STEEL

The Magazine of Metalworking and Metalproducing

VOL. 116, NO. 16 April 16, 1945

NEWS

TECHNICAL

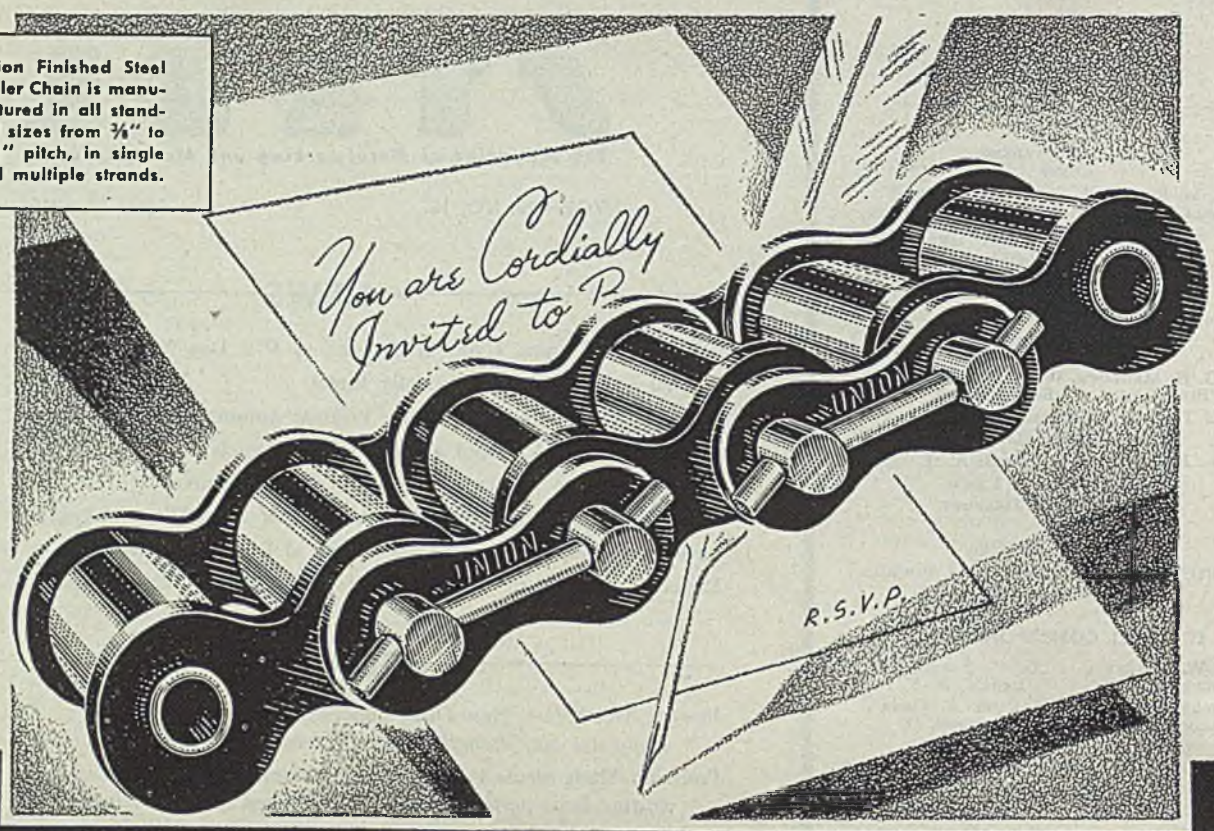
FEATURES

MARKETS

NEXT WEEK...

How Bell Aircraft Uses Turret-Head Presses for Cutting
Die Casting Production Methods at Yale & Towne
Heat Treating The Stainless Steels—Part II
New High Speed Method For Making Welding Rods
Electropolishing Steel For Microscopic Examination
Weirton Steel's New Palm Oil Recovery System

Union Finished Steel Roller Chain is manufactured in all standard sizes from ⅜" to 2½" pitch, in single and multiple strands.



INVITATION TO BUY UNION CHAIN

Certainly no one will construe this advertisement as an announcement of idle capacity. What we mean to convey is that we are always pleased to enter orders from new customers providing that we can accept them without the impairment of deliveries on orders already in production. If you buy chain as a necessary part of your own products or as an accessory for the transmission of power or handling materials in your own production, we believe you will be pleased with your choice if you buy Union Chain. Both our chains and our organization have a reputation with customers for "wearing well". Accept our invitation to find out why.

