration of the deliberations in this issue of STEEL, but advance comment was inclined toward the pessimistic side in view of what appeared to be stern opposition from the Army and Navy to broad resumption of civilian production, together with the absence of Donald Nelson because of illness.

Looking ahead to the time when new automobiles are again on the market, some observers can see shaping up a sharp fight by Ford to regain his old No. 1 position in the industry from the standpoint of sales. They reason thusly: Virtually all manufacturers are talking higher prices, anywhere from 15 to 40 per cent above comparable prices on 1942 models, all, that is, except Ford who has been pretty mum on the whole question of

Here are two views of the "Weasel," a radical and secret war vehicle, produced by the Studebaker Corp., South Bend, Ind. It is a personnel and supply carrier capable of operating over snow, deep mud, sand or on paved highways because of its light weight and broad tracks. Tracks are rubber padded and powered by a Studebaker passenger car engine



50,000TH ENGINE: Within a month after Pearl Harbor, Buick produced its first Liberator bomber engine. Within a month after D-day, the company turned out the 50,000th. Shown above are Harlow H. Curtice, General Motors vice president and chief executive of Buick and the milestone engine

postwar automobiles. A situation like this is made to order for the Dearborn master minds to pull one of their unorthodox and industry-confounding moves. What better than to announce that Ford cars of tomorrow will be priced lower than their comparable 1942 versions? This, coupled with statements already credited to Ford that he could be back in production inside of 30 days, would be a terrific sales edge on his competitors who are talking higher prices and 90 days or longer to get production rolling.

The question naturally arises: How could Ford do it? The answer is simply that he could by just deciding to do so. No stockholders would have to be given any consideration. The company's financial position has been amply reinforced by war business. He could even sell his cars at a slight loss, if necessary for a time, in the hope that the added volume which might result from such a policy would quickly make up the deficit. In fact, over the 11 years following the abandonment of the Model T, or from 1927 to 1937, Ford showed a net loss of nearly 16 million dollars, while surplus dropped almost 95 million dollars. A surprise move like lowering postwar prices might well be the spark which would touch off a return to the halcyon days of the Model T. Other automobile builders, with a weather eye on cost sheets, taxes and dividends, may well be shuddering at the thought.

Manufacturers participating in the vast supply program for mobile equipment and parts which Army Ordnance directs have constantly been amazed if not flabbergasted at the mountainous supplies of spare parts ordered, and still being ordered. It has been estimated that American vehicles—trucks, jeeps, tanks, mobile guns, etc.—require 15 to 20 times the volume of spare parts which the Germans require for an equivalent number of units, for two principal reasons. One is the lack of standardization between different makes of vehicles, each make requiring its own variety of spare parts. The other is the staggering length of the supply lines to the fronts, many times the distance over which the Germans have to radiate material to their equipment in battle.

Huge Supply of Spare Parts

In addition to the vastly more complicated problem as compared with Germany, war vehicles have been found to require at least ten times the quantity of spare parts that similar types of vehicles consume in peacetime. Combat losses are only an insignificant part of the explanation. More important are the following:

1. Physical handicaps of the terrain—poor roads, badly damaged and carrying heavy traffic; plus the ravages of sea water corrosion and coral dust experienced in Pacific operations.

2. Punishment which vehicles receive in service by drivers who, often dead sleepy, tired and in need of more nourishment, are pressing to get supplies through with no thought of care for the equipment they are driving.

3. Much driving in darkness by virtue of military necessity, with vehicles seriously overloaded.

Returning supply officers have declared that the best truck built in the U. S. will develop trouble in a few hundred miles or a few hours' operation under today's battle conditions. In the Italian campaign it was estimated that 18 replacement engines would be needed for every 100 trucks operated, but so far reports have shown that replacement requirements are nearer 100 engines for every 100 trucks.

On top of this are many other exigencies which require large volumes of parts to be produced, whether they will ever be used or not. Some losses result from rough handling and breakage of packages. Other supplies become "lost" when vital records are lost, destroyed, or mislaid.

Certain campaigns, the Aleutians venture for example, are laid out with three or four routes of approach, along each of which must be spotted the needed spare parts, even though only one route is finally traversed. Supplies for the other routes are not returned because of difficult transport conditions.

In all, there is a minimum list of some 260,000 separate items which Ordnance's Tank-Automotive group must keep track of, schedule production and expedite shipment to the different battlefronts the moment they are requested. Right now spare parts ordering is on the basis of $40 worth for every $100 worth of vehicles. This ratio is somewhat higher than in the earlier stages of the war when the pressure was more on the finished vehicles than on the spare parts. Generally speaking, the spare parts situation is well in hand, and future ordering should taper off as the "pipelines" to the fronts become filled. There are 400-500 different types of vehicles concerned.

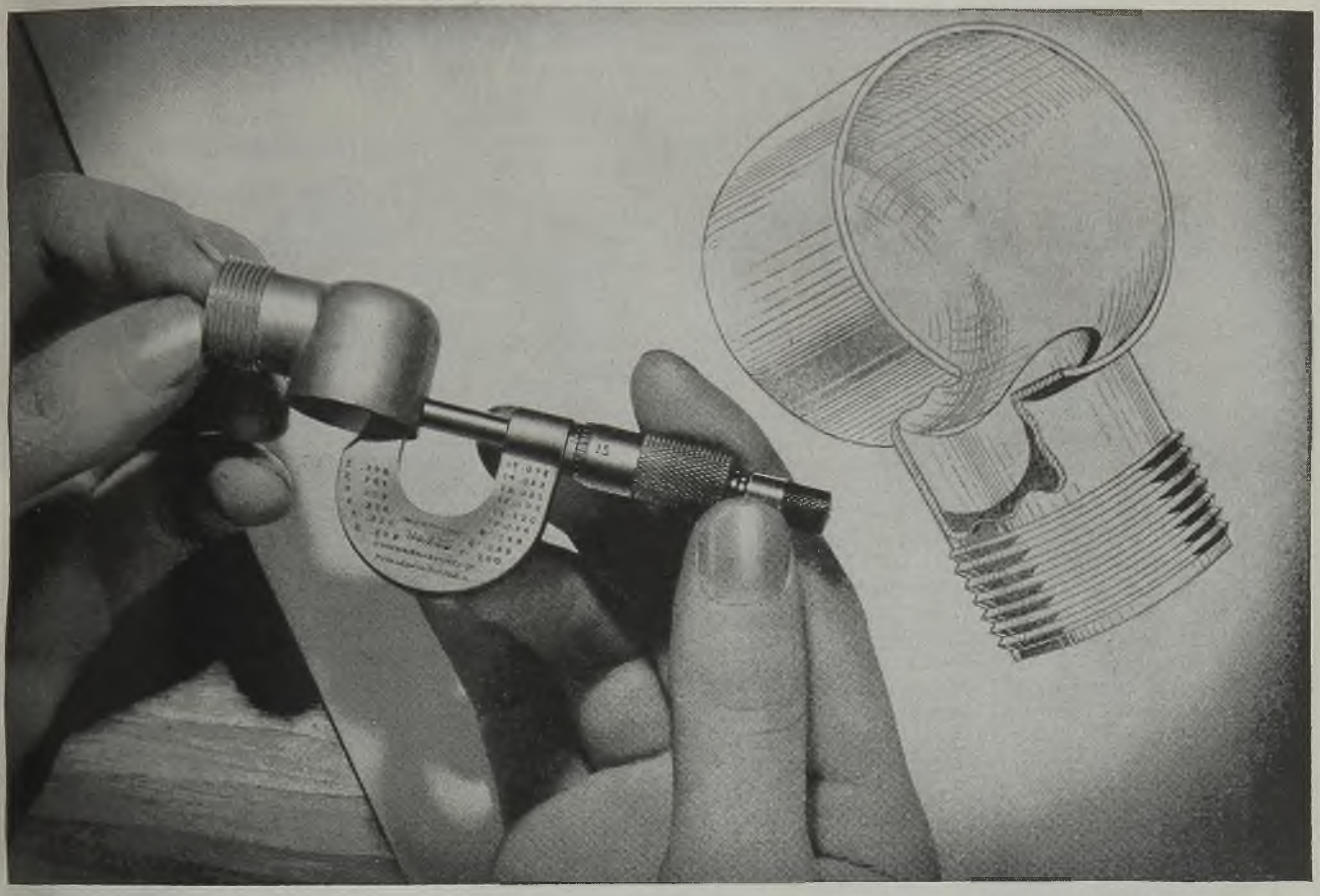
One of the knottiest supply problems which Ordnance had to meet was the case of the mysterious disappearance of distributor rotors for jeeps. It seems that the jeep has no ignition key and the standard way for locking it is to remove the distributor rotor. Once this became known to the average G.I. Joe, he quickly saw to it that he availed himself of a spare rotor for his hip pocket, just in case he should come across an abandoned jeep needing rescuing. End result has been that ordering of spare rotors has climbed to such dizzy heights that soon every soldier in the army probably will be carrying his own "jeep key."

The amphibious jeep, incidentally, built in large numbers by Ford here, did not prove out and was discarded by the Army in favor of the larger amphibious truck known as the Duck.

A novel experience is reported in connection with a shipment of storage batteries supplied to the French early in the War. With characteristic disdain for water, the French users filled the batteries with some handy stocks of wine and in no time at all needed a new shipment of batteries.

.015"

—THE CASTABILITY OF ZINC ALLOYS PERMITS THIN SECTION DIE CASTINGS



One of the principal advantages of zinc alloys over other die casting metals is their excellent castability. This castability permits the transition from thick to extremely thin sections in a single part, and facilitates complex shapes, close dimensional limits and surface smoothness. The "ease of casting" characteristic of zinc alloys also extends the size range of die castings beyond that possible with any other die casting metal.

Consider the above aircraft spark plug shield. The wall section of this zinc alloy die casting is only .015", yet it is sufficiently strong to withstand the stresses set up in the casting operation, wherein cores are pulled in two directions. Incidentally, the threads at the base of the part are cast and require only a simple chasing operation to remove the parting lines.

The castability of zinc alloys in high speed machines is only one of the many reasons why zinc alloy die castings are the most widely used under normal conditions. *Every die casting company is equipped to produce zinc alloy die castings,* and will be glad to discuss their other mechanical, physical and economic advantages with you. Or write to The New Jersey Zinc Company, 160 Front Street, New York 7, New York.

ZINC

FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are specified with

HORSE HEAD SPECIAL (99.99+% Uniform Quality) ZINC

WING TIPS

Shut-ins sort rivets, screws from sweepings from Boeing plant in own homes. System provides employment for those incapable of heavy work and helps solve critical supply problem at Superfortress plant

SHUT-INS and elderly persons, unfit for heavy work, have been doing their part in the production of the Boeing B-17 Flying Fortress and now the B-29 Superfortress. Use of this manpower with its limitations is not only providing profitable employment, giving these handicapped people opportunity to do their bit, but also has solved one of Boeing's most urgent supply problems at Seattle.

Every month 20 tons of screws and rivets are discarded or spilled on the plant floor, being swept up with the drillings and other metal scrap. The metal is remelted but screws and rivets are too valuable to be discarded as scrap. Therefore, the supply problem was simply a matter of keeping a grip on stock already on hand. The screws have to be sorted according to head and thread as well as size. But where was the manpower to perform this tedious task?

One day came a telephone call to the Boeing employment office from a worried mother who inquired if there was any work that could be done by her invalid daughter at home. Sorting piles of screws and metal was suggested and the mother agreed to try it out. A couple of sacks were delivered at the home and a week later it was returned, the screws sorted and neatly tied in cloth sacks. The experiment was voted a success, after inspectors had examined the lot.

Impressed with the idea, Boeing officials discussed the problem with the Goodwill Industries which agreed to find people to perform the work. Since then more than 50 invalid persons have been recruited. The scrap is delivered by truck and the shut-ins set up shop on the kitchen table, on the parlor sofa or even in bed. Altogether they turn back to Goodwill inspectors several tons of sorted and usable screws and rivets a month. After a double check the material is sent back to Boeing and placed in stock after a further inspection.

Use Spare Time of Idle

This program absorbs the spare time of many who otherwise would be idle and discontented because of their inability to aid in the war effort. It is adaptable to the conditions of the individuals since they work as their health permits. They spend from 5 to 35 hours a week. One of the most ambitious of this corps of home workers is a 75-year old woman who has lost a leg and lives in a wheel chair. Most of the shut-ins have developed an acute sense of touch which assists them but others use magnifying glasses to identify suspicious screws and rivets.

In addition to the work allocated to individual homes, the Goodwill plant handles a considerable tonnage of this material. Aged men, usually numbering 50, unable to perform manual labor because of physical handicaps and age, work as often and as long as their condition will permit. The result is a turnover that adds materially to the reclaimed stock, and gives the workers income which otherwise would not be realized.

Metal Removed from Bomber Fuel Cells

Plastic backing plates around the main fuel cells of Ford-built Liberator bombers have replaced aluminum. The new material is a low-pressure laminated plastic glass cloth.

Actual combat experience demonstrated that aluminum as backing plate material for fuel cells would "flower" when hit by bullets. The ragged fingers produced by the "flower" would puncture the fuel cell, making it virtually impossible for the cell to seal itself.

Ford engineers tested several materials, but the glass plastic reacted so favorably that it was adopted before all tests were completed. The advantage of the plastic is that when bullets strike it they leave clean punctures. These are usually small, and the fuel cell can seal quickly with a minimum loss of gasoline.

5000TH BOMBER: Shown awaiting the takeoff of the 5000th Liberator bomber built at the Ford Willow Run plant are, left to right: Harry H. Bennett; Lieut. Col. Harley S. Jones, AAF resident representative; Maj. Gen. R. Briggs, British ordnance; M. L. Bricker, superintendent of the Willow Run plant; Henry Ford II, executive vice president; and Henry Ford, president and founder of the company

Electrical De-icer Developed by Goodyear

Development of a successful electrical de-icer for airplane propellers is announced at Goodyear Research Laboratory, Akron, O.

To turn the trick, Goodyear scientists had to create two new types of synthetic rubber. One is a so-called conducting rubber, capable of conducting electricity. The other is an abrasion-resisting synthetic rubber to give the de-icer the desired mechanical strength to withstand the bombardment of rain drops and ice particles to which it is subjected when the propeller is turning at high speed.

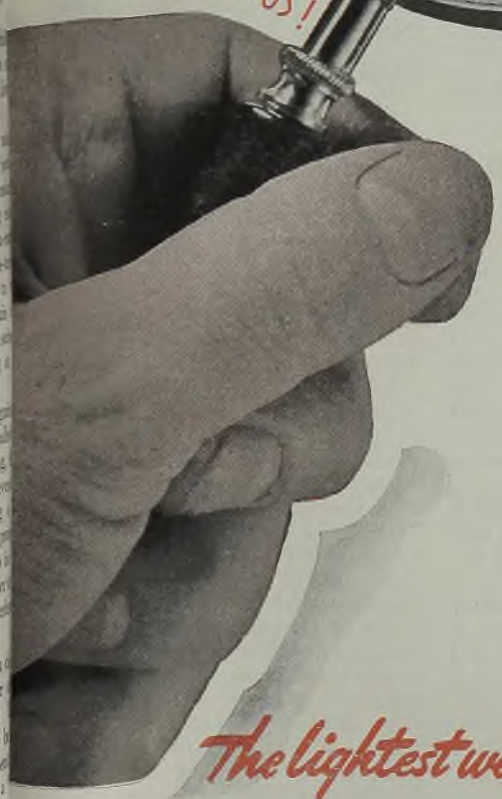
To date, the chief defense against ice on propellers has been the so-called "alcohol slinger." Strictly speaking, this is an "anti-icer." It seeks to prevent the formation of ice by releasing a fine stream of alcohol along the propeller blades. But when the ice forms in spite of this, as it frequently does under severe conditions, the device is powerless to remove it.

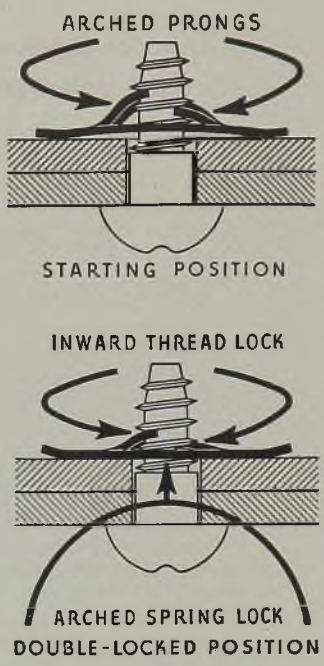
The new Goodyear device is a de-icer in that it will rid the propeller of ice that has formed on the blades. However, when desired, it can also be operated as an anti-icer to prevent the formation of ice. It consists of a "rubber boot" which fits over the leading

Look at the Speed Nuts* [PATENTED]

SPRING-TENSION LOCKING ACTION!

FASTEST THING IN FASTENINGS!





An arched spring lock and an inward thread lock are basic features found only in Speed Nuts. The ingenious design that sets up these two forces accomplishes more than you'd realize unless you checked into it more closely.

Spring steel Speed Nuts have a base which is well arched, and arched prongs that are formed to follow the helical pitch of standard screw threads. As the screw is tightened, the arch is reduced, forcing the prongs deeper into the root of the screw threads. This provides a double spring-tension lock that prevents vibration loosening.

Speed Nuts eliminate the use of lock washers and are 50% to 75% lighter in weight than other self-locking nuts. They are faster to apply and drastically reduce assembly costs. Double your use of Speed Nuts and you will double your assembly savings. Write for literature.

TINNERMAN PRODUCTS, INC.
2039 FULTON ROAD • CLEVELAND 13, OHIO
In Canada . . . Wallace Barnes Co., Ltd., Hamilton, Ontario
In England . . . Simmonds Aerocessories, Ltd., London

The lightest weight self-locking nuts ever produced!

edge of the propeller blade. The boot runs the length of the blade and extends a distance of about 3 inches on either side of the blade. It is only a few thousandths of an inch thick and weighs only 1 pound.

Despite its extreme thinness and light weight, it consists of three layers of specially compounded synthetic rubbers —a center layer of the new conducting rubber; a bottom layer of insulating synthetic rubber, and an upper layer of the new abrasion-resisting synthetic.

A similar type of de-icer boot for propellers has been developed by the United States Rubber Co., and tested by the AAF.

Liberator Bombers Carry Two 24-Volt Batteries

Claimed to be the longest aircraft battery charging line in the world, 24-volt batteries for the B-24 bomber are charged 100 at a time in the Ford Willow Run bomber plant's battery room. Two rows of batteries can be serviced at one time by the 50 charging panels.

More than 150 batteries are constantly in various stages of preparation at Willow Run to meet daily demands for electrical power units in the B-24. Each bomber carries two of the 75-pound batteries.

The battery laboratory is located in the final assembly area. Unlike many battery shops, it is completely free of fumes, a ventilating system over the charging rack carrying acid fumes outside the building. A 500-gallon lead-lined tank is used to store acid before it is placed in batteries. Sulphuric acid is shipped to Willow Run in 13-gallon glass containers. Under the tile floor, a blanket of ¼-inch lead sheeting protects the underlying pipes against possible acid penetration.

When the batteries arrive at Willow Run they are "dry-charged". Water and acid are added and then the battery is charged by passing an electric current through the cells. Batteries with acid in their cells will wear out more quickly than a dry battery, hence the solution is not put into cells until ready for use.

Only dry batteries are shipped overseas because salt water coming in contact with the battery electrolyte causes a chemical reaction which produces a toxic chlorine gas.

Average life of the batteries after installation is approximately two months, depending upon the number of flying hours of the bomber. This comparatively short life span is the result of making the battery as light as possible for military service. A battery built heavy enough to last the life of the B-24 would probably weigh 500 pounds.

Under normal conditions, no current is drawn from the batteries while the ship is in flight. Each of the four engines has a generator which is more than sufficient to supply the electrical needs while the bomber is in the air. The batteries are merely a floating source of supply in the ship's electrical circuit for emergency use.

Each bomber is equipped with a small, portable auxiliary generator which is used in emergencies and when the engines are not running at high enough speed to keep up the normal engine generator output. This auxiliary generator provides ample electrical supply for all the needs of the bomber.

Chenoweth Guides AAF Engine Development

Technical adviser to the chief of the power plant laboratory of the AAF Materiel Command at Wright Field, Dayton, O., is Opie Chenoweth, one of the world's oustanding authorities on aircraft power plants.

For 21 years, Chenoweth has guided

OPIE CHENOWETH

Technical adviser to the chief of the power plant laboratory, engineering division, AAF Materiel Command headquarters, Wright Field, Dayton, O.

experiment, design and development of airplane engines for the fighting aircraft of the Army Air Forces.

Chenoweth came to McCook Field, Dayton, in 1923, has seen the Materiel Command power plant laboratory grow to a mammoth organization of over 700 technicians. He has advanced from junior engineer to right-hand man of Col. J. M. Gillespie, chief of the laboratory. He participated in the development of many innovations in aircraft power plants, witnessed the first altitude chamber test of the geared supercharger in 1926, and worked closely with that project until it reached its present highly successful state. He was a joint recipient of the Manley Memorial Medal in 1938.

Among Chenoweth's most important achievements was the 10-year job of compiling joint Army-Navy aircraft engine specifications. This standardization made it possible to manufacture both Army and Navy aircraft engines on the same assembly lines, to eliminate untold duplication and confusion, save enormous sums.

Issues 26th Edition of Aircraft Year Book

Twenty-sixth annual edition of the *Aircraft Year Book*, for the year 1944, has been issued by Lanciar Publishers Inc., 10 Rockefeller Plaza, New York. Edited as usual by Howard Mingos, the 727-page volume is the official publication of the Aeronautical Chamber of Commerce of America Inc., and sells for $6 postpaid.

Contents cover a wide variety of aircraft subjects. Chapters are devoted to: The war in the air; the American record; the U. S. Army Air Forces; U. S. Naval aviation at war; the Civil Air Patrol; air transport in the war; aviation training for war; work of the federal bureaus and aeronautical organizations.

Following these sections is a 63-page summary of all types of aircraft designs, with drawings and illustrations, then a 90-page section devoted to individual manufacturers of aircraft engines and miscellaneous parts and accessories, followed by a directory of manufacturers, associations, government bureaus and other organizations active in the aircraft field.

As a detailed chronicle of aviation progress and a mirror of the effect which war has had on this industry which a scant five years ago was in its infant stages, the book is an excellent work. If it appears somewhat on the "stuffy" side, this is because all such documentary and reference volumes are likely to be so. Choice and scope of illustrations are good, showing all types of aircraft in their manufacturing stages and in actual combat operations.

National Motor Bearing Co. Buys Arrowhead Rubber Co.

National Motor Bearing Co. Inc., Redwood City, Calif., has purchased the Arrowhead Rubber Co., Los Angeles, to insure its wartime production program and anticipated postwar production of an uninterrupted supply of synthetic flanges.

Arrowhead manufactures such articles as seals, essential to functioning of hydraulic airplane devices, and the plant will soon be engaged in the production of synthetic flanges. Further expansion is anticipated through the development of precision synthetic rubber packing, washers and gaskets.

Although Arrowhead becomes a wholly-owned subsidiary of National Motor Bearing Co. Inc., Harry Franklin will continue as president, director and general manager, along with his staff of executives and 250 experienced workers. Lloyd A. Johnson, president, National Motor, will become president of Arrowhead's board of directors, and Frederick E. Barth, manager of National's industrial division, will also serve on the board. Milton B. Bulkeley, National's treasurer, will serve in a similar capacity for the new subsidiary.

From 1919 to 1944 – a QUARTER CENTURY of ENGINEERING and PRODUCTION ACHIEVEMENT

Solving difficult production problems for American industry has been the business of Ex-Cell-O since its inception twenty-five years ago. Often this has entailed the development of special purpose machines for single and multiple operations . . . to do work faster, more economically, and with a much higher degree of accuracy. Where the quantities have justified it, Ex-Cell-O has not only designed and built special machines to produce parts of improved quality but has undertaken actual production and assembly of these parts in its own plant, using to practical advantage Ex-Cell-O's complete heat treat equipment and widely-experienced production staff.

The days ahead . . . both war and postwar . . . are likely to offer a multitude of opportunities for the kind of engineering and production assistance that Ex-Cell-O can give so well. Consequently, the suggestion is made that, insofar as is practicable, *your* planning be started early. Ex-Cell-O's extensive facilities are at your disposal. Write to Ex-Cell-O in Detroit today.

Ex-Cell-O "Firsts"

EX-CELL-O was the first company in the United States to design and manufacture and introduce for successful commercial use...

- ...a precision ball bearing internal grinding spindle
- ...a horizontal-type precision boring machine
- ...a precision thread grinding machine
- ...a precision cylinder boring machine
- ...a 1½ horsepower compact hydraulic power unit
- ...a Diesel fuel injection pump and a universal-type Diesel engine nozzle
- ...a machine to form and fill automatically square paper milk bottles in the dairy

EX-CELL-O was also the first American company to undertake the mass production of hardened and ground precision parts for aircraft engines.