The Union Chain and Manufacturing Company ——— Sandusky, Ohio, U. S. A.

Union Chains for Every Application

Drive and Conveying Chains and Sprockets
- Bridge Chain
- Combination Malleable Iron and Steel Chain
- HB (hardened bearing) type chain
- BP (bar and pin) type chain

★

Finished Steel Roller Chains and Sprockets
- All manufacturer's standard, size ⅜ in. to 2½ in. pitch
- Single and Multiple Strands
- Extended Pitch Series in sizes 1¼ in. to 4 in. pitch

★

Silent Chain and Sprockets
- All sizes ⅜ in. to 1½ in. pitch

★

Flexible Couplings
- Roller chain type
- Silent chain type

Catalog A-2 covers Drive and Conveying Chain. B-2 covers Finished Steel Roller Chain. FC-1 covers Flexible Couplings. Ask for your copies.

ARMY E NAVY

UNION CHAINS

STEEL
April 16, 1945

Closing the Ranks

As news of the sudden passing of President Franklin Delano Roosevelt came over the wires last Thursday afternoon, the first reactions of the great majority of industrial executives undoubtedly were, first, that the people of this nation and of the world have lost one of the outstanding leaders in modern history and, secondly, that his loss at this particular moment in the progress of the war and in the preparations for peace will make necessary a most painstaking reorganization of the government's ablest talent to carry on effectively the numerous undertakings to which the nation is committed.

There is little doubt that Mr. Roosevelt's ultimate place in history will be determined more by his achievements in the field of international affairs than by his influence upon the social and economic life of his own country. Great and far-reaching as were the effects of the late President's domestic policies under the New Deal, they may not loom as impressive in the long-range view of historians as the potential fruits of his conferences with Stalin and Churchill. Woodrow Wilson, a great President, today is revered more for his futile efforts to organize the world for peace after World War I than for his considerable achievements in administering the internal affairs of the nation.

As to closing the ranks of government to carry on where the departed leader left off, it will be found immediately that the problem is complicated by the tremendous scope of activities for which Mr. Roosevelt insisted upon assuming personal direction and responsibility. In effect, he was not only President, and Commander-in-Chief, but also in greater or lesser degree the virtual holder of the portfolios of most of the cabinet posts. To a greater extent than any other President, he dominated the policies of every executive department and agency.

Under President Truman, such heavy concentration of authority and responsibility in a single individual is inconceivable. Doubtless the new President will be the first to recognize the fact that one-man dominance is impossible and, under present circumstances, undesirable.

Obviously the situation calls for a balanced organization, under President Truman, of highly competent individuals in every cabinet position and in important government agencies. It calls for the most effective co-operation possible of the President and his cabinet with a Congress that will rise to the challenge of its present responsibility and opportunity.

Most of all, it calls for the support of all of the people.

ON THE THRESHOLD: Rapid disintegration of enemy forces in Europe is spurring government agencies to feverish activity on plans for reconversion. A group of top WPB officials, operating as CPO (Committee on Period One, which is the interval between V-E and V-J Days) is attempting to facilitate the shift from present high war production to the level required to carry on the war in the Pacific.

Concurrently major cutbacks in munitions programs are being announced. One, involving nearly $200 million in artillery ammunition plants, affects production schedules in 60 establishments. Also it has been announced 12 new tank shops, contemplated or under construction, will not be completed.

These and other signs indicate that American industry is at the end of the era of full-fledged production for war and is on the threshold of the period of transition. Considering the nation's unpreparedness in many respects for total reconversion, perhaps it is fortunate that the fates of war afford us the opportunity to tackle the great problems of adjustment by stages.

However, the dimensions of the job should not

(OVER)

be underestimated. Every advantage should be taken during Period One, not only to adjust in orderly fashion to Jap war requirements but also to prepare for final reconversion after V-J. —pp. 77, 86, 93

• • •

SUPPORT THIS BILL! H. R. 2788, a bill authored by Representative John W. Gwynne of Iowa, would limit the period of time within which public and private actions based upon federal law can be instituted. For public actions the time would be two years after the cause of action accrued. For private actions the time would be one year unless a shorter time is stipulated in applicable state laws.

This bill, now before the House Judiciary Committee, is intended to protect employers from injustices under the Fair Labor Standards act, passed in October, 1938. Administrative agencies constantly are issuing new interpretations of this act and making them effective retroactively to 1938. As a result an employer operating clearly within the law in 1940 may find himself liable in 1950 for multiple damages on a charge of violating the law on the basis of an interpretation that had been handed down in 1945.

Simple justice dictates that the Gwynne bill become law. Industrial employers will be on sound ground in asking their congressmen to support it vigorously. —p. 90

• • •

CONGRESS WILL HELP: Heartening at this eventful stage of the war is the apparent disposition of Congress to consider legislation intended to help industry to adjust itself to a peacetime economy. A bill has been introduced in the House which would permit corporations to convert their excess profits tax postwar credit bonds into cash within 60 days after hostilities in Europe have been officially ended.

Further relief being considered, but not yet incorporated in bills, includes liberalization of existing rates of amortization on war plants, accelerated depreciation allowances and an easing of the loss carry-over and carry-back provisions of the present revenue law.

These overtures on the part of Congress, coupled with promises by a number of government agencies that certain restrictions and controls will be removed as soon as possible, indicate a better understanding of industry's problems than has been manifested in Washington for a long time. —p. 196

WARTIME MISCELLANY: Almost unscathed from the war and from enemy occupation, the French steel industry is operating at a low rate of output because of lack of transport. The present output of French steelworks is estimated at only 20,000 tons per month (p. 80), as compared with 500,000 tons per month in 1938 and with a monthly average of 200,000 tons during the period of German occupation . . . Carboloy Ordnance Division of Carboloy Co., Inc. announces details of a new plant to produce tungsten carbide artillery projectile cores. This "ore to core" project (p. 104) embraces the largest tungsten ore reducing plant in the world. . . . Applied to each Boeing B-29 Super-fortress are 2700 decalcomania transfer signs which provide instructions, diagrams, charts, warnings, procedure data and other information for operating and ground crews. The demand for these film-like legends (p. 102) has caused decal-making to become a full-fledged operation at Boeing's Renton plant, where more than 17,000 decals have been turned out in a single day. . . . A 60-mile aerial tramway is under construction in Sweden to carry ore from mine to railroad terminal. Spans in this unusual engineering project (p. 195) average 600 feet. There are eight driving stations for the cableway. . . . Few persons realize how extensively powder-metal parts are being used in the war effort. Toolmakers' V-blocks, micrometers and gages of powdered metal have helped relieve the critical shortage of these important items. Powder metal gears, pump rotors and stators, ball and roller bearing spacer rings, rotating bands on projectiles, sleeve bearings and scores of other parts now being produced in quantity (p. 106) testify to the importance of recent progress in the field of powder metallurgy. . . . General Motors Holdens Ltd. (p. 94) is contemplating manufacture of motor cars in Australia. . . . Thermit welding is winning laurels in regular production work in shipyards. To cast or forge a massive part such as a stern frame, rudder or propeller in one piece would be impractical for several reasons. Current practice—in the case of a propeller, for instance—is to cast the hub and four blades separately (p. 110) and to fabricate them by means of thermit welds. . . . Cut off from their major sources of supply in Germany, Swedish industrialists (p. 80) are inquiring for coal, coke and pig iron in the United States.

E. L. Shaner

EDITOR-IN-CHIEF

How Ryerson Assures Alloy Steel Quality

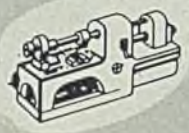
Each alloy shipment is personally inspected and tagged as a part of a rigid quality control system, which we call the Ryerson Certified Steel Plan. This plan covers: selection of the individual heats of alloy steel, the testing of samples from each heat, the positive identification of every alloy bar with stamped heat symbol and painted color markings (or with metal tags), and a Ryerson Alloy Steel Report, which is sent with each shipment. This report shows complete test information for the particular heat of steel used in filling your order. It contains: chemical analysis, recommended working temperatures, the Jominy hardenability results, and an interpretation of physical properties for 1, 2, 3 and 4 inch rounds quenched and drawn at 1000°, 1100° and 1200° F. The report serves as positive identification, a check on quality and as a guide to satisfactory heat treatment.

The Ryerson Inspection Tag symbolizes the final culmination of our quality controls, because it places a personal responsibility on us for the fulfillment of every specification in your order. This is the Ryerson way of making sure that you get the right steel. Ryerson alloys all receive the same systematic care. Call Ryerson for alloy steels, or for any other type of steel, and be assured of uniform quality and prompt action.