EX-CELL-O CORPORATION • DETROIT

An Ex-Cell-O 25th Anniversary Book, illustrated above, has just been printed. If you would like a copy just write to Ex-Cell-O Corporation, 1200 Oakman Boulevard, Detroit 6, Michigan.

SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES • PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES • BROACHES AND BROACH GRINDING MACHINES • HYDRAULIC POWER UNITS GRINDING SPINDLES • DRILL JIG BUSHINGS • CONTINENTAL CUTTING TOOLS • TOOL GRINDERS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PURE-PAK MILK CONTAINER MACHINES • PRECISION AIRCRAFT AND MISCELLANEOUS PARTS

Expanding Soviet Industry Seen Backed by Huge Mineral Wealth

On basis of known natural resources the Soviet Union is potentially the world's richest nation. Her amazing recuperative powers demonstrated in the reconstruction of her war devastated industries in reconquered areas

By JOSEPH M. KURTZ
Assistant Editor, STEEL

WHEN THE German blitzkrieg against Russia was unleashed in June, 1941, with powerful and paralyzing blows, within a short time the *Wehrmacht* rolled back the Russian armies to the gates of Moscow and captured some of the most heavily populated and highly industrialized territory in the entire Soviet Union.

But despite these apparently serious economic blows, the Russian industrial machine stood firm and continued to provide the necessary arms for battle. For the imponderables which the Nazi high command failed to consider seriously enough were Russia's wealth of natural resources, which lay east of Moscow, and the Soviet's preparedness and ability to remove her steel mills and other war plants to the rear as her armies retreated.

In a recent report to the Supreme Council of the Ukraine S. S. R., the president of the republic's cabinet reviewed the progress of economic rehabilitation in the eastern provinces of the Ukraine. His report clearly indicates Russia's amazing recuperative powers in the reconstruction of her devastated industries. During the first six months after the liberation of the eastern districts of the Ukraine, workers rebuilt or repaired 17 basic mines, aside from some 460 pits, producing 31,000 tons of coal per day. By the end of 1944, the Ukrainian government is looking forward to the restoration of 119 basic mines, producing 75,250 tons of coal a day or 27 per cent of the Donetz region's prewar average daily output of 280,000 tons.

For the past two years Russia has geared her war machine to operate on the flow of supplies from her eastern factories in the Urals and those in the highly industrialized Moscow region. These munitions, plus the tanks, trucks and planes obtained from the United States through lend-lease, have made it possible for the Russian armies to perform one of the most startling fights in history.

Nazis Used Ukraine's Manganese

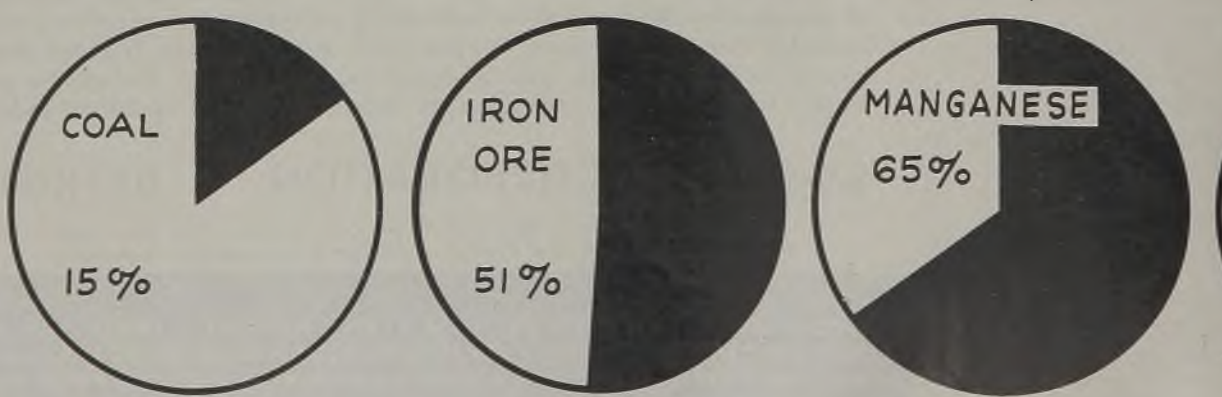
The recent Russian winter campaign dealt the Nazi industrial machine a serious economic blow. It drove the Germans out of the economically wealthy Ukraine. Although the Ukraine has been popularly conceived by the average layman as the "bread basket of Europe," her importance as a source of minerals for the German industries has been underestimated. Hitler fed an estimated 4,000,000 soldiers with food obtained from the Ukraine. But sight must not be lost of the fact that at the same time he was meeting more than 50 per cent of his manganese requirements from the Nikopol mines of the Ukraine. Manganese is a vitally important alloying element in the production of alloy steels and also is used as an alloy in several other metals. Besides manganese, the Ukraine was a large source of iron ore and coal for German industries making munitions.

With the uninterrupted flow of minerals from Soviet mines, other than those in the Ukraine, Russia has been able to continue her operation of her war plants. For Russia, on the basis of known natural resources, stands as potentially the world's wealthiest nation. Of the earth's vitally important war minerals, only in coal does the United States possess a greater reserve than the Soviet Union. Her reserves of iron ore, oil, manganese, peat and lumber and many others far exceed those of this country. By piecing together information from a number of reliable sources, particularly from the American-Russian Chamber of Commerce, New York, STEEL is able to present this study of the Russian mineral picture.

Russia's imports of minerals are insignificant for she has within her boundaries sufficient quantities of virtually every vital mineral necessary for waging war. But the United States does not compare in any respect to Russia's potential self-sufficiency. This country has imported, even prior to the war, substantial tonnages of strategic minerals when domestic supplies were either inadequate or non-existent. Our supplies of coal, iron ore, copper and petroleum, at the moment, appear to be adequate. But mining engineers are beginning to sound the warning that our petroleum resources are being wiped away far more rapidly than new discoveries are being made. And iron ore experts contend that within a few years it will be necessary to start working the lower grades of iron ore in the ranges of the north.

Another respect in which the Russian mineral picture is rosier than that of this nation is her possession of many minerals which we do not have. The United

Circles below indicate the percentage of world's known natural resources possessed by the Soviet Union. With a wealth of such minerals the Russians hope to build a vast industrial empire



States has a total deficiency in such minerals as graphite (crucible grade), industrial diamonds, natural nitrates, quartz crystals, and tin. We import more than 80 per cent of such minerals as antimony, asbestos, beryllium ore, chromite, manganese ore, mica, nickel, platinum and titanium ore.

Compare all of this with the Russian position in which her supplies of aluminum, copper, lead, zinc, silver, molybdenum, manganese, chromium, tungsten, nickel, coal, iron ore, and oil are more than adequate to meet her needs at the present or even a greatly expanded industrial development within her boundaries. The Soviets also have a plentiful supply of such minerals as asbestos, bauxite, chromite, graphite, manganese ore, mercury and platinum.

Shortly after the Germans marched into the Ukraine, they over-ran one of Russia's most important coal basins, located in the Donetz region. This particular area has reserves estimated at 70 billion tons, all of which is high-grade coal. The Soviet's entire resources of the black mineral totals about 1200 billion tons, approximately 15 per cent of the world's known resources. In coal, though, the United States leads the world with reserves of 3436 billion tons. Canada follows in the second position with 1360 billion tons. Russia ranks third. Russia uncovered several coal basins in the northern Urals about 1924 and sunk her first mine there in 1932 to supply the new plants and steel mills which were being constructed. The Pechora basin with reserves estimated at 250 billion tons is one of the most important in the Urals.

In Kazakstan, which adjoins the Ural region on the south, is the rich coal basin of Karaganda with reserves of more than 20 billion tons, much of which is perfectly suited for coking purposes. This particular coal basin supplies excellent coking coal for the large Magnitogorsk steel mill and other large plants in the southern Urals. Previously, this highly industrialized region of Russia had to have coal hauled from the Kuznetz coal basin located in West Siberia. Thus, the

distance that coal had to be transported was reduced by one-half. The Kuznetz region is one of the largest basins in Russia with some 400 billion tons of high-grade coal. In the northern part of east Siberia is the Tungus basin, covering about 1,000,000 square kilometers, with coal reserves of about 500 billion tons. There are many unexploited fields in Asia proper. But the aforementioned represent Russia's greatest coal basins and her main sources of the vital war mineral.

Another vitally important war mineral is iron ore. In this mineral Russia holds an outstanding position in the world. The Kmastroy Geological Bureau estimates that Russia has reserves of about 267 billion tons of iron ore. This compares with a total world's supply of 500 billion tons, of which the United States has 95 billion tons, England about 12 billion tons, and France with some 11 billion tons.

But exclusive of Russia's Krivoy Rog iron ore quarzites and the Kursk magnetic anomaly, the Soviet's rich iron ore deposits are estimated at slightly more than 10 billion tons. This compares with rich iron ore deposits in the United States of about 9.8 billion tons. Breaking down Russia's rich ore deposits, it is found that about 5.5 billion tons are brown ore, 2.5 billion tons magnetite ore, and 1.5 billion tons hematite ore.

By far the richest iron ore in Russia is the 1.2 billion tons of red hematite found in Krivoy Rog (Ukraine), which has an iron content ranging between 60 and 70 per cent. The steel mills in southern Russia have been supplied with ore from the Krivoy Rog region. Krivoy Rog has reserves of iron ore quarzites estimated at 50 billion tons.

Kursk District Has Future

Before the war, southern Ukraine and Ural-Kuznetz were among Russia's chief metallurgical bases. But economic experts predict that the Kursk district, with 204 billion tons of reserves, will eventually be by far the greatest metallurgical center in the Soviet Union.

The two great steel centers at Magnitogorsk (Ural region) and Stalinsk are supplied with iron ore from Magnitnaya in the Ural-Kuznetz area. About 125 miles from Stalinsk in the Gorno-Shori district an ore deposit estimated at about 300 million tons was discovered. This deposit is believed to be the chief supplier for the Stalinsk mill now and eliminates the necessity of shipping ore all the way from Magnitnaya.

In manganese Russia is extremely wealthy for she possesses approximately 589,000,000 metric tons, about 65 per cent of the world's known reserves. Since 1886 Russia has been United States' chief supplier of manganese.

The Chiatury manganese deposits in Georgia, Transcaucasia, are the world's greatest. This ore contains between 52 and 55 per cent metallic manganese. These deposits were worked almost exclusively for export trade. The Soviet's other great manganese deposits are at Nikopol in the Ukraine. These mines were under German control until recently when the Nazis were driven out by the Russian armies. New mines adjacent to the steel mills at Magnitogorsk and Stalinsk had been developed to eliminate the long transportation haul of manganese from the Nikopol mines in the Ukraine.

Military strategists speak of oil as the "blood" of a mechanized war machine. In this vital mineral, Russia leads the world with about 26 per cent of the earth's known reserves. The German high command realized the significance of these figures and the importance of petroleum in the highly mechanized warfare of today. For in the summer of 1942, the Nazis launched a powerful offensive into the Caucasus under the leadership of Field Marshal Gen. Von Paulus. The German offensive was aimed at the immensely wealthy oil fields at Baku (Transcaucasia) and the Grozny oil fields (North Caucasus). But the Nazis southern drive came to an ill-fated end at the historic battle of Stalingrad.

MINERAL PRODUCTION IN 1940

	United States (Tons)	Russia (Tons)
Coal	460,000,000	170,000,000
Iron Ore	52,500,000	26,500,000
Petroleum*	1,353,000,000	218,000,000
Bauxite	381,000	270,000
Copper	698,000	144,000
Fluorspar	165,000	70,000
Lead	404,000	55,000
Magnesium	5,700	1,500
Manganese	.....	2,270,000
Mercury	620	300
Nickel	.....	2,500
Zinc	460,000	65,000
Potash	287,000	266,000
Molybdenum	15,000	.....
Vanadium	900	.....
Tungsten	3,175	.....

*Production in terms of 42 gallon barrels not in tons.

These oil fields were sought by the Nazis as one of the greatest prizes of the war. Among Baku's new and wealthy oil fields are those of Kola, Puta, and Lok-Batan. By deep drilling, the Soviet poured millions of tons of oil into her war machine. The Lok-Batan area lies in the midst of mud volcanos, once considered indicative of the absence of oil. The reserves there are estimated sufficient for drilling 800 wells. Back in 1933, Russia drilled the world's first well in the open sea, about 300 meters from the shore in the Baku district off the Apsheran peninsula. The Grozny oil fields are calculated to contain about 100 million tons and those of Baku about 1200 million tons. The Ural-Emba district reportedly has reserves totaling about 500 million tons.

At the time the Nazis launched their offensive into the Caucasus, about 90 per cent of the Soviet Union's petroleum needs were met from oil fields in the south and north regions of the Caucasus mountains. Immediately the Russians set about to create a second Baku in the Ural-Volga basin. New refineries in central Asia and the Urals are supplied for the greatest part from oil fields in the Bugurusian region and the Ural-Emben region.

Much drilling equipment has been transferred from the Caucasus oil regions to the eastern oil fields of Russia. Skilled drillers also have been moved to the newer oil centers.

One of the Soviet's greatest reserves is peat. Her resources of this mineral are around 65 billion tons, approximately 75 per cent of all of the earth's known resources. These deposits can be found in the central and northern sections of European Russia and in Siberia. The peat represents an important source of cheap fuel for power plants and industrial plants in the Soviet Union. Her supply of oil shale appears to be plentiful, estimated around 8700 million tons. Russia reportedly has successfully used peat, combined with oxygen or agglomerated calcined pyrites, as a blast furnace fuel.

Nonferrous Metals Plentiful

Considerable deposits of vital nonferrous metals are located in the U. S. S. R. Her reserves of copper and zinc make up about 13 per cent of the world's total. At Blyava in the middle Volga region new discoveries were made. These deposits are of considerable importance because of their proximity to rail and water routes for convenient transport to smelters. Kazakstan is another locality with large deposits of lead and zinc.

Russia has made immense progress in the production of nickel, tin, tungsten, and aluminum, which were not produced at all during the Czarist regime. Her known tin reserves exceed 9.5 million tons and her nickel deposits are well over 1 million tons. In the production of precious metals such as gold, silver, and platinum, Russia is a leading producer.

The Soviet's resources of non-metallic minerals are of considerable size. She has large reserves of potash, apatite, phosphorite, magnesite, asbestos, graphite, mica, barite and chalk. Her deposits alone total 16 billion tons, about 83 per cent of the world's known reserves. Deposits of apatites and phosphorites are calculated at over 16 billion tons, about 60 per cent of the world's supply. An abundance of such minerals as salt, soda, chromium, borax, corundum, fluorite, and gypsum can also be found within the Russian borders.

This study of Russia's mineral wealth clearly indicates that she has the potential resources to build a tremendous industrial machine. Remarkable progress has been made by Russia since the last war when she was primarily an agricultural country. Under the impetus of several "Five Year Plans", she has constructed thousands of new plants and developed hundreds of new mines.

(This is the first of a series of two articles. The second, on Russia's industry, will appear next week.)

Southern California Becoming Increasingly Postwar Conscious

Survey launched by Los Angeles Chamber of Commerce to determine employment and industrial financing problems which will be met when war ends. Seek to avoid unbalanced economy in peacetime due to wartime expansion

LOS ANGELES

INCREASING attention is being given to postwar planning in Los Angeles county. On July 2 a survey was launched by the Los Angeles Chamber of Commerce, in co-operation with the Committee for Economic Development and the Federal Reserve Bank of the Twelfth District to determine what employment and industrial financing problems will have to be met in the county when the war ends.

Questionnaires were mailed to more than 2000 of the large manufacturing companies in the area.

General results of the survey with statistical tabulations by industrial groups will be available to the Committee for Economic Development, chambers of commerce and other groups interested in postwar planning.

The Federal Reserve Bank of San Francisco in its request for this information said:

"The war has greatly accelerated industrialization on the Pacific Coast and this rapid growth has brought developments that could leave the western states with an unbalanced industrial pattern from the standpoint of peacetime production. The degree to which present levels of activity will be retained after the war depends in large part upon the decisions of industrial leaders concerning their postwar production. Collection of pertinent information based on postwar intentions of businessmen is a necessary first step in arriving at an idea of what the postwar economic picture may be."

The information sought from Los Angeles manufacturers includes: List of prewar products, present activity and products planned for the postwar period; current rate of production; percentage of output in war production; average employment in past three years; number of employes that will be dropped at end of the war; what the postwar use of plant facilities will be; what outlays will be necessary to shift to peacetime production; structural alterations and additions; whether there will be new plant construction and retooling; how much money will be spent for these items immediately at the end of the war; how many employes will be retained during the changeover period; how much of needed funds will come from manufacturer's own resources, how much from banks, how much from investment bankers, and how much from other sources.

During the two weeks ending June 30, in the twelve southern counties of Southern California a steel shortage of over 1000 tons of all types and shapes was filled by the WPB. The accumulated total of steel supplied in this area by the WPB in the three month period, March 15 to June 15 was almost 13,000 tons. Calls upon the board in this same period were for 23,000 tons to relieve critical shortages.

Ten local firms engaged in military radio production were allocated $3,801,905 during June. Production of radio and electronic devices for the armed forces scheduled to be stepped up during the last half of 1944, indicate little prospects for equipment designed for civilian use.

Shortage of housing is to be relieved by a further step up in production of trailers by six local plants engaged in trailer building. The quota to be produced during the next three months will be equipped with wheels and tires for the use of migratory farm workers and construction project employes.

Under the auspices of the National Manufacturer's Association and Merchant and Manufacturer's Assocation a series of fifty war production rallies are being held in local war plants. The emphasis is put upon the importance of employer and employe relations in these meetings. First meeting was held at Cannon Electrical Development Co.'s plant.

In response to increasing demands of the war in the Pacific for high-octane gasoline, the Los Angeles area 100-octane projects continue to expand.

CENTURY OF SERVICE: 100 years of service is represented in this picture of Surface Combustion Corp. employes receiving 25-year service pins from William M. Hepburn, chief engineer, left. Others in the photo are, left to right: Emil Walz, chief erection engineer; H. C. Hickenlooper, factory cost accountant; and Edward Stephenson Jr., industrial sales engineer, Detroit

New Ship Commissioning Agency Set Up on Coast

SAN FRANCISCO

The Twelfth Naval District, with headquarters here, has established a central commissioning detail for the West Coast to supervise the outfitting of every naval craft produced in the area.

The new agency will act in an advisory capacity to the commanding officer and will follow a ship through its construction period and trial runs until it is turned over to the training command.

In determining whether a ship is ready to operate, the agency will work with and advise both the prospective ships' officers and the material bureau representative during the pre-commissioning period in regard to construction, installation and alterations.

The Navy said the need for a centralized commissioning agency to assure an orderly flow of completely outfitted fighting and service ships became apparent last year when almost 3000 vessels were constructed on the West Coast.

Swollen by the huge volume of shipbuilding, war contracts for supplies and facilities in the San Francisco Bay area reached a cumulative total of $3,660,798,000 during the period from June, 1940, through April, 1944. In addition, $861,702,000 of orders have been placed with Navy yards, Army arsenals and similar federal undertakings in the area.

MEN of INDUSTRY

FRANK W. SHIPLEY

DONOVAN WILMOT

R. V. DAVIES

R. B. McKEE

Frank W. Shipley has been appointed foundry manager, Caterpillar Tractor Co., Peoria, Ill., succeeding **M. J. Gregory**, whose retirement was announced recently. Previously, Mr. Shipley had been assistant foundry manager.

—o—

Aluminum Co. of America, Pittsburgh, has appointed three assistant general sales managers: **Donovan Wilmot**, who is in charge of product manager activities and warehouse distribution; **R. V. Davies**, manager of sales engineering and sales development activities, and **R. B. McKee**, responsible for district sales offices and all direct selling activities.

—o—

W. C. Walsh has been named San Francisco district representative of General Electric Co.'s electronics department. He will be in charge of product sales in ten western states for the company's Tube and Specialty divisions.

—o—

S. E. Hackett has joined Porter-Blairsville Co., Blairsville, Pa., a division of H. K. Porter Co. Inc., Pittsburgh, as vice president in charge of production. Mr. Hackett was formerly president of Jones & Laughlin Steel Corp., Pittsburgh, having been associated with the corporation for 20 years until he retired in 1938.

—o—

Daniel P. Orcutt has been appointed manager of the New York branch, Electric Storage Battery Co., Philadelphia, succeeding **F. F. Sampson**, who retired July 1 after 30 years with the company.

—o—

I. N. Merritt has resigned as vice president and director, Electric Household Utilities Corp., Chicago, and president and director of its subsidiary, Meadows Corp., Bloomington, Ill., to become vice president and general manager, Conlon Corp., Cicero, Ill.

—o—

Howard E. Hallas has been appointed associate director of public relations for Nash-Kelvinator Corp., Detroit.

—o—

Sterling Smith, chief of the refrigeration and air conditioning section of the general industrial equipment division, WPB, has resigned, effective Aug. 1, to assume management of the Commercial Refrigeration division, Mills Industries Inc., on Sept. 1. Prior to his association with WPB, Mr. Smith was affiliated with Nash-Kelvinator Corp., in New York.

—o—

The Industrial Marketers of Cleveland have elected the following new officers: President, **E. B. Bossart**, advertising manager, Bailey Meter Co.; vice president, **Walter Butcher**, vice president of Bayless-Kerr Co.; associate vice president, **Harry Grinton**, regional vice president of McGraw-Hill Publishing Co., and secretary-treasurer, **W. S. Leech**, vice president of G. M. Basford Co. Retiring president of the association is **Wilmer H. Cordes**, advertising manager, American Steel & Wire Co.

—o—

D. E. Batesole has been elected vice president, Norma-Hoffman Bearings Corp., Stamford, Conn. He has been chief engineer of the company since 1937 and continues in that capacity.

—o—

William E. Waste has been elected vice president of Marinship Corp. He will continue to serve as general manager and a director of the company.

—o—

F. S. Wynans has been appointed secretary-treasurer, Duraloy Co., Scottdale, Pa.

—o—

F. A. Mainzer, manager, Pacific Brass Foundry of San Francisco, has been named to serve for a second term on the nonferrous foundries industry advisory committee of the OPA.

—o—

Carl J. Dinic, formerly associated with United States Steel Corp., Pittsburgh, has been appointed assistant to the president, American Locomotive Co., New York.

—o—

William A. Whiteside, has been elected secretary, Quaker Chemical Products Corp., Conshohocken, Pa.

—o—

J. J. Hayes, manager, Auburn Stoker Co., Chicago, has been elected president of the Midwest Stoker Association. **W. J. O'Neil**, branch manager, Iron Fireman Mfg. Co., Chicago, is vice president, and **J. G. Beard**, assistant manager, Stoker division, Illinois Iron & Bolt Co., Chicago, is secretary-treasurer.

—o—

W. B. McFerrin, for the past 12 years foundry metallurgist with Cadillac Motor Car division, General Motors Corp., Detroit, is now associated as metallurgist with the Electro Metallurgical Co. in the Detroit area.

—o—

Otto Z. Klopsch has resigned as vice president and director of Calumet & Hecla Consolidated Copper Co. and as general manager of the Wolverine Tube division, Detroit. **H. Y. Bassett** has been made acting manager of the division.

—o—

J. Edward Donnellan, well known in the metal field for his work with the American Society for Metals, Cleveland, has resigned from that organization to join General Alloys Co., Boston, as vice president in charge of sales.

—o—

Henry H. Ritchotte, formerly manager of contractors' tool sales in Philadelphia for Independent Pneumatic Tool Co., Chicago, has been named manager of

E. R. GALVIN

Who has become president and a director of Tyson Roller Bearing Corp., Massillon, O., as reported in STEEL, July 3, p. 74.

EDWARD J. P. FISHER

JAY W. OWINGS

RANDOLPH A. KLOKNER

WILLIAM H. SEAMAN

the Contractors' Tool division, with headquarters in Chicago.

—o—

Edward J. P. Fisher has been appointed manager of sales, Morrison Engineering Corp., Cleveland. Mr. Fisher was the first recipient of the Wire Association Annual Medal of Award in 1934 and also is an active member of the American Society for Metals.

—o—

John R. Carlson has been appointed sales manager, Heald Machine Co., Worcester, Mass. Prior to a year's service as assistant sales manager of the company, Mr. Carlson was manager of the Dayton, O., sales district.

—o—

G. R. Prout has been appointed manager of the air conditioning and refrigeration division of the appliance and merchandise department, General Electric Co., Schenectady, N. Y. He will be located in Bloomfield, N. J.

—o—

R. W. Kerr has been elected to the board of directors, Plomb Tool Co., Los Angeles. Mr. Kerr is treasurer of the company and in addition will assume responsibility for Plomb Tool's sales program.

—o—

W. L. Marshall, who for the past three and one-half years was associated with Arnold Schwinn Co., Chicago, in an executive sales post, has been appointed sales manager of Grand Home Appliance Co., Cleveland.

—o—

Hubert B. Wilder has been appointed Houston representative of the J. B. Beaird Co., Shreveport, La.

—o—

C. D. Manning has been appointed executive assistant to the president, and **F. M. Parsons** has been named sales manager, Kellogg Switchboard & Supply Co., Chicago.

—o—

Perry D. Helser has been named secretary-director of the Magnesium Association, which is composed of manufacturers, fabricators and smelters and which has established permanent offices at 3239 RCA building, 30 Rockefeller Plaza, New York. Mr. Helser formerly was chief of the Magnesium Products Branch, Aluminum and Magnesium Division, WPB, and prior to that was president of General Ceramics Co., New York.

—o—

Jay W. Owings has resigned as deputy chief of the Pipe Branch, Steel Division, WPB, to rejoin Youngstown Sheet & Tube Co., Youngstown, O., as assistant manager of tubular sales.

—o—

Randolph A. Klokner, who had been in charge of the Milwaukee and Wisconsin district for Vilter Mfg. Co., Milwaukee, for the past 17 years, has been appointed Chicago district manager for the company.

—o—

A. C. Teetsel, former executive vice president and a director of Ferodo & Asbestos Inc., New Brunswick, N. J., has been appointed manager of friction materials manufacturing, Thermoid Co., Trenton, N. J.

—o—

Ralph O. Anderson has been named district manager of sales territory which the Norton Co., Worcester, Mass., has designated as the West Central Rocky Mountain district. Mr. Anderson will make his headquarters in Denver.

—o—

R. R. Mueller will resign as general plant manager, Russakov Can Co., Chicago, Aug. 1, to head his own consulting service.

—o—

Harry I. Askew has been appointed district sales manager of the Universal division, Detroit, of Universal-Cyclops Steel Corp., Bridgeville, Pa.

—o—

Reinhold D. Loesch, president, Lake Erie Foundry Co., Buffalo, has been elected chairman of the western New York chapter, American Foundrymen's Association.

—o—

Baldwin Locomotive Works, Eddystone, Pa., announces that sales and service activities of Baldwin-Westinghouse diesel locomotives will be under the supervision of **C. G. Green,** assistant to the divisional vice president, Locomotive and Ordnance division. **J. G. Broz,** sales manager, diesel engine section, Locomotive and Ordnance division, will have charge of the sales of diesel engines and electric locomotives.

—o—

William H. Seaman, president and general manager, National Roll & Foundry Co., Avonmore, Pa., has been named board chairman, succeeding **J. Howard Webster** in the latter position. **Donald H. Baum** has been elected vice president in charge of sales and a director. **C. N. Buchholtz,** controller, and **E. R. Pierce,** general superintendent, have been named directors, succeeding **Colin W. Webster** and **J. A. Weingart,** resigned. **Richard J. Buck** has resigned as vice president but will remain a director of the company.

—o—

Dr. J. H. Ross, M.B.E., has been appointed assistant director general of the Chemicals and Explosives Production Branch, Department of Munitions and Supply, Canada.

—o—

Canadian Munitions and Supply Department has announced the appointment of **Brig. N. O. Carr** as associate director general of the Automotive and Tank Production Branch. **E. G. Perley** has become assistant director general of that branch, and **C. S. Finkle** has been named director of the manufacturing division of the branch.

—o—

Charles Lukens Huston celebrated his 88th birthday anniversary July 8 at his summer home in Montrose, Pa. A contemporary of Andrew Carnegie, John Fritz and Charles M. Schwab in the early days of the steel industry in Pennsylvania, Mr. Huston is still active as first vice president of Lukens Steel Co., Coatesville, Pa.

—o—

F. C. Greenhill, vice president, Acklin Stamping Co., Toledo, O., has been elected president of the Pressed Metal Institute, Cleveland. **J. H. Robins,** president of American Pulley Co., Philadelphia, and **Tom J. Smith, Jr.,** were appointed first vice president and ex-

ecutive vice president, respectively. Three new trustees are: **C. W. Custer,** American Stamping Co., Cleveland, chairman of the Cleveland district; **C. W. Cederberg,** Larson Tool & Stamping Co., Attleboro, Mass., chairman of the New England district, and **V. S. Morrison,** Morrison Steel Products, Buffalo, chairman of the New York State district.

—o—

Frederick R. Lack, vice president and manager of the Radio division, Western Electric Co., New York, has been elected a director of the Radio Manufacturers Association for a term of two years.

—o—

H. O. Teeple has joined the technical service group of the Development and Research division, International Nickel Co. Inc., New York. A chemical engineer, he will specialize in corrosion problems.

—o—

E. J. Zimmer Jr. has been appointed assistant to **L. B. Keplinger,** vice president and director of sales, Rheem Mfg. Co., Richmond, Calif. Mr. Zimmer had been associated with E. I. du Pont de Nemours & Co., Wilmington, Del., for the past 18 years.

—o—

Thomas Rutherford has been appointed manager of railroad and casting sales, Midvale Co., Philadelphia, and **Truxtun R. Brodhead** has been made Philadelphia district sales manager.

—o—

Huntley H. Gilbert, vice president in charge of sales, Pullman-Standard Car Mfg. Co., Chicago, retired June 30 because of ill health. He will continue to be available in a consulting capacity.

—o—

Joseph H. Hart, chief chemist, Kelite Products Inc., Los Angeles, has been named laboratory director. **Meredith H. Fairchild** succeeds Mr. Hart as chief chemist, and he is succeeded as analytical chemist by **Donald W. Vance.**

—o—

Dr. Lawrence W. Bass has resigned as director of the New England Industrial Research Foundation to become associate director of research, Air Reduction Co. Inc., New York. Dr. Bass will continue his association with the Foundation as technical consultant.

—o—

Edwin S. Pillsbury, chief of the Termination Section, Procurement Division, AAF Materiel Command, Wright Field, O., has been promoted to the rank of colonel.

—o—

John Eaton, for the past four years associated with the Department of Munitions and Supply, Canada, has resigned as joint director general of the general purchasing branch to return to the purchasing department of the Canadian Pacific railways.

—o—

Louis M. Kuilema has been appointed sales manager in charge of the newly-opened Cincinnati office of Pennsylvania Salt Mfg. Co., Philadelphia.

—o—

D. E. Reichelderfer has been elected assistant controller, American Rolling Mill Co., Middletown, O. He succeeds **H. H. Tullis,** recently named controller of the company.

OBITUARIES . . .

John Van Wicheren Reynders, 77, who has conducted a consulting engineering practice in New York since 1916, and who was vice president and general manager of Pennsylvania Steel Co., Steelton, Pa., prior to that time, died July 10 in New York. While with the Pennsylvania Steel Co., Dr. Reynders directed construction of many famous bridges, including the steel railway arch across the Niagara river, the Gokteik viaduct in Burma, India, the Memphis bridge across the Mississippi, and the Queensboro and Williamsburg bridges in New York. After leaving Steelton, in 1916, Dr. Reynders was chairman of American Tube & Stamping Co., Bridgeport, Conn., for two years. From 1912 to 1917 he was also receiver of the Central Iron & Steel Co., Harrisburg, Pa. Among his achievements has been the completion of the Bear Mountain bridge across the Hudson river after the contractors had abandoned the project. He was a past president of the American Institute of Mining and Metallurgical Engineers.

—o—

J. William Kendrick, president of James R. Kendrick Co., New York, died July 6 in East Orange, N. J. Born in Leicester, England, Mr. Kendrick came to this country as a boy in 1876.

—o—

Thomas Aldridge, 57, who founded the Springfield Detail & Machine Parts Co., Detroit, in 1925, died July 5 in that city.

—o—

Fred L. Mills, 49, president, Mills Industries Inc., Chicago, died July 5 in St. Charles, Ill. In 1915 he was made general manager of the company, then the Mills Novelty Co., which was founded by his father. Upon the death of the latter in 1929 he assumed the presidency. In July, 1943, when production was turned to war products the company name was changed.

JOHN V. W. REYNDERS

—o—

Col. Herbert O'Leary, 58, one of the world's leading small-arms authorities, died July 2 in Walter Reed hospital, Washington. Colonel O'Leary's last assignment was ordnance officer of the Second Service Command at Governors Island, N. Y. For many years he was chief of the Small Arms Division of the Office of the Chief of Ordnance, Washington.

—o—

George H. Gottfried, 63, a stationary engineer for the Taylor Chair Co., Bedford, O., died July 5 in Cleveland.

—o—

Primus C. Clark, 70, president of the Clark Controller Co., Cleveland, died there July 8. In 1925 Mr. Clark left Electric Controller & Mfg. Co., Cleveland, where he was vice president and treasurer, to organize his own company.

—o—

W. H. B. Ward, 77, retired steel company executive and one of three men who founded Trumbull Steel Co., whose Warren plant is now a part of Republic Steel Corp., Cleveland, died at Warren, O., recently.

—o—

John J. Malley, 57, for 30 years superintendent of the ore unloading dock at the Central furnace of American Steel & Wire Co., Cleveland, died July 7 in that city.

—o—

Noble E. Snyder, 52, chairman, W. H. Hutchinson & Son Inc., Chicago, died July 2 in Eagle River, Wis.

—o—

Harry J. Deutsch, 49, works manager of the Fairfield-Bridgeport, Conn., plant of Aluminum Co. of America, died July 5 in Bridgeport. Mr. Deutsch had been chief metallurgist of the Alcoa Detroit plant when he removed to Buffalo in 1940 to become works manager of American Magnesium Corp. there. Two years later he transferred to Bridgeport.

—o—

William F. Dorflinger, 42, Cleveland district representative for the Cellophane division, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., died July 4 in Cleveland.

—o—

Robert H. Clifford, chief designing engineer, C. O. Bartlett & Snow Co., Cleveland, died July 11 in that city.

—o—

Irvin Grammes, 56, president of the Cleveland Dowel Pin Co., Cleveland, died there July 10.

N. Y. Region Leads Nation in War Contracts

Accounts for $29 billions of war supply and facilities contracts from June, 1940, to January, 1944

THE New York region, comprising all of New York state, northern New Jersey and part of Connecticut, led all other regions in dollar volume of war supply and facilities contracts from June, 1940, to January, 1944, according to a report just issued by the Department of Commerce. The region, the report said, accounted for $29,300,000,000 of a total of $189,500,000,000 awarded throughout the nation in that period.

Of the 11 major industrial districts in the area, northern New Jersey was awarded the largest share, $9,000,000,000, while New York city ranked next with $5,000,000,000. From a nationwide standpoint these districts were topped only by Detroit and Los Angeles.

While New York city was slow in getting contracts early in the war, most of the 30,000 small manufacturing plants are busy, with many working at capacity on war contracts or subcontracts. A recent study by the Regional Plan Association, New York, it was pointed out, showed that 1,860,000 persons were employed in manufacturing in the metropolitan area, an increase of 72 per cent since 1939, an all-time record for the area.

Shortage of 125,000 workers in the New York region by autumn is anticipated, based on reports from three major geographical divisions of the region, but the report warns that it is impossible to estimate the requirements for manpower accurately even on orders which have been scheduled.

Bliss & Laughlin Buys New England Drawn Steel Co.

The business of the New England Drawn Steel Co., Mansfield, Mass., was taken over on July 1 by Bliss & Laughlin Inc., Harvey, Ill. It is being operated as the New England Drawn Steel division of Bliss & Laughlin Inc., under the direction of Harold L. Sherwin, who continues as general manager with headquarters at Mansfield.

Dresser To Acquire International-Stacey Corp.

Dresser Industries, Bradford, Pa., will acquire financial control of International-Stacey Corp., Columbus, O., and subsidiaries in a step designed "to enlarge postwar participation in oil field equipment potentials," H. N. Mallon, president of Dresser, disclosed recently.

Announcement followed a meeting of International-Stacey directors in Columbus approving the transaction. Dresser directors, meeting in New York on June 23, had previously signified approval.

Dresser and International-Stacey stockholders will be asked to ratify the agreement in special meetings to be called soon. No changes in management or personnel of International-Stacey companies are involved or contemplated.

Dresser's net worth is approximately $10,000,000 and that of International-Stacey, $5,000,000.

BRIEFS . . .

Eastern Machine Screw Corp., New Haven, Conn., announces appointment of F. F. Barber Machinery Co. as Canadian representatives with offices in Toronto, Windsor and Montreal.

—o—

American Chain & Cable Co. Inc., Bridgeport, Conn., has acquired the business of Pennsylvania Lawn Mower Works Inc., Primos, Pa.

—o—

Mec-Rad division, Black Industries, Cleveland, reports that it has started construction on a new building, adjacent to its present plant, to be devoted to the manufacture of mechanical and electrical components for radionics.

Ergolyte Manufacturing Co., Philadelphia, manufacturer of welding equipment, has opened a new plant at 3231 North Lee Street, Philadelphia, to do contract welding.

—o—

Aircraft Accessories Corp., San Francisco, has purchased the Power Brake Division of Besler Corp., Emeryville, Calif.

—o—

Apex Steel Co., Los Angeles, has purchased the foundry division of Johnson Iron & Foundry Co., Los Angeles. This gives Apex facilities for pouring an additional 150 tons a month.

—o—

Osgood Co. and General Excavator Co., Marion, O., have appointed the following new distributors of their products: Acme Equipment Co., Detroit; Arthur C. Leake, Middletown, Va.; Municipal Sales Co., Richmond, Va.; Walling Tractor & Equipment Corp., Portland, Oreg.; H. L. Baxter, Toronto, Ont.; Rousseau Equipment Co., Winnipeg, Manitoba, and Dominion Distributors Ltd., St. John's Newfoundland.

—o—

Lee Metal Products, Baltimore, has moved from 10 West Chase street to 712-722 Stirling street.

—o—

Associated Machine Products & Engineering Co., Baltimore, has been formed through acquisition of the Robertson Precision Assembling Corp.

EX-CELL-O's SILVER ANNIVERSARY

EX-CELL-O Corp., Detroit, manufacturer of various war products ranging from machine tools to aircraft parts, celebrated its twenty-fifth anniversary in business on July 10.

The company was incorporated in 1919 and located on the second floor of a small two-story building on Beaubien street in Detroit with 2375 square feet of floor space. It was financed by a few of the workers in the small tools department of one of the large motor car companies who decided to stake their scanty resources against their faith in the future of the "precision idea" in industry. Today the company has several large plants with nearly a million square feet of floor space and more than 10,000 employes.

PHIL HUBER

The company now has an aircraft parts division, diesel division, machine tool division, railroad division, and pure-pak division.

Of the 23 original stockholders five are active in the company's service today. They are J. H. Palmer, George L. Buffington, Phil Huber, Edward H. Hopson, and Charles Benker.

Phil Huber, president and general manager of the company, received his formal education and practical toolmaker training in Cincinnati. After spending some time in Indianapolis, Mr. Huber went to Detroit where he occupied positions of various types with such firms as Packard, Continental, Dodge and Ford. He then became one of the organizers of Ex-Cell-O and was a member of the board of directors from the company's inception. He held a number of executive positions with the company and was named president and general manager in 1937.

Lag in Programs Indicate Production Job Ahead

NEED for further expansion in war materiel output is evident with such programs as heavy cargo trucks, electronic equipment, radio, ammunition, tires, and construction equipment required to build airports, roads, and docks on the continent, still behind production schedules.

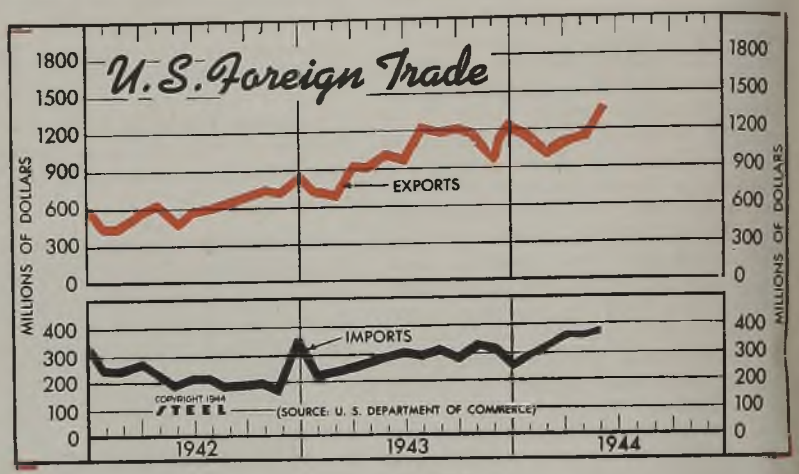
Heavier, longer range type plane output schedules are being increased, other types curtailed. New tank production quotas call for an increase of 12 per cent, with an even greater percentage increase on a weight basis scheduled. Increasing difficulty is being encountered in expanding production of heavy ammunition and bombs. Heavy truck production in June was 32 per cent behind schedule, with 75 per cent of the lag due to shortage of iron castings. Invasion experience has shown the necessity of keeping munitions programs flexible and production capacity available.

Most industrial indicators recorded a greater decline during the holiday week ended July 8 than registered in the like 1943 period. Electric power output was off to 3,940,854,000 kilowatts, engineering construction awards declined to $18,922,000 and truck assemblies to 14,600 units, while freight traffic is estimated off nearly 100,000 cars to about 800,000. The national steel rate held steady at 96 per cent, but the production outlook in this basic industry is not encouraging with the hot weather further intensifying the already critical manpower shortage.

CONSTRUCTION—Private building is holding its own as programmed while military and other public construction is declining according to schedule. Although total construction remains at less than half the volume registered in the comparable 1943 months, the slow seasonal rise in private building begun last spring is expected to continue through the summer. Total construction during June was up two per cent to $320 million, and was about 6 per cent above the April level.

COAL—Although the slump in consumer stocks of soft coal was halted in May for the first time in ten months, inventories June 1 of 55,307,000 tons were well below the 79,525,000 tons recorded on June 1, 1943, and this year's estimated soft coal requirements are higher. Daily average by-product coke production was off 0.6 per cent during May to 184,071 net tons, while a gain of 1.5 per cent to 20,712 tons was recorded in beehive coke output. For the year to date by-product coke production is slightly above the like 1943 period. Stocks of by-product coke June 1 of 762,131 net tons represented a gain of 11.2 per cent over the preceding month.

FOREIGN TRADE—Reflecting last minute military preparations United States exports increased sharply during May to a new all-time peak of $1,421,000,000. This compares with $1,192,000,000 for the preceding month and the previous peak of $1,262,000,000 recorded in July, 1943. May imports of $386 million were the highest recorded since October, 1929.



Foreign Trade
Bureau of Foreign and Domestic Commerce
(Unit Value—$1,000,000)

	Exports				Imports			
	1944	1943	1942	1941	1944	1943	1942	1941
Jan.	1,192	730	481	325	300	228	254	229
Feb.	1,086	719	480	303	313	234	254	234
March	1,158	988	628	357	359	249	272	268
April	1,192	980	717	387	359	258	235	287
May	1,421	1,085	535	385	386	281	191	297
June	.....	1,002	648	330	...	295	215	280
July	.....	1,262	650	365	...	300	213	278
Aug.	.....	1,204	703	460	...	315	186	282
Sept.	.....	1,233	732	425	...	285	196	262
Oct.	.....	1,193	802	666	...	329	200	304
Nov.	.....	1,074	787	492	...	317	168	281
Dec.	.....	1,241	873	653	...	278	358	344
Total	.....	12,716	8,035	5,147	...	3,369	2,742	3,345

FIGURES THIS WEEK

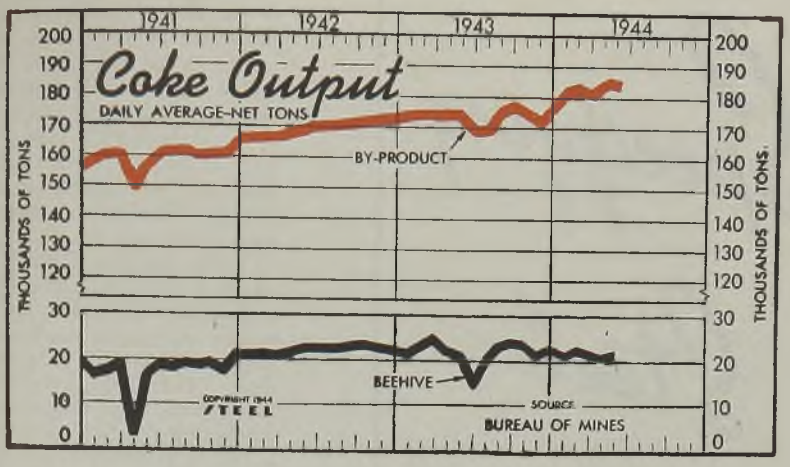
	Latest Period*	Prior Week	Month Ago	Year Ago
INDUSTRY				
Steel Ingot Output (per cent of capacity)	96	96	98	97
Electric Power Distributed (million kilowatt hours)	3,941	4,327	4,264	3,919
Bituminous Coal Production (daily av.—1000 tons)	2,003	2,000	1,978	1,694
Petroleum Production (daily av.—1000 bbls.)	4,579	4,587	4,523	4,090
Construction Volume (ENR—unit $1,000,000)	$18.9	$34.5	$42.9	$42.0
Automobile and Truck Output (Ward's—number units)	14,600	19,335	18,930	19,435
TRADE				
Freight Carloadings (unit—1000 cars)	800†	898	874	809
Business Failures (Dun & Bradstreet, number)	21	36	22	33
Money in Circulation (in millions of dollars)‡	$22,598	$22,421	$22,255	$17,607
Department Store Sales (change from like week a year ago)‡	+15%	+3%	+11%	+19%

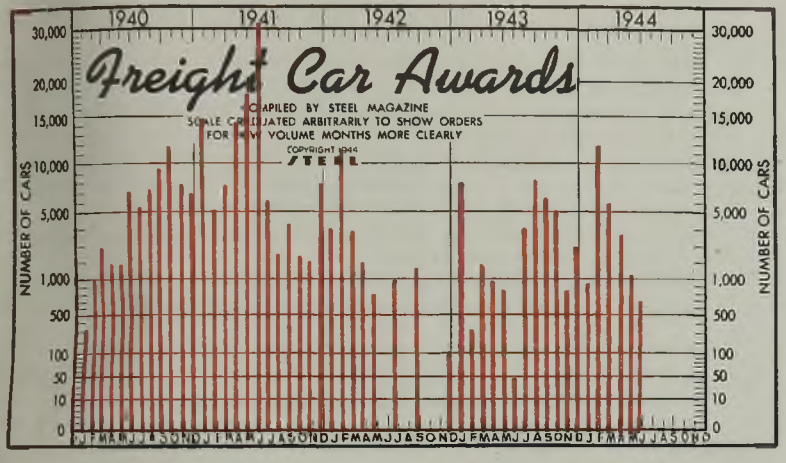
*Dates on request.
†Preliminary. ‡Federal Reserve Board.

Coke Output
Bureau of Mines

(Daily Average—Net Tons)

	By-Product 1944	By-Product 1943	Beehive 1944	Beehive 1943
Jan.	182,226	174,044	21,933	21,440
Feb.	184,384	175,099	22,248	23,987
Mar.	183,123	175,051	21,529	24,369
Apr.	185,259	175,857	20,457	22,948
May	184,071	174,400	20,700	21,200
June	.....	168,735	.....	14,055
July	.....	169,936	.....	20,009
Aug.	.....	176,396	.....	23,102
Sept.	.....	178,090	.....	23,637
Oct.	.....	175,492	.....	23,495
Nov.	.....	171,594	.....	20,421
Dec.	.....	179,042	.....	22,935
Average	.....	174,465	.....	21,795





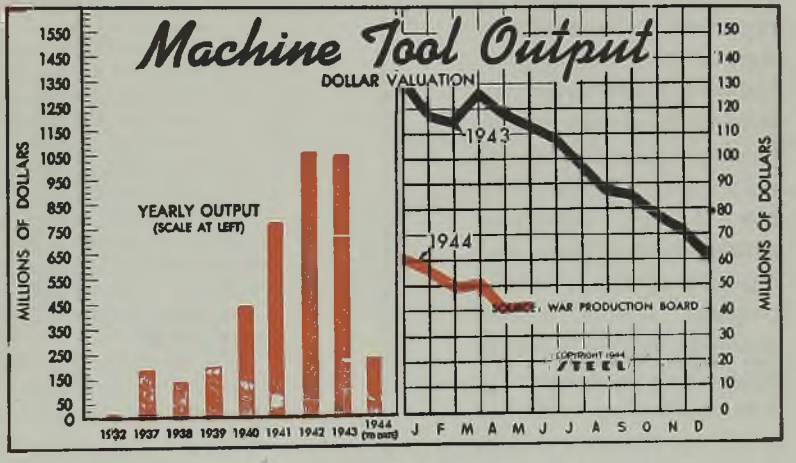
Freight Car Awards

	1944	1943*	1942	1941
Jan.	920	8,365	4,253	15,169
Feb.	12,340	350	11,725	5,508
March	6,010	1,935	4,080	8,074
April	3,819	1,000	2,125	14,645
May	1,352	870	822	18,630
June	750	50	0	32,749
July	.....	4,190	1,025	6,459
Aug.	.....	8,747	0	2,668
Sept.	.....	6,820	1,863	4,470
Oct.	.....	5,258	0	2,499
Nov.	.....	870	0	2,222
Dec.	.....	2,919	135	8,406
Total	.....	41,355	26,028	121,499

*Including reinstatements.