RYERSON STEEL

Joseph T. Ryerson & Son, Inc., Steel-Service Plants: Chicago, Milwaukee, Detroit,

PARISH SAYS..

Whether or not you may be interested in producing one of these post-war  or perhaps a modern  or maybe it's new equipment for streamlined  or continuing the manufacture of vitally needed plant  then again it might be  or a hundred and one other products that will grace our new free world...

Pressed metal parts and stampings point the way to perfect reproduction of modern design and low cost manufacturing. THE PARISH PRESSED STEEL CO. has realized that metal parts must be properly fabricated to meet the demands of manufacturers for beauty in design, shock and temperature resistance and surface protection through fine finishes. PARISH engineers are ready to assist you with your present and post-war fabricating problems from the drawing board to the finished product. We are equipped to reproduce the most intricate modeled shapes in aluminum or other metals, faithfully and economically. Why not call on PARISH for the very finest in engineering and modern production methods?

PARISH PRESSED STEEL CO.

Subsidiary of SPICER MFG. CORP., READING, PA.

WESTERN REPRESENTATIVE: F. SOMERS PETERSON, 57 CALIFORNIA ST., SAN FRANCISCO, CAL.

"Period I" Planning Gains in Urgency As V-E Day Nears

WPB Committee established to plan switchover to peacetime production during interval between defeat of Germany and victory over Japan. Large cancellations in shell and tank programs made in face of favorable war news

J. D. SMALL
Chairman, "Committee on Period One"

PLANNING for the transition from an all-out war to a "half-and-half" economy between V-E and V-J Days is being given new urgency daily as time rapidly runs out for Germany.

Despite this urgency, so apparent during the past several weeks since the wraps have been taken off talking on reconversion preparations, a tremendous task remains to be done before the facilities, materials and manpower to be released after the collapse of Germany can be directed into the production of badly needed civilian goods.

Plans have been and are being made, but they are still in the embryonic stage. A special committee has been working within the War Production Board on the problems of relaxing wartime controls after V-E Day. Some major cutbacks in munitions programs already have been announced. The green light has been given for building of certain critical machine tools necessary for resumption of civilian output. The war agencies, the WPB, War Manpower Commission, Army, Navy and others, have been asked to prepare step-by-step programs for the orderly absorption of released veterans and war workers, of facilities and materials. Congressmen are contemplating priming the reconversion pump by making postwar refunds of excess profits taxes available earlier and by granting other financial relief to firms struggling to reconvert.

Most of these programs, however, are tentative and incomplete; they must be co-ordinated into a workable, overall program if this country is not to be caught on V-E Day with its plans down.