Machine Tool Output
(000 omitted)

	1944	1943	1942
Jan.	$56,349	$117,384	$ 83,547
Feb.	50,098	114,593	84,432
Mar.	50,799	125,445	98,358
Apr.	41,201	118,031	103,364
May	41,712	113,710	107,297
June	.....	108,689	111,090
July	.....	97,428	113,596
Aug.	.....	87,405	117,342
Sept.	.....	85,842	119,883
Oct.	.....	78,300	130,608
Nov.	.....	.....	120,871
Dec.	.....	.....	131,960
Year			
1942			1,321,862
1941			812,462
1940			450,000
1939			210,000



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,644	$12,322	$8,676	$7,557
Federal Gross Debt (billions)	$204.0	$200.2	$188.5	$141.3
Bond Volume, NYSE (millions)	$40.6	$46.2	$55.8	$52.1
Stocks Sales, NYSE (thousands)	7,844	9,932	5,943	4,163
Loans and Investments (millions)†	$55,036	$51,152	$49,988	$45,843
United States Government Obligations Held (millions)†	$39,917	$37,832	$37,029	$32,987

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	249.3	248.9	250.3	243.1
Industrial Raw Materials (Bureau of Labor index)‡	114.6	113.2	113.8	114.0
Manufactured Products (Bureau of Labor index)‡	101.1	101.1	101.1	99.7

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

Specifying Steel on Hardenability

Work now in progress as reported to members of American Iron and Steel Institute apparently will lead to revolution in steel buying methods through use of hardenability bands in specifying grades rather than relying entirely on chemical analysis. Author reports steelmakers can work to controlled hardenability but must be allowed wider composition limits to permit adjustment of individual elements at time of melting

By L. L. FERRALL
Chief Metallurgist
Rotary Electric Steel Co.
Detroit

THE END QUENCH hardenability test was the outgrowth of a number of years of endeavor to find a suitable means of measuring the hardening properties of steel prior to actual usage. Messrs. Jominy and Boegehold published the first report on the principle of end quenching in 1937. Since that time many papers have been written describing the various ramifications of the test and thousands of tests of this nature have been made. Fundamentally, it embodies the idea of extracting heat from a specimen of predetermined size, at varying rates, and subsequently, measuring the hardness which is developed with the different cooling rates. Each cooling rate in a particular steel is reflected by certain hardness values and consequently, certain structural conditions.

This test has made it possible to predict the critical diameter size in which a particular steel will harden to any reasonable predetermined value with a known quench. After a number of years of experimentation with this and other types of hardenability tests the steel producing industry as well as steel users have for all practical purposes adopted the end quench test principle. The Society of Automotive Engineers has accepted this method of determining hardenability and has published an approved procedure for conducting the test. Complete details concerning the procedure can be obtained by referring to the SAE handbook.

Most Constructional Alloy Producers Share in Program

The Alloy Technical Committee of the American Iron and Steel Institute has recognized the need for some practical approach to the hardenability problem, particularly to the possibility of determining the limits of hardenability to which steel can be made successfully. With this in mind, a co-operative program was undertaken which was shared by most of the constructional alloy steel producers. To determine the limits and practicability of the end quench test, the program included investigations to show:

1—The difference if any between cast tests and rolled or forged tests from the same heats of steel.
2—The variation in hardenability from one part of a heat to another.
3—The agreement of a number of laboratories in checking the same steel specimens.
4—The accuracy and value of calculated hardenability limits.
5—The feasibility of recommending end quench hardenability bands for certain of the commonly used constructional alloy steels.

A resume of these investigations enables us to make the following statements:

1—That cast tests taken on the pouring platform are practical and very valuable.
2—That with a reasonable number of tests, properly selected, the hardenability of a heat can be properly determined.
3—That there is reasonably good agreement between different laboratories in checking the same specimens when care is exercised in the technique of conducting the test.
4—That, with an accurate knowledge of chemical composition, calculated hardenability has certain possibilities.

These subjects have been covered in detail in other reports. It might be significant to mention that the technique of conducting the test has a definite influence on the ultimate results, consequently, it has been considered advisable to endeavor to standardize the technique. A joint committee of the Society of Automotive Engineers and the American Iron and Steel Institute is working on this problem.

The development of hardenability bands or limits is the primary objective of the present discussion. For the sake of clarification, the hardenability band is the area between two end quench curves, which represent the high

Fig. 1—Typical end-quench hardenability band, in this case for NE-8743 steel

Fig. 2—Comparative calculated hardenability ranges, 112 heats open-hearth NE-8740 steel

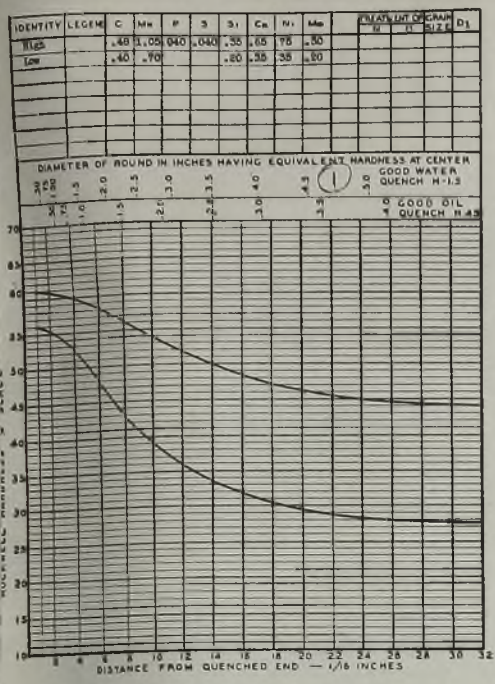
Fig. 3—Summary of ladle analyses illustrating percentages outside present specified ladle analysis range, open-hearth, NE-8740 steel

Fig. 4—Summary of ladle analyses illustrating percentage outside selected chemistry range, open-hearth NE-8740 steel

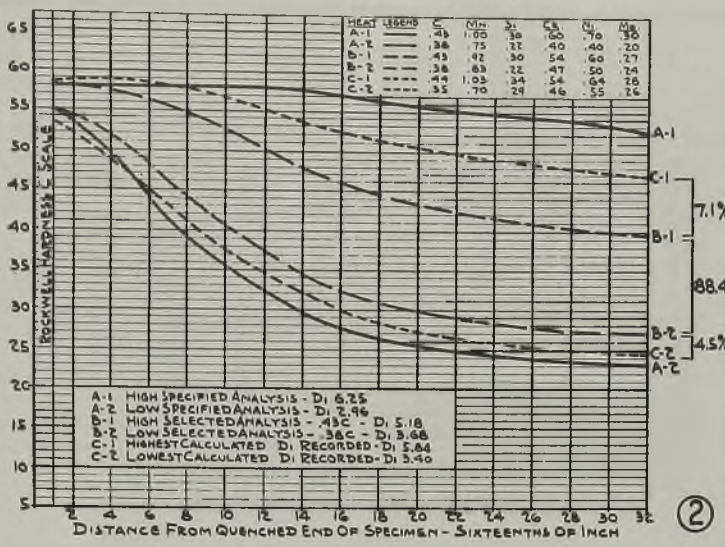
Fig. 5—Summary of calculated outside Di (ideal critical diameters) illustrating outside Di range calculated from selected chemistry ranges, open-hearth NE-8740 steel*

Fig. 6—Comparative calculated hardenability ranges, 112 heats, open-hearth, NE-8740 steel

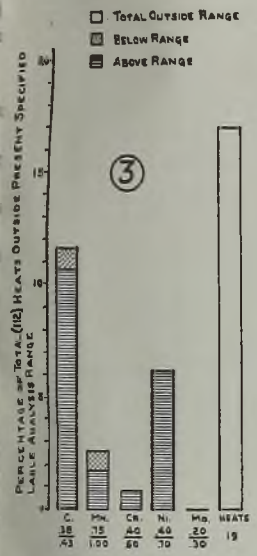
Fig. 7—Frequency of Di values (ideal critical diameters) in 112 heats of NE-8740 steel


IDENTITY LEGEND
C Mn P S Si Cr Ni Mo
High .40 1.05 .040 .040 .35 .65 .75 .30
Low .40 .70 .20 .35 .35 .20
DIAMETER OF ROUND IN INCHES HAVING EQUIVALENT HARDNESS AT CENTER
GOOD WATER QUENCH H-1.2
GOOD OIL QUENCH H-0.43
ROCKWELL HARDNESS C SCALE
DISTANCE FROM QUENCHED END — 1/16 INCHES

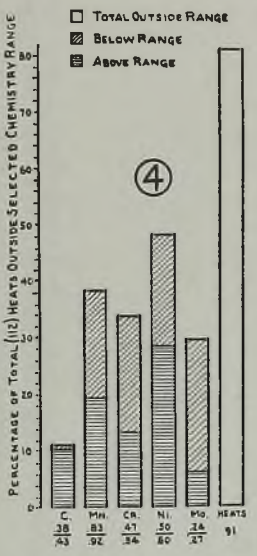
①


HEAT LEGEND C Mn Si Cr Ni Mo
A-1 .45 1.00 .30 .60 .70 .30
A-2 .38 .75 .22 .40 .60 .20
B-1 .43 .92 .30 .54 .60 .27
B-2 .38 .83 .22 .47 .50 .24
C-1 .43 1.03 .34 .64 .70 .28
C-2 .35 .70 .29 .46 .55 .26
A-1 HIGH SPECIFIED ANALYSIS - Di 6.25
A-2 LOW SPECIFIED ANALYSIS - Di 2.96
B-1 HIGH SELECTED ANALYSIS - .43C - Di 5.18
B-2 LOW SELECTED ANALYSIS - .38C - Di 3.68
C-1 HIGHEST CALCULATED Di RECORDED - Di 5.84
C-2 LOWEST CALCULATED Di RECORDED - Di 3.40
7.1%
88.4%
4.5%
ROCKWELL HARDNESS C SCALE
DISTANCE FROM QUENCHED END OF SPECIMEN - SIXTEENTHS OF INCH

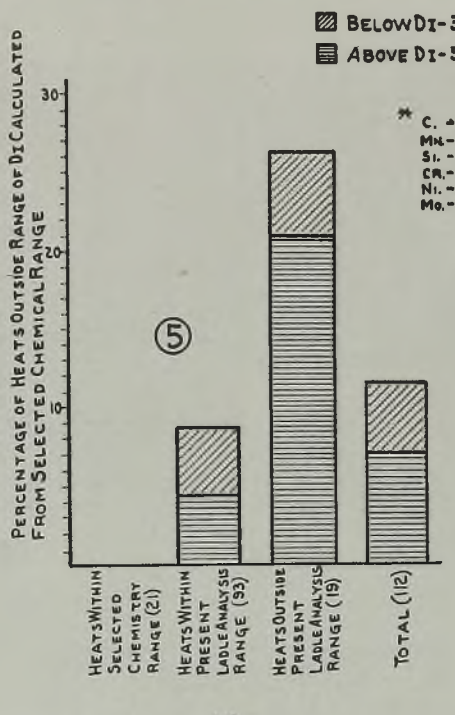
②


TOTAL OUTSIDE RANGE
BELOW RANGE
ABOVE RANGE
PERCENTAGE OF TOTAL (112) HEATS OUTSIDE PRESENT SPECIFIED LADLE ANALYSIS RANGE
C. .38/.43
MN. .75/1.00
CR. .40/.60
NI. .40/.70
MO. .20/.30
HEATS 19

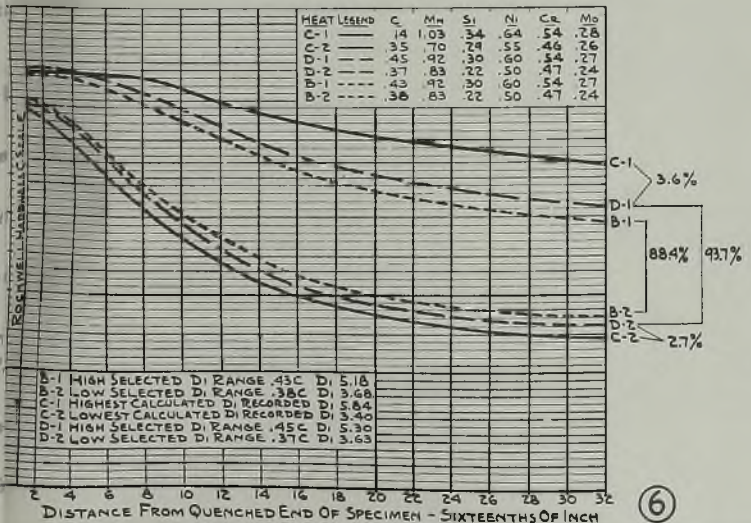
③


TOTAL OUTSIDE RANGE
BELOW RANGE
ABOVE RANGE
PERCENTAGE OF TOTAL (112) HEATS OUTSIDE SELECTED CHEMISTRY RANGE
C. .38/.43
MN. .83/.92
CR. .47/.54
NI. .50/.60
MO. .24/.27
HEATS 91

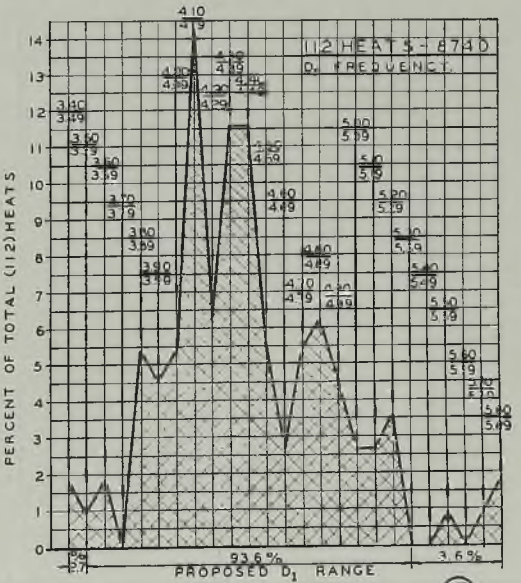
④


BELOW Di - 3.68
ABOVE Di - 5.18
* C. - .38/.43
MN. - .83/.92
SI. - .22/.30
CR. - .47/.54
NI. - .50/.60
MO. - .24/.27
PERCENTAGE OF HEATS OUTSIDE RANGE OF Di CALCULATED FROM SELECTED CHEMICAL RANGE
HEATS WITHIN SELECTED CHEMISTRY RANGE (21)
HEATS WITHIN PRESENT LADLE ANALYSIS RANGE (93)
HEATS OUTSIDE PRESENT LADLE ANALYSIS RANGE (19)
TOTAL (112)

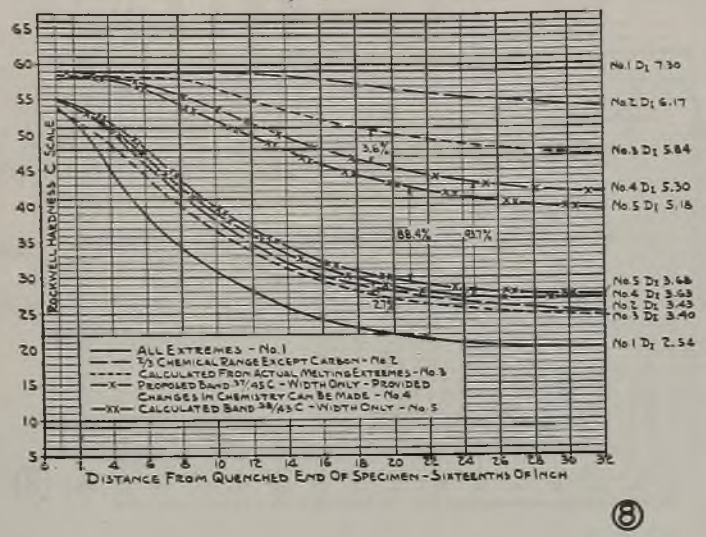
⑤


HEAT LEGEND C Mn Si Ni Cr Mo
C-1 .14 1.03 .34 .64 .54 .28
C-2 .35 .70 .29 .55 .46 .26
D-1 .45 .92 .30 .60 .54 .27
D-2 .37 .83 .22 .50 .47 .24
B-1 .43 .92 .30 .60 .54 .27
B-2 .38 .83 .22 .50 .47 .24
C-1
D-1
B-1
B-2
D-2
C-2
3.6%
88.4%
93.7%
2.7%
B-1 HIGH SELECTED Di RANGE .43C Di 5.18
B-2 LOW SELECTED Di RANGE .38C Di 3.68
C-1 HIGHEST CALCULATED Di RECORDED Di 5.84
C-2 LOWEST CALCULATED Di RECORDED Di 3.40
D-1 HIGH SELECTED Di RANGE .45C Di 5.30
D-2 LOW SELECTED Di RANGE .37C Di 3.63
ROCKWELL HARDNESS C SCALE
DISTANCE FROM QUENCHED END OF SPECIMEN - SIXTEENTHS OF INCH

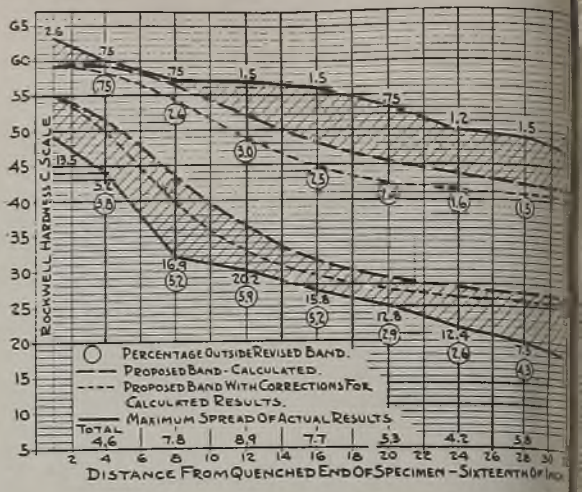
⑥


112 HEATS - 8740
Di FREQUENCY
PERCENT OF TOTAL (112) HEATS
93.6%
3.6%
PROPOSED Di RANGE

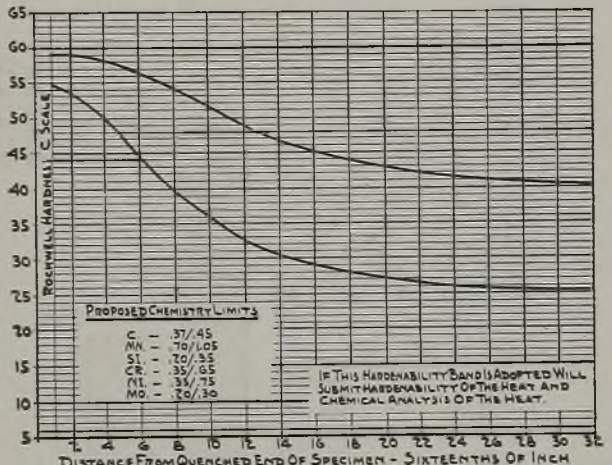
⑦



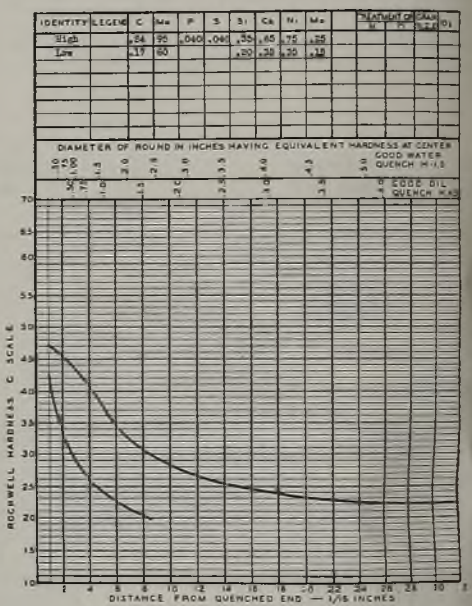
⑧



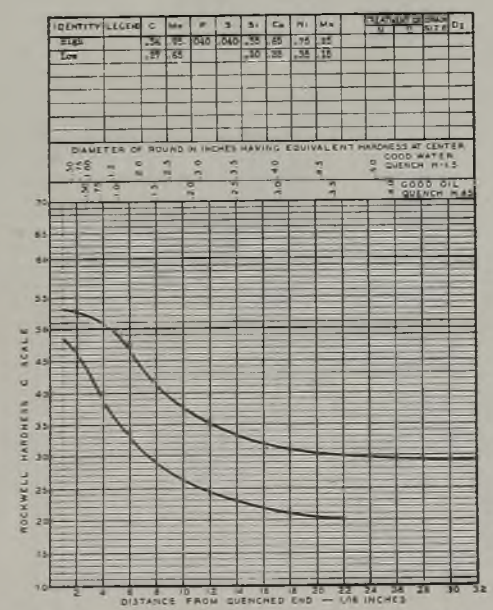
⑨



⑩



⑪



⑫

Fig. 8—*Summary of calculated hardenability bands, NE-8740 steel*

Fig. 9—*Actual tests vs. calculated bands, NE-8740. 153 tests*

Fig. 10—*Proposed hardenability band, NE-8740 steel*

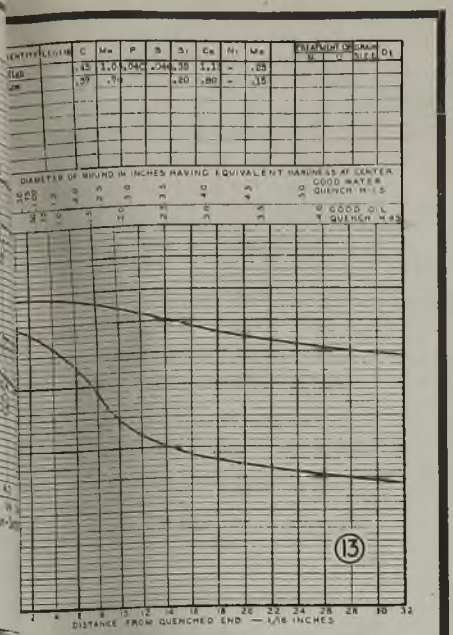
Fig. 11—*Proposed tentative standard band, open-hearth NE-8620 steel*

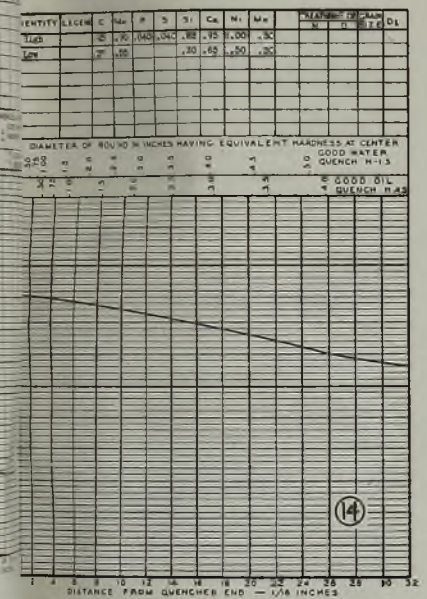
Fig. 12—*Proposed tentative standard band, open-hearth NE-8630 steel*

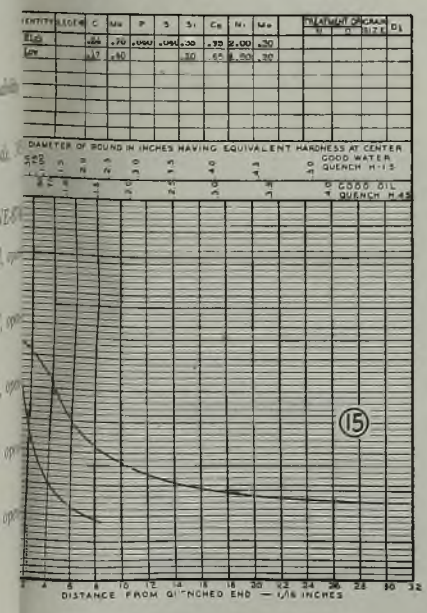
Fig. 13—*Proposed tentative standard band, open-hearth A-4140 steel*

Fig. 14—*Proposed tentative standard band, open-hearth A-4340 steel*

Fig. 15—*Proposed tentative standard band, open-hearth A-4620 steel*







and low hardness values which might be obtained from a number of heats representative of the normal manufacturing practice of any particular grade of alloy steel. A typical band is shown in Fig. 1.

The user is interested in the smallest spread in hardenability obtainable, since this reflects in better control of his raw material, greater consistency in fabricating and heat treatment and consequently, in better production with lower costs. In the past, efforts have been made to secure this uniformity by closer control of individual chemical element limits. It is the general opinion that if chemical composition can be supplemented by hardenability control, and somewhat wider limits of chemical elements are permitted, the steel manufacturer can adjust or balance the hardening elements at the time of melting. Thus, a more uniform product from heat to heat can be anticipated.

It has been suggested that hardenability bands be developed by accumulating actual hardenability data on large numbers of heats. Obviously, to do this properly is quite difficult, if not almost impossible. It would require tremendous numbers of heats to represent all of the combinations of hardening elements possible in any particular grade. In view of this difficulty, the Alloy Technical Committee has attacked the problem from a different standpoint involving the study of:

1—The ladle analyses of a large number of heats made by all of the principal alloy steel producers.

2—The frequency of occurrence of off heats resulting from one or more elements being outside of the specified chemical limits.

3—The relationship of calculated and actual end quench hardenability results.

The ladle analyses of the heats of the individual types were used to calculate Ideal Critical diameters known as Di values using the principle of Grossman's hardenability factors, and subsequently, the end quench curves were calculated as proposed by Field (*Metal Progress*, March, 1943). A study was then made to show influence of the use of hardenability bands on the normal practice of steelmaking.

Explanation of Method With AISI 8740 as Test Piece

The exact method used in arriving at the bands can best be shown by example and for this purpose AISI 8740 steel has been selected. The standard chemical element spread for this grade is as follows: Carbon 0.38 to 0.43; manganese 0.75 to 1.00; chromium 0.40 to 0.60; nickel 0.40 to 0.60; molybdenum 0.20 to 0.30.

By calculating the Di values and using the method proposed by Field, hardenability curves were calculated using the high and low values of the hardening elements. This band is shown in Fig. 2 between curves A1 A2. It can be seen that the limits of this band are too wide to be of practical interest to the user. For the purpose of determining how far the band could be reduced another set of curves was arbitrarily calculated using one-third of the chemical range, carbon excepted, namely: Carbon 0.38 to 0.43; manganese 0.83 to 0.92; chromium 0.47 to 0.54; nickel 0.50 to 0.60; molybdenum 0.24 to 0.27.

The new band is shown in Fig. 2 by curves B1 and B2. Obviously, the band included between these curves would be attractive to the consumer, but the restrictions on chemical composition would be very objectionable to the steel producer.

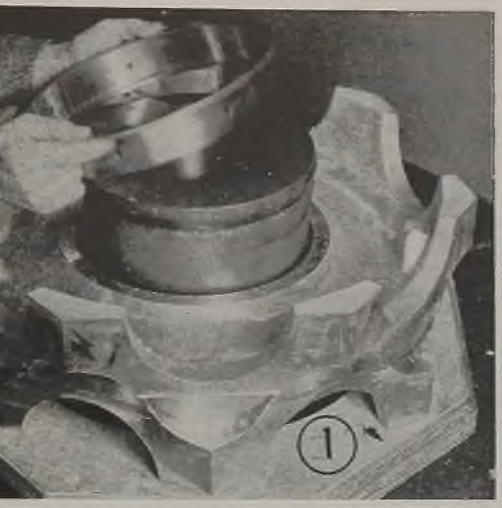
It now seemed advisable to consider the ladle analyses of a number of heats which represent normal production of 8740 steel. Ladle analyses were available on 112 heats produced by a number of mills in different types of furnaces. In Fig. 3 we have shown a record of these heats with respect to their compliance with the standard chemical specification. It can be seen that 16.9 per cent of the heats melted are outside of the standard chemical range in one or more elements. Fig. 4 represents these same heats when their analyses are considered in connection with the selected one-third chemical range. Here we see that 81.2 per cent of the heats are outside of the restricted range.

Since these heats represent a normal production of this type it would seem important to study their hardenability characteristics. In line with this thought the Ideal Critical sizes were calculated on the 112 heats and the end quench hardenability curves representing the extreme values of the Ideal Critical sizes were subsequently calculated. The Ideal Critical sizes, namely Di values of the 112 heats varied from 5.84 to 3.40. In Fig. 2, these curves are shown by C1 C2. This band is narrower than that representing the full ladle analyses range, but it is still wider than would probably be desired.

Considering further the Ideal Critical sizes, we notice that of the 112 heats, all but 11.6 per cent fell within the limiting values of Di for the narrow selected chemical range, namely 5.18 to 3.68 Di. This is shown in Fig. 5. The 11.6 per cent is made up of 7.1 per cent of heats which were above the high and 4.5 per cent below the low. It was previously mentioned that in this same group of 112 heats, 16.9 per cent of them were outside of the standard

(*Please turn to Page* 150)

By C. S. LUCAS
Metallurgical Engineer
Wright Aeronautical Corp.
Paterson, N. J.



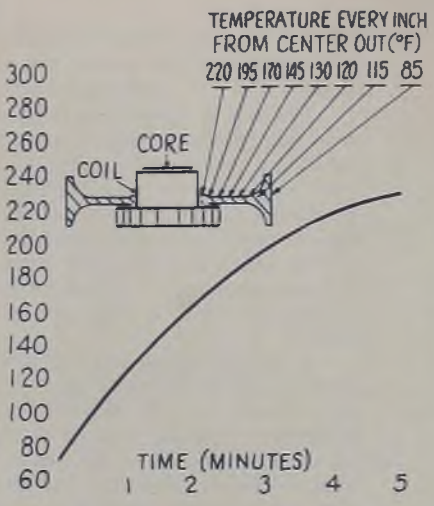
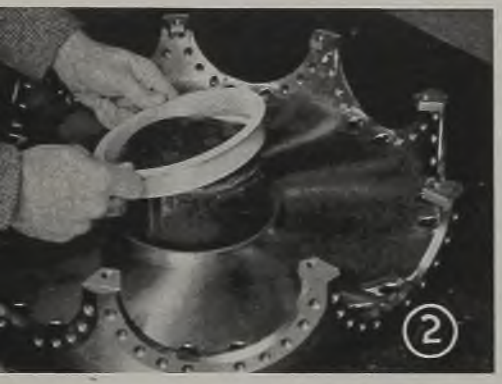


Fig. 1—Crankcase center section is placed in the position shown and heated for the time set by the automatic timer. The part is then removed from the unit and the bushing assembled. The complete operation from conveyor back to conveyor requires about 5½ minutes. Schematic sketch shows unit and temperature-time curve



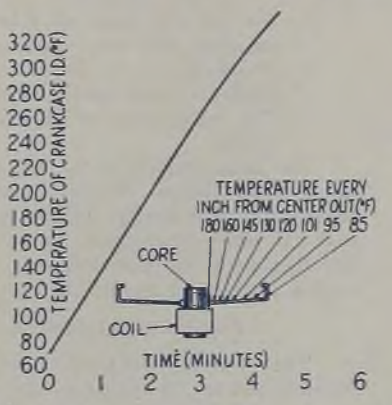


Fig. 2 — Crankcase section is placed in position shown and heated. The part then is removed from the heater and the bushing assembled, complete operation from conveyor back to conveyor requiring only 2 minutes

Fig. 3 — Crankcase front or rear section is placed on the unit and located by the blocks shown. The automatic timer is put into operation. After the timer has cut the circuit the crankcase is removed and placed on bushing fixture where the bushings are assembled. Time required for complete operation is 6 minutes

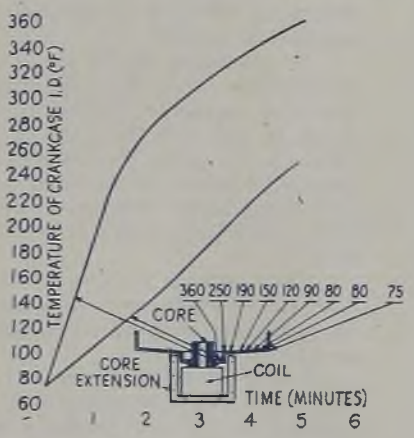
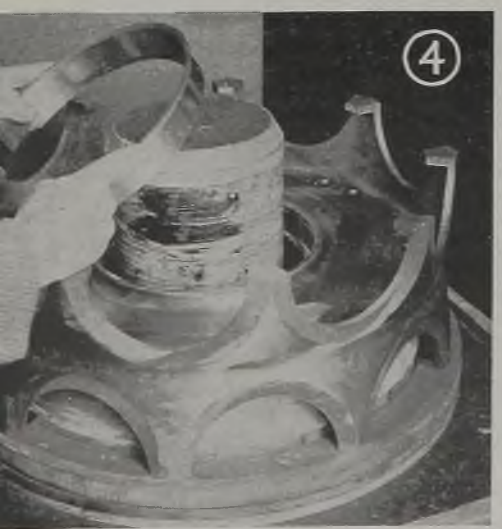


Fig. 4—Crankcase center section is placed in the position shown and heated for time set by the automatic time relay. An experienced operator can assemble the bushing while the part is still in this position. The complete operation from conveyor back to conveyor requires about 5 minutes



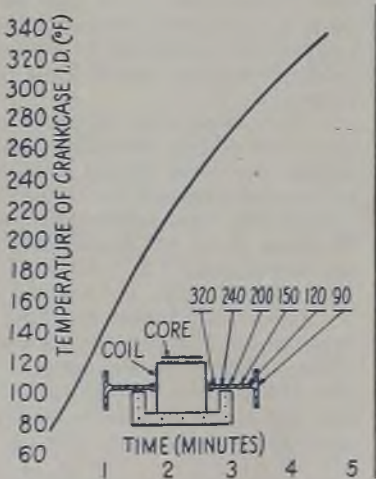


Fig. 5 — Nose section is transferred from the conveyor to the unit as shown and heated for length of time set by automatic time relay. It is then removed from the heater and the bushings assembled (small bushing first). Time required is about 4½ minutes

Shrink Fits

facilitated through use of induction heating coils to heat bores into which parts are to be fitted. Heating cycle shortened

CONVENTIONAL practice in aircraft engine plants for making shrink fits, such as locating steel bushings in aluminum or magnesium housings, has been to refrigerate the inner member and heat the outer member before assembly, so that when both resume normal temperature a tight fit will be insured. Usual method of heating the outer members has been to place the part in a hot oil bath or into an oven for sufficient time to bring it to temperature, usually around 220-250 degrees Fahr. for aluminum, and 400 degrees for steel.

An ingenious method for greatly speeding up the heating cycle in this type of work, possibly obviating the need for either oil baths or ovens, has been devised by engineers of Wright Aeronautical Corp., Paterson, N. J., and made available to the industry. Essentially it involves the use of a specially designed induction heating coil and core which fits into the bore to be heated, and with regular 60 cycle current brings the metal to temperature in a few minutes.

Such heating units have been successfully designed and applied in production to steel and aluminum crankcases, nose sections, supercharger housings, propeller shafts and reduction drive gears. They show the following specific advantages.

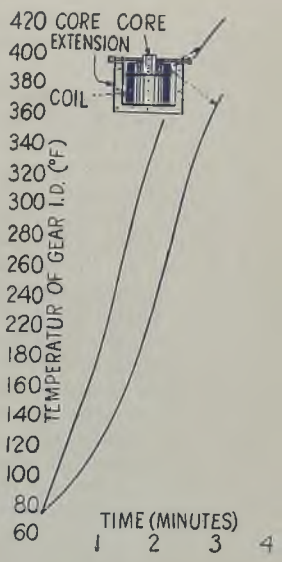
1—Readily adapted to continuous production because of speed of heating and handling.

2—Initial cost of each unit far below that of an oven or oil bath.

3—Less maintenance than ovens or baths.

4—Less floor space required than for ovens or baths.

5—Parts heated locally only in the required area, facilitating handling of part immediately after heating.



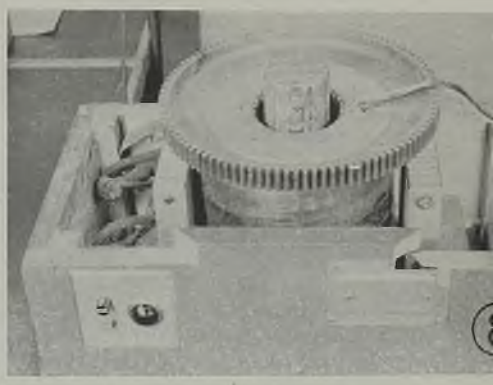


Fig. 6—Supercharger rear housing is placed under the counterbalanced heating unit which is in turn forced down in place by the operator. The part is heated for the time set by a timer. When the heating cycle is completed, the heating unit is forced up and the housing transferred to a locating fixture where the bushing is assembled. The time required for heating and assembly is about 4½ to 5 minutes

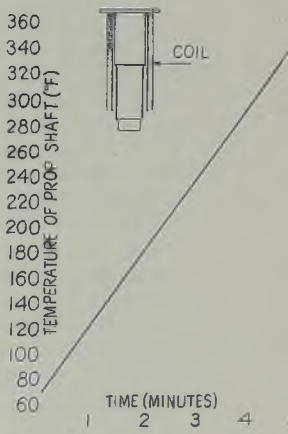
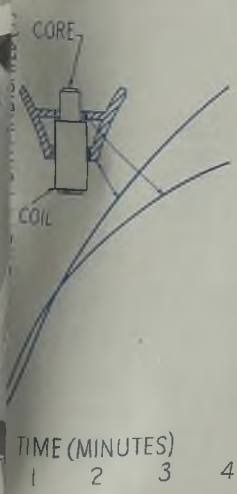
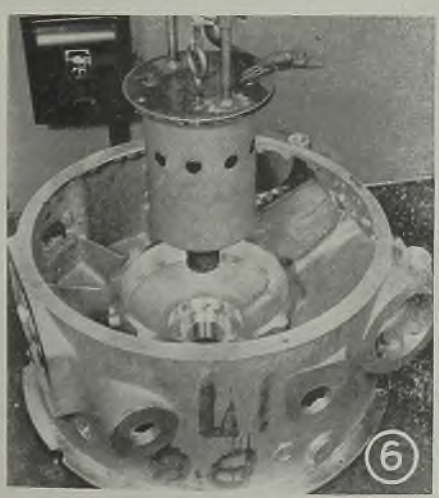
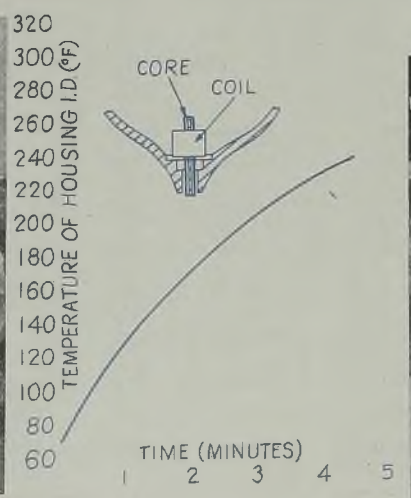


Fig. 7—The propeller shaft is lowered into the induction coil by means of a hoist and the lifting fixture as shown. The shaft strikes a limit switch at the bottom of the coil which opens the circuit to the pushbutton. The operator can now cut on the current for the time set by the time relay. On completion of the heating cycle, the shaft is removed and the bushing assembled. The time required for the complete cycle is about 6½ minutes

Fig. 8—Reduction gear is placed in the position as shown and heated for the time set by a time relay. It is then removed and shrunk on the crankshaft front. The table shown above is only temporary and is to be replaced in the near future. The time required is about 3 to 3½ minutes







6—Induction heating units avoid such hazards as slippery floors, oil burns, etc.

7—Power requirements are less than with either ovens or baths.

Each part to be heated by induction requires a special core and coil design, which cannot be accurately determined by electrical circuit calculations. Experience, plus cut-and-try methods, have proved to be the best procedure in developing such units.

Charts in Fig. 1 to 8, reproduced herewith, show temperature distribution and heating rate for eight production engine parts heated by 60-cycle induction units. Illustrations show the actual corresponding engine parts and induction heating coils used. It should be noted that ferrous parts heat more rapidly than nonferrous, this difference being due, in part, to the comparatively larger section necessitated by the comparatively low allowable design stress of aluminum and magnesium parts, the lower resistivity of aluminum and magnesium alloys, and in addition, to greater losses through conduction and convection.

High Savings in Heat Energy

Observation of the temperature gradients from the inside diameter to outward extremities, in Figs. 1 through 8, illustrates graphically the savings in heat energy resulting from this method of heating. Since the outside extremities seldom exceed room temperature, parts can be handled with bare hands without danger of burns thus contributing greatly to more efficient production.

The induction heating units shown here, with the exception of the one used to heat the reduction gear, Fig. 8, should be used in conjunction with refrigerated bushings or inserts if the heating time is to be kept to a minimum. Table I lists temperatures of the parts and bushings, along with other pertinent information regarding the design and electrical characteristics of each unit.

Reference to Table I shows that the aluminum crankcase center section coil draws 10.5 amperes at 423 volts no load. With the load, the current increases to 29 amps and the power factor rises to 28.5 per cent. This increase in power factor does not necessarily mean an increase in efficiency because the amps drawn is almost tripled on application of load. It appears that a difference in permeability and the considerably lower resistance of aluminum parts account for the greatly increased primary current. Further study of Table I shows that almost all the power to heat ferrous parts is derived mainly from the increased efficiency of the unit on application of load. The difference between the current drawn with load and without load for ferrous parts is almost negligible mainly because the air gap in the otherwise open magnetic circuit (no load) is decreased by a material of high magnetic permeability.

Costs Are Lower

To heat the inside diameter of an aluminum crankcase center section, by induction heating requires 14-kilowatt-minutes, compared with 22.5 kilowatt-minutes by oven heating. Likewise a steel front crankcase can be heated to 360 degrees with 11 kilowatt-minutes, against 38.2 kilowatt-minutes for oven heating. These reductions in power consumed are due, in part, to the localized heating possible with the induction units. Engine parts heated in an oven gain heat by convection while parts heated by induction generate their own internal heat by resisting the flow of currents induced within them, plus, in the case of magnetic materials, the heat gained by hysteresis losses.

Costs of the induction heaters naturally are well below those of an oven or hot oil bath. For example, the material necessary to construct a unit for the crankcase rear section, Fig. 2, excluding the bench and switches, cost about $20 plus 40 man-hours for fabrication. This unit will heat one crankcase section to 250 degrees Fahr. in 3 minutes, compared with oven heating rate of 9 minutes per part. On this basis, to equal the induction heating rate, three ovens would be needed, each costing approximately $650, plus $200 for installation.

Induction units due to size can be installed on benches, conveyors, or assembly presses thus eliminating excessive and hazardous handling.

The induction unit used to heat magnesium nose sections, Fig. 5, cost $25 for material and 50 man-hours for fabrication. It heats the section to 260 degrees in 3.5 minutes.

The propeller shaft heating unit, Fig. 7, cost about $18, excluding the bench, plus 32 man-hours for fabrication. It heats the shaft to 350 degrees in 5 minutes, against 25 minutes formerly required by a hot oil bath, which cost around $800, plus $200 for installation.

Procedure for Designing Coils

In all cases, structural steel parts will be magnetized after heating with the 60-cycle induction units, unless the parts are removed from the unit while the current still flows. This can be accomplished by merely starting the current momentarily while the part is being removed from the core.

To assist in the design of induction heating coils, whether for ferrous or nonferrous parts, the following procedure is recommended by Wright engineers:

1—Determine the voltage available at the proposed location and use this voltage (plus or minus 20) in all experiments. The voltage dictates the performance of the coil once it is in service.

2—Prepare a core of laminated sheet steel to fit the part. Insulate each lamination with shellac or the equivalent to decrease eddy current losses. If possible and practical, add a core extension to more satisfactorily complete the magnetic circuit. See Figs. 3, 4, and 8.

If the inside diameter of the steel part to be heated is over 8 inches, the core should be small enough to allow space for the coil to be wound between the core and part. An example is the steel crankcase center section illustrated in Fig. 4. Since aluminum and magnesium alloys are not magnetic, the designer should endeavor to wind the coil between the core and the part if the

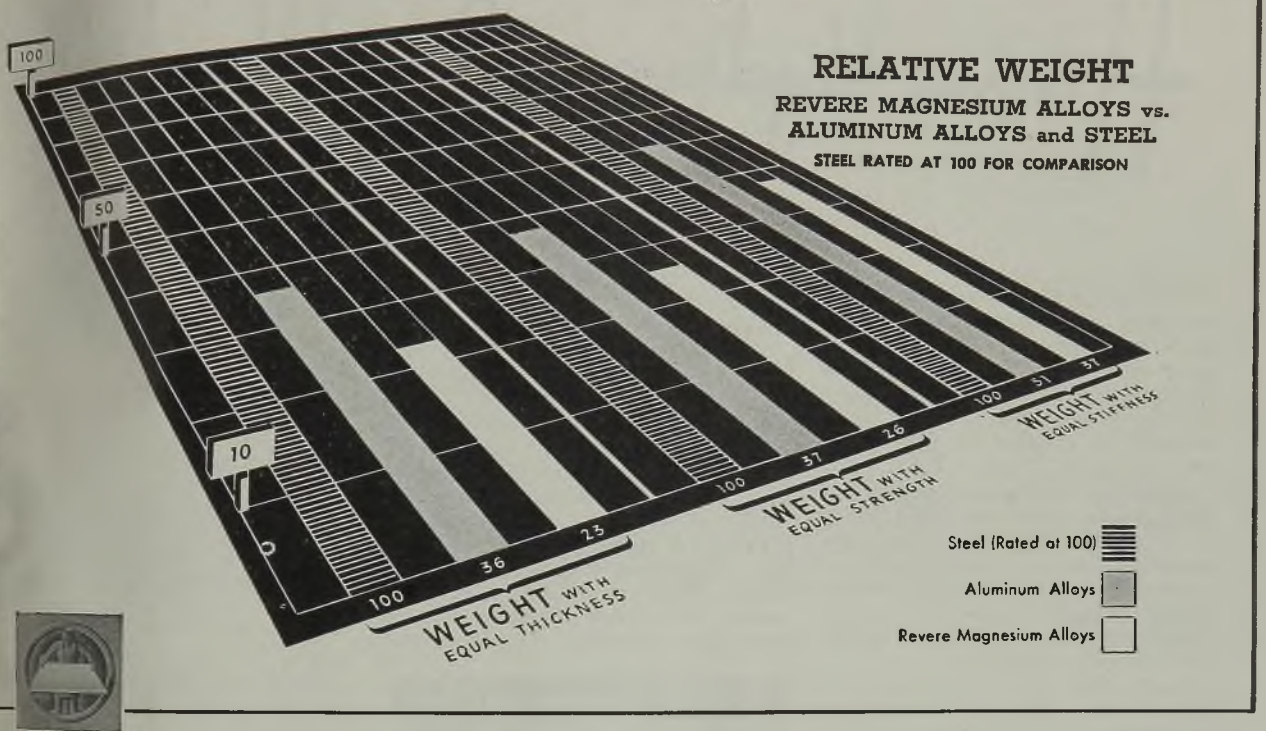
(*Please turn to Page* 160)

TABLE I

PERTINENT DATA FROM INDUCTION HEATING UNITS

Part No.	Part Name	Material	Temp. of Part °F	Time Required Min.	Temp. of Bushing °F	Number Turns in Coil	Wire Gauge B & S#	Load	Voltage	Current (AMPS)	Actual Power (K.W.)	Power Factor %
A	Crankcase center	Aluminum	220	4	—40	300	8 Sq.	No	423	10.5	0.350	7.5
								With	423	29.0	3.500	28.5
B	Crankcase rear	Steel	180	1.5	—25	340	8 Sq.	No	428	18.5	0.300	5.2
								With	428	17.8	0.600	7.8
C	Crankcase front and rear	Steel	360	4.5	—40	265	8 Sq.	No	432	13.5	0.900	15.1
								With	432	14.2	2.200	36.1
D	Crankcase center	Steel	320	4	—40	300	8 Sq.	No	440	17.2	0.500	8.1
								With	440	20.4	1.150	12.8
E	Supercharger rear housing	Magnesium	230	3.5	—30	495	15 Rd.	No	458	7.1	0.150	4.6
								With	458	11.8	1.250	23.3
F	Nose section	Magnesium	230	3.5	—30	395	8 Sq.	No	245	9.5	0.168	7.2
								With	245	42.0	2.260	22.0
G	Propeller shaft	Steel	350	4.5	—20	375	8 Sq.	With	440	19.0	0.704	8.3
H	Stat. red. gear	Steel	400	2.5	75	375	8 Sq.	No	448	20.5	1.340	14.5
								With	448	21.1	3.600	38.8

NOW AVAILABLE } Magnesium Alloy Sheets by REVERE



THE world's largest magnesium sheet and plate mill is now in operation—Revere. Here are produced the three alloys in demand for wartime uses:

Revere Magnesium "M" — Magnesium-Manganese alloy with moderate strength and good forming characteristics.

Revere Magnesium "FS-1"—magnesium-aluminum-zinc alloy, a general purpose metal combining high strength with good forming characteristics.

Revere Magnesium "J-1" — magnesium-aluminum zinc alloy, the highest strength sheet available.

When production exceeds war needs, Revere Magnesium Alloys will be available for use in an ever-increasing number of fields, such as automotive, household appliances, railroads. These alloys will bring revolutionary economies in weight, power, machining, production, labor. For technical assistance in planning conversion to these wondrously light magnesium-base metals, write Revere.

REVERE MAGNESIUM ALLOY SPECIFICATIONS

Grades and Tempers

h = hard rolled a = annealed
r = hot rolled

Alloys M, FS-1, and J-1 can be furnished in these tempers:

Revere M	Tempers h, a, r.
Revere FS-1	Tempers h, a, r.
Revere J-1	Tempers h, a, r.

The mill should be consulted regarding these tempers.

LIMITS OF MANUFACTURE

Sheets and Plates

Supplied from 0.020 inch and thicker in a wide range of sizes, depending upon the thickness and weight of the sheet or plate.

INDEX TO SPECIFICATIONS

Form	Revere Alloy	American Society for Testing Materials: Alloy Designation	ASTM: Specification No.	Society of Automotive Engineers	Aeronautical Material Specifications S. A. E.	Navy Bureau of Aeronautics: Alloy Designation	Navy Bureau of Aeronautics: Specification No.	Navy Department: Alloy Designation	Navy Department: Specification No.	U. S. Army Air Forces: Alloy Designation	U. S. Army Air Forces: Specification No.
Plate, Sheet and Strip	M	11	B90-41T	51	4370	..	..	11	47 M 2	1	11339
	FS-1	18X	B90-41T	..	....	..	..	18	47 M 2	..	11340
	J-1	8X	B90-41T	..	4380**	..	..	8	47 M 2	2	11338

**4380 annealed 4381 hard rolled

REVERE
COPPER AND BRASS INCORPORATED
MAGNESIUM-ALUMINUM DIVISION
Founded by Paul Revere in 1801
Executive Offices: 230 Park Ave., N. Y. 17, N. Y.

Fig. 1 — Notice narrow and extremely uniform beads on these low-carbon steel aircraft engine exhaust stacks welded by the atomic hydrogen process at the Ryan Aeronautical plant

Atomic Hydrogen Arc Welding

. . . . aids joining of thin sheet in aircraft production

By W. J. Van den AKKER
Assistant to Production Superintendent
Ryan Aeronautical Co.
San Diego, Calif.

NO PROGRAM in history has ever so completely marshalled the industrial power and ingenuity of this country as the present war. Tremendous strides have been made in welding. The reason for the few weld failures that do occur generally can be identified quickly and easily.

In welding light-gage materials for aircraft, progress can be measured largely in the fuller utilization of existing welding facilities coupled with an increased knowledge of welding design as well as of the metallurgical characteristics of the special alloys customarily used in this type of work.

At the Ryan Aeronautical Co., early use was made of the atomic-hydrogen arc-welding method pioneered and developed by the General Electric Co. This process had not previously been used to any appreciable extent for the welding of light gages of stainless steel in the fabrication of exhaust collectors, heat exchangers, etc., although it had advantages over other processes which had been known for some time.

The atomic hydrogen method overcomes the two major difficulties of carbon pickup and partial loss of the stabilizing elements, columbium and titanium. With the use of hydrogen, which in many respects is the opposite of oxygen, a reducing atmosphere is present so that any "burning" or severe oxidation, with its resultant ill effects, is not so difficult a problem. In addition, the heat transfer of the atomic arc is so much more rapid that the time at welding temperature is also shortened. This latter characteristic is very desirable since the corrosion resistance of the material is improved.

Resistance to corrosion is particularly necessary because of the high service temperatures to which the parts are subjected. It is a curious corollary that the ductility and corrosion resistance of 18-8 stainless steels are usually closely related so that a weld of good ductility is generally corrosion resistant and vice versa.

Early attempts to use the atomic-hydrogen welding process at our plant met with many of the usual stumbling blocks. Some welding operators distrusted the method, thereby slowing down shop acceptance. To others, this method's high rate of heat transfer compared to the previous method, ma it difficult for the operator to control h speed.

Fig. 2—Some of the atomic-hydrogen welding booths in use fabricating aircraft parts

Too slow a speed would often result a burning through, necessitating repair and in many instances scrapping of the part. Too fast a welding speed resulted in severe shrinkage of the weld over its length, so that a series of cracks would form across the weld. These cra necessarily demanded repair weldin again resulting in an unfavorable att tude on the part of the welding operator and sometimes on the part of the super visors.

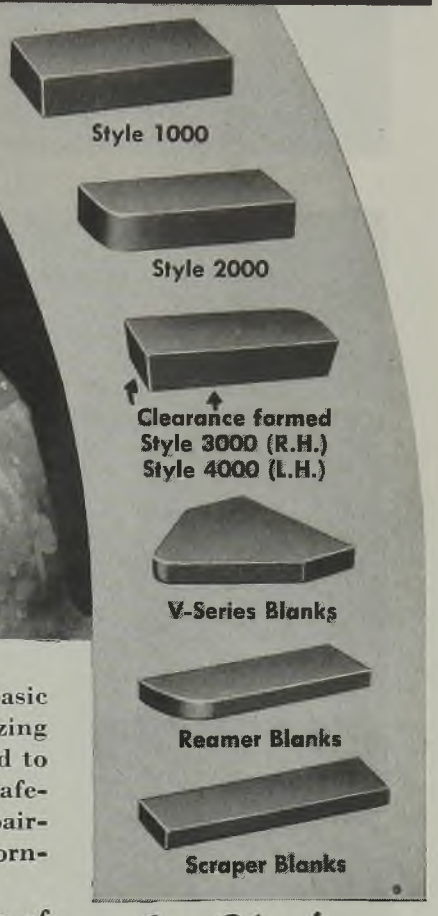
Persistence, together with a care evaluation of the lessons learned, soo brought forth much interesting and us ful information. The "silent arc" ob tained when the electrodes are held closely together permitted a finer contr on thin gages of metal, while using th "singing arc", obtained with the elec trodes separated to a greater extent, ver often forced the operator to weld m rapidly that cracks would develop, as result of the severe cooling which fol lowed as the arc passed rapidly over th molten metal.

Another factor which always puzzle the technician as well as the weldin operator was the formation of worm holes almost in the center of the wel running lengthwise with the bead. Th trouble has been eliminated almost com pletely, however. It was caused by t rapid welding which did not give th metal time to flow flat before it solidified.

Methods now used with the atomi hydrogen process, as refined by compr hensive experience, demand a slow welding speed than was earlier used, b this is still a little more than twice as as the previous welding method. Al the use of the "silent arc" has bee

STANDARD *Carboloy Blanks*

FOR RAPID BRAZING TO YOUR TOOLS & CUTTERS



For convenience, economy, flexibility, many plants maintain a basic stock of standard Carboloy Blanks in their tool cribs for rapid brazing to tool and cutter shanks. In this way your plant can be prepared to rapidly tool-up special jobs on a moment's notice. A worthwhile safeguard to provide for emergency tooling. Handy, too, for quickly repairing cutters damaged through accidental abuse, and for salvaging worn-out high speed steel cutters.

Prompt deliveries from stock. Styles as shown, in wide range of sizes. For cutting steel, cast-iron, non-ferrous and non-metallics. Brazing instruction manual free on request. Training film strip also available, at print cost of $3.50.

Be prepared for all requirements. Keep a stock of standard Carboloy Blanks on hand. Write for catalog GT-175.

CARBOLOY COMPANY, INC.

11141 E. 8 MILE ROAD, DETROIT 32, MICHIGAN

Birmingham · Chicago · Cleveland · Los Angeles · Newark · Philadelphia · Pittsburgh · Seattle · Thomaston, Conn.

Also available through 22 leading mill supply distributors

In Stock

Prompt deliveries. Styles as shown. Wide range of sizes.

WRITE FOR CATALOG

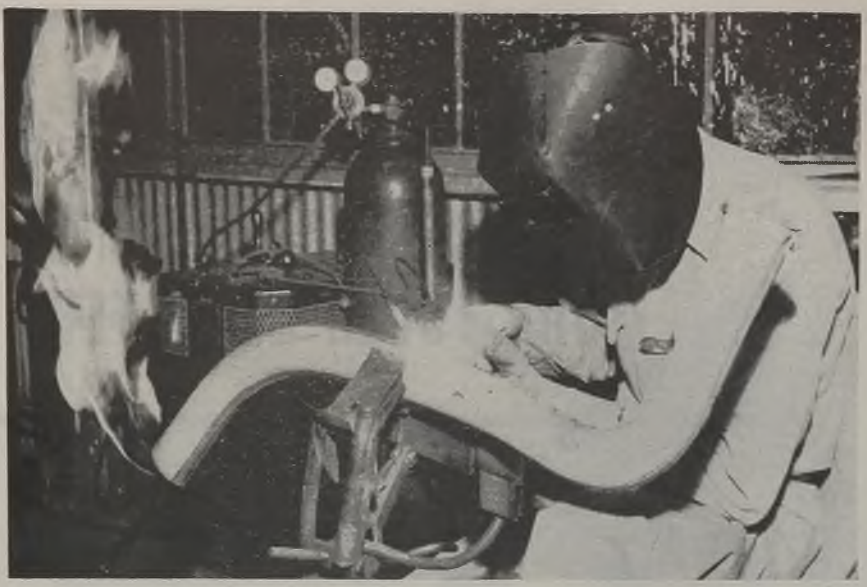
CARBOLOY

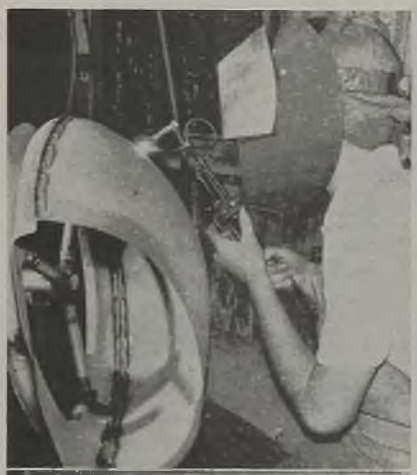
TRADEMARK

For Cutting CAST IRON and Non-Ferrous Metals

For Cutting STEEL

TUNGSTEN CARBIDES ★ ★ ★ TUNGSTEN CARBIDES WITH TANTALUM AND/OR TITANIUM CARBIDES





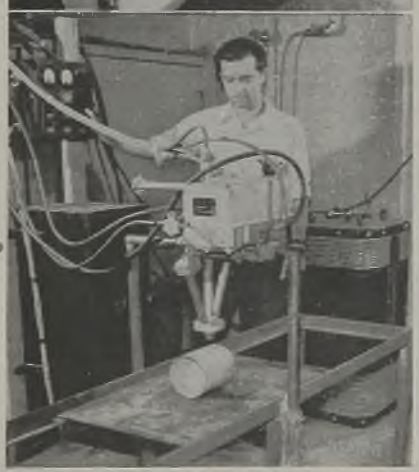


Fig. 3 (Above)—In atomic-hydrogen welding of long irregular section, end of section is plugged with asbestos and natural gas burned inside to provide reducing atmosphere, resulting in smooth inner bead on work

Fig. 4 (Left)—Woman operator joins sections of large stainless steel shell by atomic-hydrogen process to hold down distortion. Women easily become very proficient in this work

Fig. 5 (Below, left)—Automatic atomic-hydrogen equipment setup is shown here. All are General Electric photos

standard because of the finer control obtainable.

Higher hydrogen pressures as well as a higher current are used in tacking since here a high heat is required to bring the metal temperature up quickly so as to develop a small weld without distorting the assembly.

Another technique found to be very advantageous is adjusting the tungsten electrodes so that the arc fan can be rotated to almost any desired angle. This flexibility permits a great range of welded joints and permits the operator to weld ill-fitting parts with more than a fair degree of proficiency.

The following types of joints have been welded with this process: Lap, fillet, butt, flange, seam, edge, and corner. Notwithstanding the above-mentioned advantages, many of primary importance, there is still the major function of a welded joint to be considered. We may define this major function as being the final bond obtained after the weld is complete—its soundness, strength, and fatigue-resistance characteristics.

In this respect, the welds produced by the atomic hydrogen welding process have proved superior to those of many other methods of welding and equal to the welds made by any of the methods now in general use. In many specific applications, this process is desired over others.

So far, our discussion has concerned the welding of stainless steel. This process has also been used and is now in use in the welding of low-carbon steel sheet compatible with enameling materials. For the welding of these materials, the atomic-hydrogen process has offered an excellent means of joining thin-gage materials on both irregular and closed-angle welding, resulting in welds of good strength and ductility. The welding output per operator has been materially increased because of the greater speed obtained.

This is also proving very desirable because of the narrower weld bead obtained, an advantage in aircraft welding since the soundness of the weld is more easily determined and visual inspection is made easier, together with the fact that a uniform narrow bead commensurate with adequate penetration shows a fine degree of operator control. This usually indicates that the weld metal has not been so severely over-heated as to damage the material.

The cost of the atomic-hydrogen arc-welding process is lower than that of the previous process because of the greater amount of welding which can be completed in an 8-hour day. About one-third of a cylinder of hydrogen per operator is used daily and the electrode cost is about 20 cents.

Pressure gages used are standard with the slight exception that the working pressure gage is graduated in one-pound divisions. This is not, however, absolutely essential. The electrical cost is quite low.

Another factor in cost is the matter of joint preparation. It has been found that by careful manipulation of the atomic-hydrogen arc-welding torch, ill-fitting joints can be welded quite successfully because of the better penetration achieved. Thus, the fitting cost can be reduced with resultant saving in the over-all cost of welding.

Great Heat Over Small Area

The electrode holder has two insulated leads entering through the handle. The head of the holder mounts two tungsten wires set at an angle of approximately 50 degrees. These electrodes are surrounded with a hollow sleeve through which pure hydrogen is forced under comparatively low pressures, usually from 1 to 5 pounds. The higher pressures are used in tacking, the lower for welding.

When the arc is struck between the two tungsten electrodes, it is bathed in an atmosphere of hydrogen which burns with a yellowish flame while the arc itself can be identified because of its brilliant blue-white color. Helmets similar to those used in arc welding protect the eyes of the operator.

It is at this juncture that we must truly appreciate the atomic-hydrogen welding process, for the action of the electric arc dissociates the hydrogen from its common form of H_2 (molecular) to that of the H_1 or atomic form. This requires a tremendous amount of energy. However, since this energy is absorbed in breaking the hydrogen gas down to its atomic form, it is regained when this gas strikes the metal and an enormous evolution of heat results over a small area. This release of heat energy accounts for the very rapid rates of heating which are obtained.

It must also be borne in mind that the

(*Please turn to Page* 166)

THE FORBIDDEN ROOM...

There are only six keys to the door, and the lock is often changed. . . . For this is a very private room. It is in the plant of one of America's greatest corporations, and behind the door to this inner sanctum part of the future is being made.

There are literally hundreds of "forbidden rooms" in America today, where the plans, the designs, the mock-ups and models are being made for countless new products and machines—from giant electrical power plants, still in the experimental stage, to table-model television sets, now a solid post-war certainty.

Few outsiders ever enter this inner circle . . . but one of these is the machine tool engineer.

For equally as important today as any brilliant new design is the *cost of manufacture*—and it is here that the machine tool engineer comes in. Leading manufacturing executives know that this factor of cost is going to be more important, in the fast competition of the post-war period, than ever before in history.

It is because of this that Jones & Lamson engineers are being taken into their conferences and their confidences: helping them to plan complete production line set-ups for the day this war ends.

Even more important than the machine tools your company uses is the machine tool engineering that goes with the use of those tools!

JONES & LAMSON
MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.

Manufacturers of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

Profit-producing Machine Tools

MEAT & POTATOES

Western BRASS PRODUCTS

WESTERN CARTRIDGE COMPANY EAST ALTON, ILLINOIS, U.S.A.

Before the war we accepted big, juicy steaks as a part of our everyday lives. We ordered them... got them... and enjoyed them, without a thought of the day when a steak might be a rare treat.

The same thing happened to Brass, Bronze and Copper. For years these metals met the exacting requirements of peacetime industry. Then, to crush the vicious forces of would-be world rulers, American industry converted for war.

The need for Western metals necessitated stepping up our production time after time in our mills at East Alton, Ill., and New Haven, Conn. Exacting specifications were met and are continuing to be met so that the fighting men of the Allied Nations will have all the ammunition and other tools of war that they need.

Possibly Western metals can help you in meeting war requirements now and peacetime requirements later on. We will do everything we can to meet your specifications ... *now and later.*

Western BRASS MILLS

Division of WESTERN CARTRIDGE COMPANY, *East Alton, Ill.*

BRASS • BRONZE • PHOSPHOR BRONZE • NICKEL SILVER • COPPER

ALIEN PATENTS

Available to Industry

STEEL is presenting a list of enemy patents of interest to the metalworking industries. Many of these are available on a nonexclusive royalty-free basis under simple licensing terms. Copies of any patents listed may be obtained by addressing the Commissioner of Patents, United States Patent Office, Washington 25. Include 10 cents for each patent, specifying serial number.

These patents are classified by types of operation, such as metal founding, metalworking, metal rolling, metal bending, metallurgy, metal treatment, metal forging and welding and the like. Included are enemy patents, patents pending and patents in enemy-occupied countries.

CLASS NO. 75—METALLURGY

LIST OF ENEMY PATENTS

DESCRIPTION	PATENT NO.
Finely divided magnetic substance	2179810
Process of roasting iron carbonate ores	1729697
Process for the refining of chromium ores	1828756
Process for eliminating arsenic and antimony from iron ores and manganese ores	1923511
Process of converting tin ores into the form of pieces	1726066
Process of agglomerating ore mineral or other matter and the product produced thereby	1739839
Method of prepairng ore briquettes	2177228
Process for sintering fine ores or the like	1951935
Process for the agglomeration of fine iron ores	2075210
Process for obtaining metals from ores	1852965
Process for extracting metals from ores	2045226
Process for extracting metals from ores	2082284
Process of reducing the quantity of sulphurous acid gas set free from copper glance on its roasting	1825536
Process for the recovery of iron from iron and sulphur carrying metallurgical products especially ores	1925391
Method of treating antimonial ores	1719657
Process for the purification of metals	1745464
Method of producing aluminum and aluminum alloys	1881872
Method of sintering metallic bodies	1925292
Method of manufacturing alloys	2012777
Metallurgical slag reaction	2097344
Production of magnesium from magnesium oxides	2099151
Method for metallurgical treatment of ores by high frequency electric currents	2177070
Method of manufacturing iron alloys	2071942
Method of making steel	2139853
Method of manufacturing iron by direct reduction	2156263
Method for the decarbonizing of highly corbonaceous ferrochromium	1608270
Manufacture of steel	1923471
Vacuum method of manufacturing steel	2040566
Method of manufacturing low carbon iron and steel alloys	2040604
Treatment of titanium bearing iron ores or spongy iron obtained therefrom	2185466
Titanium steel and the process of manufacturing the same	1839157
Recovery of copper from waste copper lyes	1833276
Recovery of copper zinc and other metals from solutions containing chlorides and sulphates	1639610
Method for working up solutions obtained by leaching ores having been subjected to a chlorination roasting process	1720138
Process of reducing ores and the like	1732788
Process for working up complex ores and metallurgical products	1762867
Steel having a high yield point and a good notch toughness	1889482
Process for recovering nonferrous metals from melts containing metal oxides	1941506
Alloy for permanent magnets	2105657
Permanent magnet	2105658
Process for reducing material containing zinc in shaft furnaces	2186645
Porous metal and metal oxide	1919730
Process of making compound structural material and shaped articles thereof	2030229
Method of manufacturing porous metallic bodies	2082126
Process of manufacturing porous metallic bodies	2122053
Producing nickel alloy articles	2159231
Metallic article	2159604
Shaped bodies for electric purposes particularly leading in wires and bars for electric current	2172548
Agglomerated material in particular for electrical purposes and shaped bodies made therefrom	2179960
Method for the production of piston rings especially of light metal pistons for internal combustion engines	2219095
Method of sintering hard substances in vacuum	2227176
Method of sintering metal	2227177
Production of shaped articles from metal powder	2289787
Method of working blast furnaces with the aid of furnace dust	1713435
Steel for railroad rails, wheel tires, plank piles and other objects	2002932
Process of extracting volatilizable metals from ores and metallurgical products	1736665
Process for the production of ferroboron	1964139
Process for working up ferro vanadium containing products	1970467
Method of making zinc from oxygen compounds of zinc or substances containing oxygen compounds of zinc	1751778
Process for producing pig iron or steel simultaneously with portland cement	2035550
Process of directly producing wrought iron	1964917
Process of producing wrought iron	2047562
Production of lumped wrought iron	2228702
Process for the reduction of fine iron ores	2107549
Treating ferriferous ores	2026683
Process and apparatus for the production of metallic iron in the rotary tube kiln	2112566
Process for producing sintered alloys	1856607
Process for the production of molten iron or steel by the direct method	2045639
Production of pure metals	1864673
Method of producing industrial iron by means of iron sponge	2018300
Treating lumped iron	2127299
Extracting of iron	1815946
Extracting of iron	1868666
Direct batch process for the production of iron and steel	2185911
Method of producing the blast required for blast furnace or similar plants by means of calcium carbide	1773491
Metallurgical process and apparatus	1824960
Method of influencing the chemical and physical properties of blast furnace slags	2057919
Production of iron	2120740
Method of refining clayey iron ores	2205896
Treatment of ferriferous ores	2254660
Process for making self-improving aluminum alloys	1846558
Treatment of iron ores	2219046
Process of producing steel in an open hearth furnace	1752374
Process and device for the production of iron alloys free from gases especially oxygen	1807468
Method for operating cupola shaft furnaces	2146872
Method for operating cupola furnaces	2158510
Method for the production of cast iron in cupola furnaces	2158511
Method of utilizing bundled scrap metal	1756049
Process for the rapid recarburization of pig iron melted in a cupola furnace	2068793
Method of manufacturing articles for which a resistibility against the noxious effect of the aged state is required	1729378

LIST OF ENEMY PATENTS—(Continued)

DESCRIPTION	PATENT NO.
Treating iron baths	1940341
Production of gray cast iron	1705972
Process for the manufacture of a highly valuable cast iron	1705995
Process for obtaining cast iron	1715509
Smelting process	1751185
Process for the production of pig iron having a fine graphitic texture	1955481
Process for the elimination of phosphorus from pig iron	1650157
Process for separating zinc sulphate from sodium sulphate	1787806
Process for desulphurizing iron or iron alloys	2258850
Process of treating ingot iron	1594133
Process for the production of age resisting iron and steel	1970067
Purifying pig iron	1730960
Purifying pig iron	1782923
Process of desulphurizing molten metal and briquettes used therefor	1651492
Process of treating and refining crude iron	1578009
Process for the deoxidation of steel baths	2173205
Process for the deoxidation and degasification of steel	2237485
Method for the purification of iron and steel	1818556
Method of producing free cutting steel	2120894
Process of decarburizing iron or steel or their alloys	1821407
Refining process for producing pure iron	1846234
Process for treating iron and iron alloys	2093666
Finely divided metals from metal carbonyls	1759661
Process of working up mixed shavings of white metal and red metal	1739992
Method of treating waste alloys for the purpose of removing therefrom certain constituents whose presence renders the alloys unsuitable for certain uses	1819607
Separating and recovering nonferrous metals from metallic initial materials	1864161
Separation of the constituents of alloys or mixtures of metals and or elements similar to metals	2207461
Process for the separation of metals	2254805
Method of melting oxidizable material	1827174
Manufacture of potassium	1818881
Flux for the smelting and refining of magnesium and magnesium alloys	1989456
Purification and refinement of magnesium and magnesium alloys	2067275
Process for the refinement of magnesium and magnesium alloys	2106221
Process for the production of magnesium by means of thermic reduction	2258374
Process of treating aluminum to facilitate the welding and soldering thereof	1604698
Method of treating aluminium or aluminum alloy	2039165
Manufacture of aluminium	2090451
Cleaning means for metal and metal alloys	2131549
Process for the extraction of cadmium	2074806
Recovery of nickel and copper from nickel copper mattes	2239626
Process for removing bismuth from copper or copper containing melts and products	2155325
Process of treating molten ferrous metals and alloys with compositions containing lithium alkali alloys and products resulting from such treatments	1869497
Process of treating molten copper and copper alloys with compositions containing lithium alkali alloys and products resulting from such treatments	1869498
Process for treating copper	2190570
Coating material for metal articles	1855377
Corrosion resistant and malleable alloy	2006598
Mechanically workable alloy	2006599
Corrosion resistant and malleable alloy	2006600
Corrosion resistant mechanically workable alloy	2006601
Process of treating molten nickel and nickel alloys with compositions containing lithium alkali alloys and products resulting from such treatments	1869499
Method of producing metals	1723444
Process for the recovery of platinum and its bymetals from mattes	1896807
Method for the producing of technical pure beryllium respectively for freeing metallic beryllium from impurities	1673043
Process for making metallic tungsten	1682058
Process for the production of tungsten metal	1877961
Method of producing chromium	1915243
Production of beryllium	2121084
Process of preparing metallic chromium from chromium chloride	2246386
Process for smelting material containing tin oxide	1824475
Process of producing zinc	1705128
Process of reducing zinc ores	1728094
Distillation of readily volatilizable metals	1950249
Process for the distillation of zinc and similar metals	2000140
Process of treating zinciferrous iron ores	2011400
Treatment of ores and metallurgical products	1618204
Treatment of sulphide ores or sulphidic metallurgical products	1728681
Process for treating ores and metallurgical products, slags and the like	1754170
Process of recovering volatilizable metals from ores or the like	1755712
Process for dezincing of ores or smelter products	1842326
Process for the recovery of metal values	1921825
Method for the deoxidation of technically pure zinc	2121306
Treatment of ores and metallurgical products	1731898
Method of recovering gasifiable metals as oxides	1754169
Method of working blast furnaces	1713436
Method of introducing additional agents into metallurgical baths	1587600
Method of removing gases from molten light metals such as aluminum and its alloys	1810801
Process of melting and deoxidizing metals and alloys	1856293
Process of treating molten metals and alloys with compositions containing lithium and products resulting	1869495
Art of treating metals	1869496
Art of treating metals	1869979
Process of treating molten metals and alloys with compositions containing lithium and products resulting from such treatment	1869980
Method of avoiding coarse crystallization at the solidification of metallic castings	2042735
Process for the treatment of scrap iron	1723411
Process of recovering tin	2055732
Recovery of metals and metal compounds soluble in ammoniacal liquors	1825211
Process for the recovery of silver	2273569
Process of precipitating heavy metals from ammoniacal solutions	1686391
Process for precipitating iron from the solutions freed from copper obtained by burning pyrites with chlorine	1879577
Process for the precipitation of copper and for the treatment of substances containing copper and nickel	2068296
Precipitation of copper	2189263
Decomposition of nickel copper matter	2186293
Process for dissolving metallic copper and reprecipitating the same from the resulting solution in metallic form	2227783
Process for the treatment of materials containing nickel and or cobalt together with copper, iron, lead and precious metals	1863807
Process for the separation of nickel from copper	2180520
Process for the separation of nickel and copper	2223289
Iron nickel alloy	1760326
High speed tool steel	1910801
Articles which must have a reduced tendency to rust	2013600
Manufacture of articles from steel alloys	2059893
Steel for permanent magnets	2105652
Steel for permanent magnets	2105653
Nickel titanium cobalt iron and manganese permanent magnet	2105656
Manufacture of articles from steel alloys	2132877
Scale resisting steel alloy	2157146
Manufacture of articles from steel alloys	2157653
Silicon iron alloy	2173312
Alloy steel	1942779
Chromium aluminium steel adapted to be used for articles exposed to high temperatures	2043631
Articles with reduced tendency to corrode	2056591
Heat resisting article	2061370
Heat resistant alloys	2105283
Alloy of nickel, titanium, cobalt, iron and aluminum for permanent magnets	2105655
Magnetic alloys	2193768
A structural steel	1812155
Structural steel	1917527
Steel for railroad rails, wheel tires, plankpiles and other objects which are subjected to heavy wear	2041635
Article made from steel and cast iron with reduced tendency to corrode	2053846
Corrosion resistant alloy	2054927
Corrosion resistant alloy	2090105
Nickel, titanium, cobalt, iron and copper permanent magnet	2105654
Corrosion resistant chromium, manganese, iron alloys	2184305
Steel alloy	1711733
Steel alloy	1877962
Steel alloy	1979015
Corrosion resistant and cold workable molybdenum steel	2110891
Manufacture of articles from steel	2157654
Manufacture of high speed steels	2159086
High resistance steel	2218888
Method of reducing metal oxides	1906184
Manufacture of iron alloys	1986702
Process for the production of chromium steel alloys by the basic process	2004836
Method of producing ferro chromium	2008055
Steel alloy	1630448
Machine parts and apparatus intended for high temperature operation	2031904
Process of preparing pig iron in highly heated mixers	1666428
Process for manufacturing shear resisting iron such as iron for die casting nuts, iron for screws and the like	1860568
Method of manufacturing magnetic iron and steel	2026890
Method of manufacturing silicon iron alloys	2144200
Process for the production of iron castings with a low carbon content	1683714

For Tool Room Bosses Who See Red

Let BLUE FLASH Tool and Cutter Wheels help lighten your load and pick up the time lags with their

1. **Cooler cutting** . . . Bay State's H9 vitrified bond is so tenacious that less is needed to hold the abrasive grains . . . a feature that helps wheels cut better . . . last longer.
2. **Cleaner and faster cutting** . . . Blue Flash wheels have special abrasives designed for various tool room grinding purposes. The most generally used is Bay State's "AAA" resulting in a pure white product. For production and duplicate parts grinding, both A6 and AA2 abrasives give outstanding performance — these products are blue in color.

Bay State makes a complete line of tool room grinding wheels for every purpose . . . for cemented carbides, for tool salvage, notching, fine finishing, small surface grinding, and general cutting-off.

Where extra coolness and fast cutting is vital, Bay State's KOOLPORE wheels, with their very open porosity, are getting the call in many shops.

Bay State offers the broadest line, the most practical features; fractional grades . . . controlled porosity; the finest honing and finishing stones made; expert engineering assistance to help you get the most from grinding — "fit the grit to the grind".

Write for additional details and tables on Blue Flash Tool and Cutter Wheels. Ask for bulletin F.

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.

BLUE FLASH GRINDING WHEELS *FAST and COOL*

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS

LIST OF ENEMY PATENTS—(Continued)

DESCRIPTION	PATENT NO.
Process for the manufacture of strong machinable cast iron	1726433
Method of producing cast iron of high qualities of strength in a cupola furnace	1887453
Process for the production of cast iron	1965436
Process of making cast iron	1985553
Manufacture of alloys	1863642
Process of producing iron alloys	2053149
Method of making ferroboron and boron steel	1674119
Process of manufacturing titanium steel	1847350
Method of producing steel in basic open hearth furnaces	1991685
Process for producing titanium steel	2137945
Process of producing alkaline earth molybdates in lumps	2241742
Method for production of beryllium copper alloys	2149257
Production of metal alloy and of articles made thereof	1742417
Metal composition	1803882
Alloy	1811068
Alloy	1840457
Hard alloy	1847617
Alloy of azotized character	1864567
Hard metal alloys	1992372
Alloy	2018752
Hard substance alloy	2116400
Hard metal composition	2121448
Manufacture of tools of tungsten	1740009
Process for producing articles of refractory metal alloys	1800122
Process for the manufacture of difficultly melting heavy metals	1829950
Process for manufacturing shapes from homogeneous alloys of great hardness	1855994
Process of producing hard metal alloys	2056708
Process for making shaped bodies from hard substances	2116399
Aluminium alloy	1899465
Aluminium alloy and article made therefrom	2076281
Aluminium alloy	2109117
Aluminum alloys	2166495
Aluminium alloy	2116273
Aluminium alloy	2116275
Aluminum alloy	2118686
Light metal alloy	1831584
Aluminum alloys	2039458
Aluminium alloy	2090894
Aluminum alloys	2166496
Light metal alloy parts	2228013
Aluminium alloy	2116274
Aluminum alloy as bearing metal	2215445
Incorrodible aluminum alloy	1747796
Anticorrosive aluminium light alloy	1870732
Aluminum alloys	1932873
Aluminium alloy	2090895
Process for making alloys of magnesium and aluminum	2112703
Light metal alloy	2137639
Solder for aluminum	1691532
Process for the production of aluminum silicon alloys free from carbide	1747197
Aluminum alloy as bearing metal	2196236
Structural material capable of withstanding halogen hydracids	1939890
Process for producing beryllium alloys	2025614
Process for producing beryllium alloys	2025615
Process for producing beryllium alloys	2025616
Process for the manufacture of copper alloys	1675008
Alloy	2170431
Copper base alloys	2172639
Method for producing beryllium alloys	2228310
Copper aluminum alloy	1718502
Alloy of nickel silver tin and copper	1903192
Brass composition and process of producing the same	1699665
Copper silicon alloy	1792944
Copper zinc alloys	2144993
Copper zinc alloys	2156348
Copper zinc alloys	2206109
Copper alloy	2245459
Alloy with copper as primary metal	1876262
Copper base alloy	1975216
Beryllium copper alloys	2192495
Beryllium copper alloys	2192496
Beryllium copper alloys	2192497
Copper beryllium alloys	2030921
Manufacture of metal alloys	1607245
Alloy	2200050
Soldering alloy	2274863
Bearing metal	1632604
Bearing metal alloy	1691931
Bearing metal alloy	1691932
Bearing metal alloy	1731021
Bearing metal	1754364
Lead bearing alloy containing copper and nickel	1795635
Alloy of lead and antimony	1807788
Lead of high resistance against the action of hot sulphuric acid	1939799
Alloy suitable for use as bearing metals	2212178
Alloy metal for bearings	1804883
Magnesium alloy	1941039
Magnesium alloy	2159964
Magnesium alloy of high strength	2204567
Magnesium alloy	2204568
Magnesium alloy	2226549
Magnesium alloy	2226550
Magnesium alloy	2231881
Magnesium alloy	2251266
Magnesium alloy	2273831
Composition of matter and method of preparation	2218755
Magnetic alloy	1772771
Magnetic alloy of high permeability	1857970
Heat treatable nickel beryllium alloys	2062130
Alloy for surgical needles	1942150
Heat resisting implements	2067569
Heat resisting implement	2073718
Alloys	2090044
Heat resisting implement	2104835
Heat resisting implement	2104836
Magnetic alloys with high initial permeability	2114109
Osmium alloy	1574966
Palladium alloy	2123330
Silver alloy	1590091
Chemically resistant silver alloy	1863612
Chemically resistant silver alloy	1863645
Alloy and article partially composed of same and process for producing the alloy	1566534
Process for the manufacture of very hard metallic alloys	1652027
Tungsten base alloy for points of gold nibs	2072368
Tungsten base alloy	2072676
Tungsten base alloy for points of gold nibs	2074474
Tungsten alloy	1703577
Zinc alloy	2070474
Deep drawing zinc alloy	2166338
Plastic zinc alloy of constant dimensions	2166340
Machinable plastic zinc alloy	2166341
Nickel chromium iron alloy and articles made therefrom	1736053
Method of producing metal powders	2037672
Solder for aluminum and its alloys	2004372
Process of conglomerating fine ores flue dust the residue of roasting pyrites small coke and the like	1614369
Metallurgical process	2313019
Process for the production of pure beryllium	2091087
Production of sintered articles	2239800
Process of producing heavy metal beryllium alloys	1945565
Process of producing a hydraulic aluminous binding material together with an iron alloy	1628872
Process for producing a hydraulic aluminous binding material together with an iron alloy	1834770
Method of making semipyrophoric iron and the product obtained thereby	2207879
Method for making semipyrophoric iron	2096009
Process for manufacturing cast iron and other materials	2124905
Reaction method	2320206
Process and device for the production of iron alloys free from gases especially oxygen	Re 19610
Process for effecting metallurgical reactions regularly and rapidly	2310865
Melting converting and refining metals	2209481
Process for melting up light metal scrap	2170863
Process of removing magnesium from aluminum alloys containing magnesium	2174926
Process for the production of metallic beryllium	1740857
Process for the production of reguline beryllium and beryllium alloys	2171439
Process for producing zirconium metal	2214211
Reduction of difficultly reducible oxides	2242759
Process of refining tin	1609967
Zinc liquation	2257085
Process of reducing ores	1787348
Deoxidation of nonferrous metals	1967810
Method of purifying fused metals	2111032
Manufacture of lead from substances containing lead	2142274
Process for treating liquid zinc amalgams	2239869
Treating metal mixtures	2170394
Manufacture of alloys	2250697
Wheel rim	2028029
Composition of stainless iron alloy	1611798
Corrosion resistant and cold workable molybdenum steel	2207554
High speed steel	2209622
Manufacture of high speed steels	2209623
Chromium tungsten molybdenum cobalt alloy steel	2229178
Manufacture of high speed steels	2230607
Manufacture of high speed steels	2278315
Durable pen	1611799
Process for the production of ferromanganese	2128615
Method of running a blast furnace	2162402
Alumino solder	1640161
Solder for aluminum and aluminum alloys	1661052
Method of obtaining heavy metal beryllium alloys	1949082
Process for the introduction of graphitic carbon into light metals or light metal alloys	2170259
Process for the production of alloys containing beryllium	2251088
Process for the production of alloys containing beryllium	2251089
Metallic alloy	1881315
Alloy of high fusion point	1893144
Sintered alloy	1961408
Alloy	2036245
Plates and bodies to be applied on iron tools and machine members	2317786
Process of producing aluminium alloys	2257988
Malleable aluminum alloy	1968344
Aluminum alloy rivet	2252361
Free cutting alloys	2184692
Free cutting alloys	2184693
Aluminum base alloy	2261210
Castings of aluminium alloys	2139246
Castings of aluminum alloys	2186394
Alloy of copper tin and nickel	1661083
Copper zinc alloys	2236975
Dental alloy	2304416
Process for producing alloys containing zirconium	2235508
Stainless silver alloy	1888188
Casting zinc alloy	2189054

(*Please turn to Page* 172)

We don't have to 'baby' this wheel—"

"One of our jobs is grinding hardened high speed steel punch blanks. We used to take off .006" at a pass and congratulate ourselves. Now Por-os-way removes .020" at a clip . . . without loading or burning. Holds its corner and requires no dressing. It's one wheel we don't have to 'baby'." Try Por-os-way yourself and for production's sake don't baby it. Don't be satisfied until you've pushed the Por-os-way wheel to the utter limit of its possibilities. Send today for the booklet "Facts about Por-os-way"—with the prescription blank. Then order a trial wheel and TRY it!

CHIP CLEARANCE—AN EXTRA ADVANTAGE

Taps have it! Cutting tools have it! It's chip clearance! The very porous structure of the Por-os-way wheel provides chip clearance NATURALLY so material can be removed without interfering with the tiny grinding edges. Proved by long, curling chips. Reflected in the greatly reduced need for dressing.

THIS MAKES THE DIFFERENCE—

You can spot the difference between an ordinary wheel (top) and a Por-os-way wheel (bottom) with the naked eye. The extra porosity of Por-os-way is the reason for more than 8 distinct operating advantages.

2 TO 5 TIMES MORE PRODUCTION PER MAN PER MACHINE

RADIAC*

POR-OS-WAY*

A. P. DE SANNO & SON, INC., 436 Wheatland St., Phoenixville, Pa., Since 1893

S ANGELES

nd Mounted Wheels

nes and Discs

Radiac

Por-os-way engineers pioneered in adopting the open structure wheel for precision finishing. And yet the same wheel—at a deeper cut—can often be used for rough grinding as well as finishing, ending time wasted in wheel changes and additional finishing steps.

The List of Por-os-way Users Reads Like a Blue Book of American Industry, Included are:

Edward G. Budd Mfg. Co. • Buick Motor Division of General Motors • Curtiss-Wright • Douglas Aircraft • SKF Industries • Studebaker Corporation • Timken Roller Bearings • Wadel Engineering Co. • Westinghouse Electric • Wright Aeronautica

RADIAC*

Take advantage of Prescription-Fitting and Custom-Compounding when you buy mounted points, mounted wheels and internal grinding wheels.

It's virtually impossible to go wrong with Radiac service. First of all, the wheel is selected for your individual job by a "prescription-fitting". Then it is specially "custom-compounded." But that is not all. The "prescription" is filed by us so that repeat orders can be quickly and accurately filled. Radiac gives you the right wheel the first time and every time! Write for booklet with complete details on Internal Grinding Wheels (booklet #1) and Mounted Points (booklet #2).

RADIAC MOUNTED POINTS & MOUNTED WHEELS

All wheels and points are dressed and finished ready to use (no finishing, by you necessary) • All kiln glaze is removed • All are 100% tested to precision tolerances • Concentricity is guaranteed • Special Bakelite cement secures wheel to mandrels • Radiac Mounted Points and Mounted Wheels are available in tough, regular aluminum oxide (brown) or in special aluminum oxide (white or red bond) for greater friability.

RADIAC INTERNAL GRINDING WHEELS

All wheels are 100% tested to precision tolerances • Every wheel is a product of pioneers in the development of internal grinding wheels • Radiac Internal Grinding Wheels are available in tough, regular aluminum oxide (brown); in special aluminum oxide (white or red bond) or a special exclusive "Blue Glass" friable bond which permits an increase in the ratio of cutting grain to bond

PIONEERS
in the development of mounted points, mounted wheels, and internal grinding wheels.

For Fast Stock Removal, Long Life, Cool Cutting—

RADIAC*

Radiac POR-OS-WAY— Radiac PARAFLEX —Radiac Mounted Points and Mounted Wheels — Radiac Internal Grinding Wheels — Radiac Abrasive Cut-Off Machines and Discs.

*T.M. Reg. U.S. Pat. Off.

A. P. DE SANNO & SON, INC., 436 Wheatland Street, Phoenixville, Penna., Since 1893

NEW YORK • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO

Repairing Cracked Cylinder Blocks by Electric Bonding

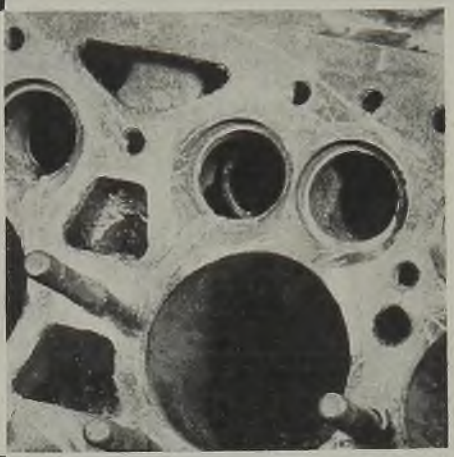
By L. E. KUNKLER
President
Metallizing Co. of America
Chicago

IN REPAIRING cracked cylinder ocks by electric bonding, observance correct procedure is exceedingly imortant because the operation consists only resistance contact of the pure ickel electrode with the block. The perator moves the electrode holder over he work with a vibrating and moving pplication and fusion takes place almost nstantly. Thus care with which step-by-tep directions are followed is the yard-tick for success.

All resistance is momentary and penetration takes place to a depth of 0.0015 o 0.005-inch. Current source is a spot-velding transformer designed for this articular type of application, utilizing igh amperage and low voltage.

The only accessory tools needed for he procedure are a ⅛-inch or 1/16-inch ound-nose cape chisel, narrow V-type ointed chisel, center punch ground to

Combination of specially designed spot-welding transformer, pure nickel electrodes deposited with vibrating motion, and colloidal solution effective in repair work. Method eliminates high temperatures which set up stresses, and avoids recrystallization



almost a round point (not too sharp an angle), hammer and hand grinders with small mounted wheels.

Procedure for Bonding

Step No. 1: With the round-nose cape chisel, a groove is cut from ⅛-inch to 1/16-inch deep and wide down the middle of the crack in the cylinder block, allowing a square shoulder on each side of the crack. The groove should be cut at least ¼-inch beyond the end of the crack and a direct opening should not be chiseled through the wall.

Step No. 2: Groove has been made down the middle of the crack with V-pointed chisel. Thorough tapping follows to compress metal at the crack.

Step No. 3: Crack now is ready to be bonded. Terminal control on electric bonder is set at No. 4, 5, or 6 tap. (The latter is the most efficient setting, but until operator becomes familiar with machine and action of the metal, it is best for him to start with No. 4 and work up to No. 6, which gives the highest heat.) Approximately 20 pounds air pressure are recommended with No. terminal; 30 pounds with No. 5, and 0 with No. 6. The nickel rod should extend not less than 1-inch and not more than 1½ inches out of the holder. probably will be necessary to hold the d in contact with the surface for a w seconds until the rod gets red hot

Fig. 1 (Above, left)—Cape chisel is employed to clean metal and remove excess around crack

Fig. 2 (Above)—Bonding is accomplished by deposition of pure nickel, as shown. Sufficient electrode metal is placed to fill crack completely

Fig. 3 (Above, right)—After crack has been bonded, deposit is pressed and ground flush with face of cylinder block. Colloidal solution, flushed through cooling system, seals off any remaining porous areas

from ½ to ¾-inch back from the tip. Keep it in this condition while bonding. If rod gets too hot it will break off in lumps and not form a fine dense deposit. A layer of nickel then is laid in the bottom of the groove by agitating the electrode (similar to striking a match) across the surface. A good deposit is assured by moving slowly.

Step No. 4: With the center punch ground down almost to a round point, the nickel should be peened lightly but thoroughly into the crack.

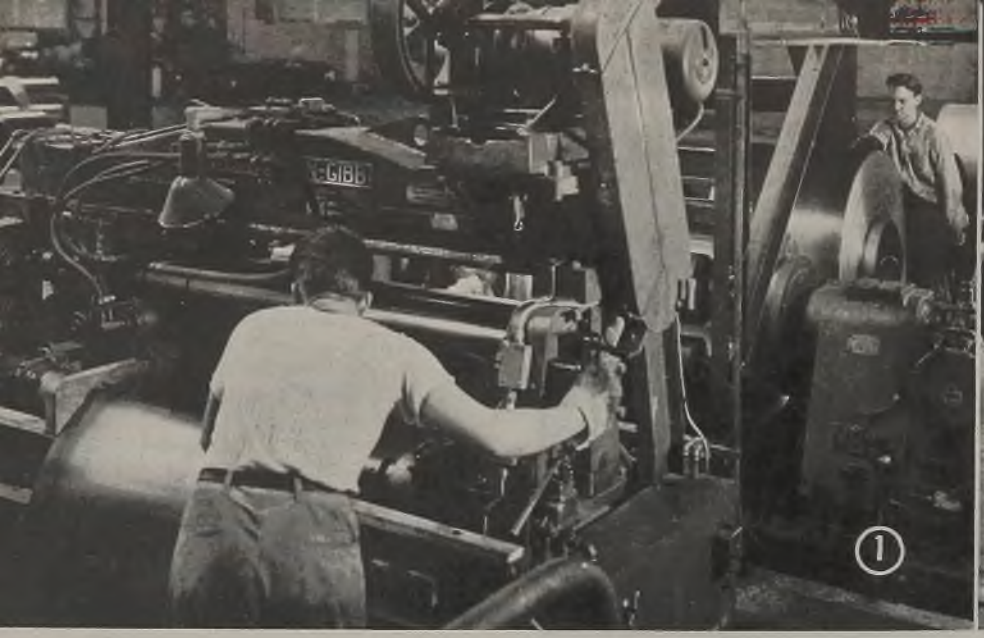
Step No. 5: With the bonder set at No. 4, 5, or 6 and the air pressure as suggested, another and slightly different procedure is used to fill up the crack. First, the electrode is held at an angle of 45 degrees, passed slowly over the cracked area (as outlined in Step No. 3) and material allowed to fill up the designated area, the rod being drawn toward operator. After operator gains sufficient experience, crack can be filled completely in one pass.

Step No. 6: Terminal control is set on No. 1 or No. 2 tap at 20 pounds air pressure and the electrode again passed over the surface of nickel deposit to give it density and fill in remaining porous areas.

Step No. 7: The excess metal must be finished flush with face of block by means of a small hand grinder with small mounted wheels of various shapes, depending upon location and accessibility of the crack. For best results, valve seats should have inserts and cylinder walls should be sleeved.

Step No. 8: To guarantee elimination of porosity in the deposited nickel, a good colloidal solution is recommended. The colloidal solution here employed, has metal particles suspended in it, including chrome that if measurable would be 0.00050-inch in diameter. These metal particles can be observed only with an electronic microscope. The metal does not settle in the bottom of the container. It is in constant solution and it enters areas inaccessible to water. It coagulates and forms a new structure within a structure. In addition, use of a good solution will clean the block, saving the necessity of degreasing.

(*Please turn to Page 182*)



Operates Three Continuous

Tin Plate Lines

Sparrows Point plant with all lines in production has a daily output of 4000 base boxes of half-pound plate. Alkaline plating bath is employed and six lines for brightening or reflowing operation. Sequential steps in process are presented

LIKE MANY other producers, Bethlehem Steel Co. has undertaken electrolytic tinning on a commercial scale, to meet the shortage of tin resulting from the Japanese conquests in the Far East. Three continuous tinning lines are now available at the company's Sparrows Point plant, each line capable of a daily production of approximately 4000 base boxes of tin plate, based on a coating weight of 0.5-pound. The entire output is of that quality.

The process used is that developed by Crown Cork & Seal Co., which employs an alkaline plating bath, a sodium stannate electrolyte. Normally an anodic current density of about 40 amperes per square foot is used, and the electrolyte is maintained at a temperature of 195 degrees Fahr. Practically all of the tin plate produced goes through a brightening, or reflowing operation. Six lines are maintained for that purpose.

The lines will accommodate cold rolled strip in widths from 20 to 33 inches, in coils weighing up to 6 tons.

The plating line has an overall length of approximately 150 feet. At the head of the line are two uncoilers, designed for 7.5 to 10 horsepower brake drag and with hydraulically operated adjustment, one of which is paying out the strip while the other one is being charged.

From the coiler the strip passes through a double-seam type electric welder, with traveling head and twin electrodes. Two passes are made, giving a total of four seams. It takes about 45 seconds to complete a weld.

A pair of rubber covered pinch rolls pulls the strip through uncoiler and welder and delivers it to a 12-strand looping tower of the vertical, multiple-roller type, with counter weighted take-up and equipped with a suitable crash device. This tower has a capacity of storing over 400 foot of strip, sufficient to maintain feed to the line while the strip remains stationary in the welder.

Following the looping tower is a pickling tank, 17 feet long, of welded steel construction, with hopper bottom and ¼-inch rubber lining, and of approximately 5000-gallon capacity. Here the strip is pickled with 2.5 to 3 per cent sulphuric acid (by weight), with inhibitor, steam heated and automatically maintained at a temperature of 150 to 170 degrees Fahr., according to the condition and the grade of the strip. The tank is equipped with a series of top and bottom rolls, rubber covered, between which the strip travels in eight vertical, serpentine passes, about 150 feet being exposed to the pickling liquid at one time.

The pickled strip passes into a second tank where it is washed with cold water. A baffle plate in the center divides the tank into two compartments. Wringer rollers and water sprays at the exit complete the washing.

Plating is carried out in an unlined, hopper bottom steel tank, 52 feet long and 10 feet deep, equipped with steam coils for heating the electrolyte. Here the strip travels in the same serpentine fashion as in the pickling tank, between twenty-four 12-inch diameter top steel rolls and twenty-five 12-inch diameter rubber covered bottom rolls, giving a total of 48 vertical strands. A tin anode, 28 x 96 x 4 inches thick, and immersed to a depth of 83 inches, is suspended between each strand. The anodes weigh

Fig. 4—Multiple roller type 12-strand looping tower with counterweighted takeup provides storage for 400 feet of strip

Fig. 5—Tin anodes are 28 x 96 x 4 inches thick and weigh 2800 pounds

Fig. 6—Delivery end of plating line where operator controls speed, tension, loads and voltage

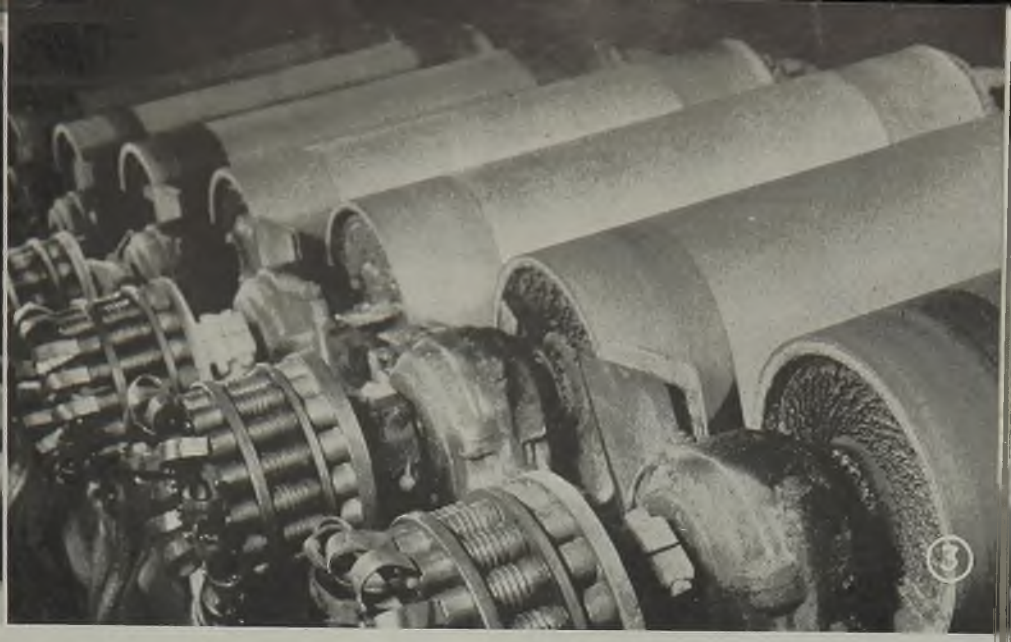


Fig. 1—Coils are joined by electric welding. Two passes are made in 45 seconds, providing four seams

Fig. 2—Strip from looping tower is given a sulphuric acid pickle in a tank 17 feet long and equipped with ¼-inch rubber lining

Fig. 3—Plating is accomplished in unlined steel tank 52 feet long and 10 feet deep. Tin anodes are suspended between each strand; line current is taken off cathodes through top rolls

approximately 2800 pounds and are remelted when they have worn down to about 1-inch thickness.

Normally a group of eight anodes is connected to a 10,000 ampere motor-generator set, giving a total of 60,000 amperes. The line current is taken off the cathodes through the top rolls, which are made of steel and are equipped with a specially designed contact system for carrying the current.

Steam coils, automatically controlled, maintain a temperature of 195 degrees Fahr. in the plating tank. No provision is made for circulating the electrolyte, except pumping the spent solution from the bottom, for filtering out sludge, and returning the filtered solution at the top. Some agitation is also furnished by the moving strip. The electrolyte withdrawn is filtered on a 30-pound pressure filter, through asbestos covered with a layer of activated charcoal. Exhaust hoods over the tank carry off steam and any fumes that may be created during the process.

The speed of the moving strip is governed by the width of the strip and may go as high as 600 feet per minute. For 28-inch strip a speed of 420 feet per minute is maintained.

As the strip leaves the tank it passes through a set of wringer rolls and a cold distilled water spray which washes it on top and bottom, rinsing any drag-out of electrolyte back into the tank. The water thus added is sufficient to compensate for losses by evaporation. Next the strip passes to a 2-compartment wash tank with squeegee rolls at the exit, where it is thoroughly washed with hot water. A set of pinch rolls, consisting of a 24-inch rubber covered steel roll with two 12-inch snubber rolls pulls the strip through the line.

Coiling of the plated and washed strip is carried out in a reel with collapsible mandrel, mounted on a sliding base to permit lateral movement. This is important, as there are no special arrangements for guiding the strip. The entire reel mechanism floats back and forth, automatically controlled to follow any slight lateral movement of the strip,

Fig. 7—Tension reel at end of plating line is built with collapsible mandrel
Fig. 8—Tension reel at delivery end of fusing line
Fig. 9—Approach end of shearing and classifying unit. Flaws in plate are detected by electronic equipment
Fig. 10—Piler at end of shearing and classifying unit

thereby producing a straight sided coil.

Ahead of the coiler is a portable hand-operated electric shear for cutting out the weld, and a looping tower which is a duplicate of that used at the beginning of the line. Samples for testing purposes are taken from each coil by means of a specially designed punch installed directly over the front pinch rolls.

Most of the strip produced is processed in one of six brightening, or reflow lines. Each line has an overall length of about 110 feet and is designed for a capacity of 250 to 300 feet of strip per minute.

The beginning of the line is similar to that of the plating line, with two feed reels, a welder of the double-seam type, and a 12-strand looping tower. This is followed by a tank where the strip is cleaned cathodically, in a hot solution containing trisodium phosphate. A current of 1000 amperes is applied as the strip passes through the tank in two vertical loops. Washing in a rinse tank with spray and wringer rolls follows.

The strip then goes through a gas-fired radiant tube furnace, 44 feet high, consisting of two vertical, refractory-lined chambers, entirely enclosed in steel plate, and separated by a centerwall made of 12-inch refractories. At the top the strip is supported on a 36-inch alloy steel roll with water-cooled shaft and bearings. A four-story working platform with ladder communication is provided on three sides of the heating furnace.

The first chamber of the furnace, where the strip passes upward, is the preheating zone. On its downward path in the other chamber the strip is momentarily heated to a temperature slightly above the melting point of tin (449 degrees Fahr.) causing the deposit to flow over the surface, and producing a bright surface appearance which is equal to that of hot dipped plate. This calls for a close, automatic control of the temperature, which is accomplished by means of a 6-point pyrometer of the recording type, attached to thermocouples at six different points in the furnace.

As the strip leaves the furnace it passes through a quench tank which also serves as a water seal. The temperature in this tank is maintained at 125 degrees Fahr. by automatic control. Next it may be given one of several chemical surface treatments to improve its lacquering properties. This, if used, is followed by a hot distilled water rinse and a hot-air drier.

Where oil is required on the finished plate, the strip is passed through a vertical branner. However, this branner can be by-passed if an unoiled surface is desired.

A coiler, with electric shear and looping tower, similar to that used in the plating line, completes the installation for the coiled product which then is cut up, classified, inspected, and assorted in the conventional manner.

A handful of shot aluminum around the stopper head of an open-hearth ladle will prevent the formation of a skull in the nozzle well should the heat undergo a slow tap. The well thus is kept clean and a good shut-off is secured during the pouring operation.

Ore Beneficiation

Engineered to *your* particular requirements

McKEE engineering is directed toward a single object—*accomplishment of the results you require by the most efficient possible method.*

For this purpose Arthur G. McKee & Company have, *within our own organization*, complete specialized facilities for consulting, engineering, procurement, expediting and construction of ore treating plants.

Our engineers draw upon the entire field in selecting equipment best adapted to your particular conditions.

The capacity and scope of the McKee organization enable us to undertake a project of any size with our own experienced personnel.

McKee can handle any single phase of your project or can render a complete engineering and construction service on ore treating plants and equipment for:

CRUSHING
SCREENING
CONCENTRATING
BLENDING
SINTERING

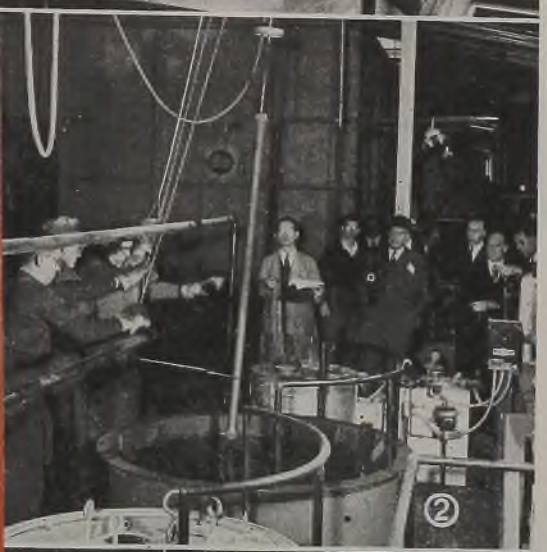
Arthur G. McKee & Company

★ *Engineers and Contractors* ★

2300 CHESTER AVENUE • CLEVELAND, OHIO

ROCKEFELLER PLAZA
NEW YORK, N. Y.

COMMERCE BUILDING
HOUSTON, TEXAS



84-inch Torsion Bars

. . . . are heat-treated by Michigan plant after machining and grinding without resulting scale or decarburization

By A. H. ALLEN
Detroit Editor, STEEL

HARDENING, quenching and drawing of 3-inch steel torsion bars installed on a new type of combat vehicle is accomplished with a special heat treating setup in a Michigan plant, no scale or decarburization being permissible since the heat treating is carried out after machining and grinding.

The bars are approximately 84 inches long, 3 inches in diameter, and are of NE-9262 steel, with carbon range 0.60-0.65 per cent. Originally all finish machining and grinding was done after hardening, resulting in considerable expense in maintenance of high-grade cutting tools and additional man-hours of labor. It was then decided to attempt heat treating after finishing, and the Bellevue Industrial Furnace Co., Detroit, was called upon to design suitable heat treating equipment.

Heating is done in a complete muffle high-heat furnace of the circular pit type, with nickel-chromium muffle 20 inches in diameter and 96 inches deep. Controlled atmosphere is supplied with Bellevue's new gas cracking unit. Balance of the heat treating cycle is carried out by means of special quenching apparatus and a two-heat recirculating draw furnace.

The heating furnace accommodates five torsion bars at a time, hung on eye-bolt type hangers with cover plates attached as shown in an accompanying illustration. The gas-fired muffle is brought to

(*Please turn to Page* 186)

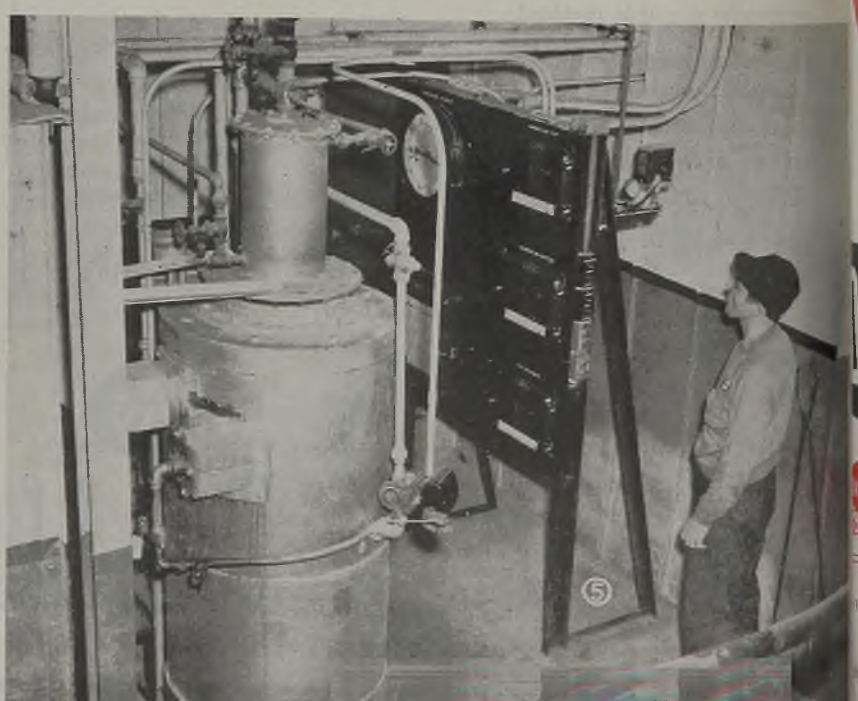
Fig. 1—*Charging* 7-*foot torsion bar in heating furnace, where it is heated for* 2½ *hours at* 1600 *degrees. The furnace accommodates five bars in a gas-fired muffle with specially controlled atmosphere*

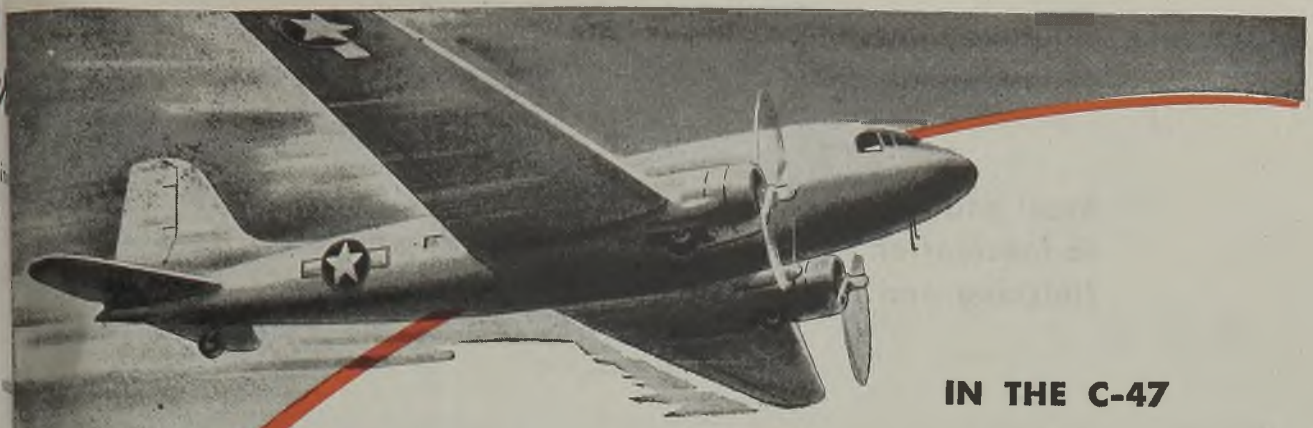
Fig. 2—*Transferring hot bar to quench tank in which oil is kept circulating and held at* 110 *degrees*

Fig. 3—*Removing quenched bar, still at temperature of* 300 *degrees from oil before transferring to draw furnace in background*

Fig. 4—*Lowering quenched bar into two-heat recirculating draw furnace which also accomodates five bars at a time. First heat is at* 200 *degrees for* 35 *minutes to retard cooling of the bars from* 300 *degrees. After final cooling in air the bars are given a draw at* 900 *degrees for* 30 *minutes*

Fig. 5—*New type of gas cracking unit supplying controlled atmosphere to heating furnace. Special attention to this atmosphere is required to avoid any trace of scaling or decarburization on the bars*



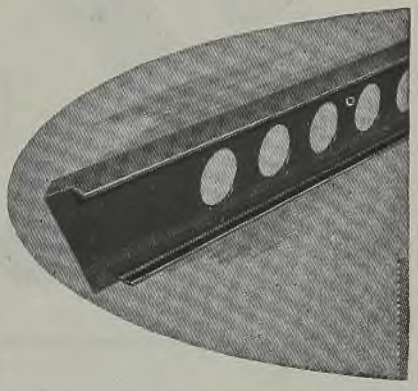


IN THE C-47

Magnesium floor beams— 25% stronger yet 5% lighter!

The *weight* of a metal is no longer considered a measure of its *strength*. To reduce weight and at the same time retain strength has become a commonplace accomplishment.

Now, through the utilization of Dowmetal Magnesium Alloys, it is possible to combine lighter weight with *increased* strength.



This new "team"—light weight and strength—goes to work in the Dowmetal floor beam installation of the Douglas C-47 "Skytrain," the Air Transport and Troop Carrier Commands' "Workhorse of the Air." Here Dowmetal extruded I-beams have proved 25% stronger yet 5% lighter than the best of all other metals tested—and the cost is 30% less.

Magnesium, the lightest of all structural metals, logically finds its place in industry wherever metal is put in motion, whether by hand or by power: in portable and manual tools, in the reciprocating and moving parts of machinery, in the various fields of transportation. Dowmetal Magnesium Alloys have been developed to fulfill a broad range of requirements: sand, permanent mold and die casting, forging, extrusion, forming, welding, riveting. Dow shops and foundries are equipped to fabricate Dowmetal in quantity, and in small or experimental lots. As the pioneer and major producer of magnesium, Dow offers the knowledge and experience gained during 28 years of research.

DOWMETAL *magnesium*

THE METAL OF MOTION

DOWMETAL

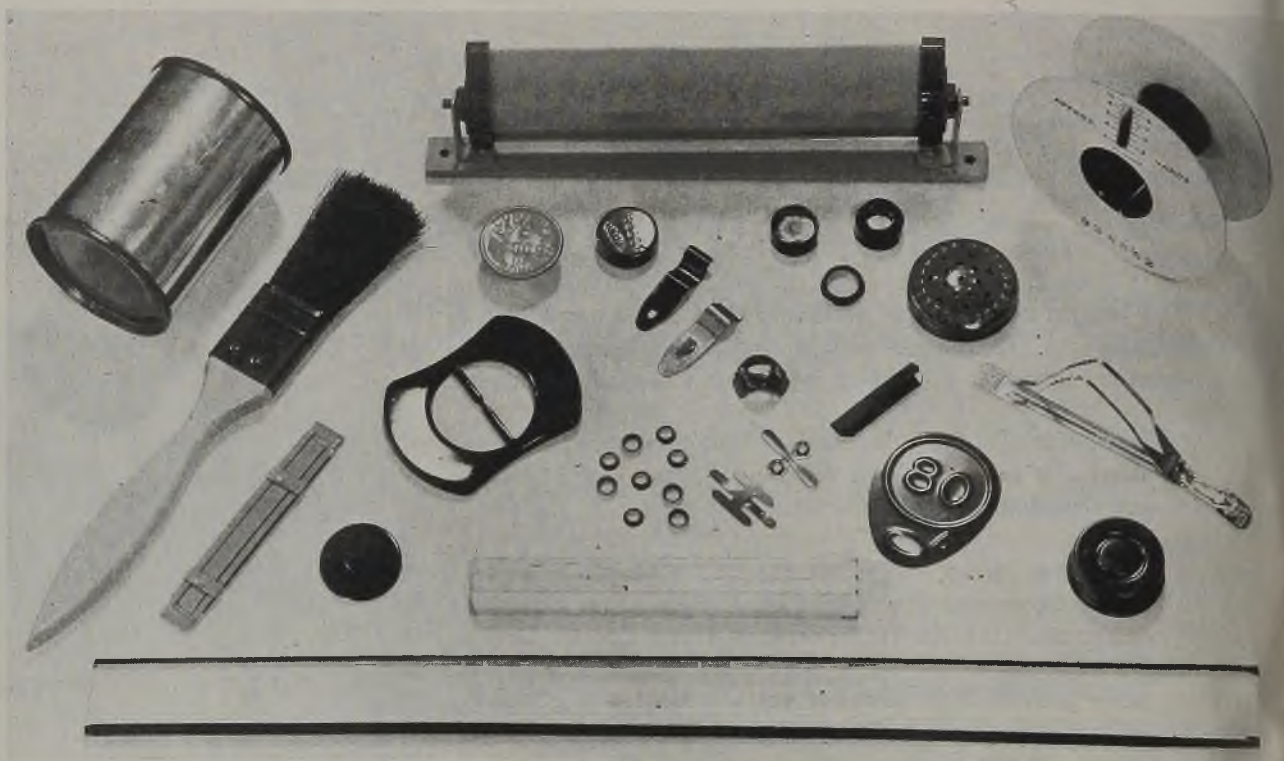
MAGNESIUM DIVISION • THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York · Boston · Philadelphia · Washington · Cleveland · Detroit · Chicago · St. Louis · Houston · San Francisco · Los Angeles · Seattle

Precoated Metal Strip

Steel and other materials in coil form are finished prior to fabrication by new method, eliminating need for final finishing and minimizing handling requirements

By R. L. HARTFORD
Pittsburgh Editor, STEEL



Samples of small "gadgets"—stampings which have been made from coiled strip finished prior to forming—which illustrate the possibilities of using precoated metals. Note the molding trim at the bottom of illustration has been finished in one color on one side, another color on the reverse. The ends on the can at upper left have been formed and crimped without marring or cracking the finish

SMALL in size but mighty in total tonnage are the myriad small stampings required in every day living—bottle caps, drawer pulls, the clasps on envelopes, metal trim for paper containers—the list is endless.

They are stamped in multiple from sheets of metal, principally steel but also aluminum, zinc and brass, in tremendous quantities. Because the intrinsic value per piece is so low, cost of manufacturing, including not only the fabricating operation itself but auxiliary operations such as finishing, handling, packing and inspecting, must be kept at minimum levels.

There has been a definite trend developing in the small stampings industry and among can manufacturers to change from flat sheets of metal to coiled strip. This is undoubtedly a by-product of the continuous mill, which finishes the metal in coil form. The steel industry was the first to change to this method of production, followed by producers of aluminum, brass and other metals. The change was a natural one, for all other things being equal, it is obviously more economical to start a coil of metal through the stamping press and follow a continuous process than to use single sheets which must either be fed by hand or by a mechanical feeder, limited in speed and requiring constant attention.

The can companies have been leading the way in this development, and several installations are already operating successfully. Manufacturers of miscellaneous small stampings have been slower to follow, probably because many of their applications have been affected by limitation orders and the problem of steel supply has been most difficult. Another factor has been the lack of suitable pre-lacquered coils. However, interest in such applications is considerable, and unquestionably a large tonnage of coiled strip will be supplied for this purpose after the war.

The war has also affected this development in another way—that of metal finishing. Limitation orders in many cases have not prohibited the use of steel for such purposes but have prevented the use of coated metal, such as tin and terne plate, from which many of these stampings are ordinarily made. It has been necessary to find alternate coatings which would not only protect the metal from corrosion, but also provide an attractive finish. The metal coats, of course, had been supplied by the mill, and would stand up through the stamping operation so that no finish other than a lithograph job or some similar operation was required.

Several difficulties presented themselves. For instance, the use of paint, enamel or lacquer required considerable time for application and drying. This

(*Please turn to Page* 188)