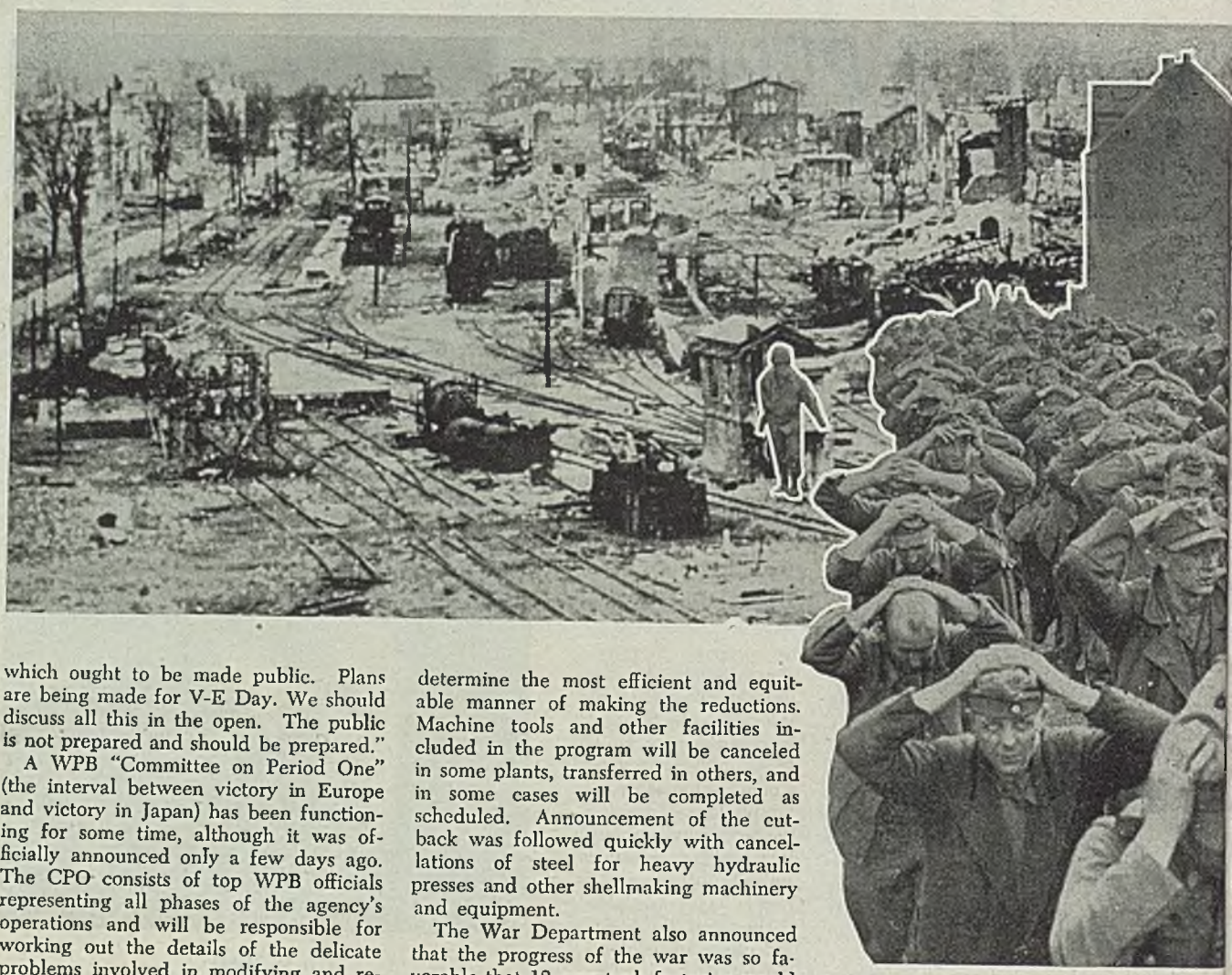
Officials of the WPB insist that plans have been prepared for V-E Day and that transition will be orderly. As yet, however, these plans have not been "laid on the table" for open inspection, and business is in the dark on what they will be permitted to do when organized resistance in Germany ends. Many businessmen believe the shift from war to limited peacetime production will be delayed unless these plans are brought into the light. This view was voiced last week by Maury Maverick, president of the Smaller War Plants Corp., before the Executives Club in Chicago when he said: "Plans are being made, public and private, national and international,

S. W. ANDERSON

A. C. C. HILL JR.

W. C. SKUCE

JOHN L. HAYNES



which ought to be made public. Plans are being made for V-E Day. We should discuss all this in the open. The public is not prepared and should be prepared."

A WPB "Committee on Period One" (the interval between victory in Europe and victory in Japan) has been functioning for some time, although it was officially announced only a few days ago. The CPO consists of top WPB officials representing all phases of the agency's operations and will be responsible for working out the details of the delicate problems involved in modifying and relaxing war and war-supporting production controls on industry. It is charged with formulating the overall pattern for the resumption of civilian production. It is similar to the CODCAVE (Committee on Demobilization of Controls After Victory in Europe) which was set up by WPB last fall when the defeat of Germany appeared imminent.

CPO is headed by J. D. Small, executive officer of WPB, and is divided into 11 subcommittees, each of which is charged with certain phases of the overall problems.

Several major cutbacks in munitions programs have been announced recently. One of these announced last week involved nearly $200 million in artillery ammunition plants and facilities and affects the production schedules of about 60 plants. The curtailment amounts to approximately 10 per cent of the entire artillery ammunition program authorized last December. Production schedules for the 75 and 105-millimeter high-explosive shells, the M-48, M-51 and M-54 fuses and the M-21 boosters were the most seriously affected.

The cutback was largely a "paper" revision as production on major parts of the program had not yet started. Ordnance officials last week started discussions with the contractors involved to determine the most efficient and equitable manner of making the reductions. Machine tools and other facilities included in the program will be canceled in some plants, transferred in others, and in some cases will be completed as scheduled. Announcement of the cutback was followed quickly with cancellations of steel for heavy hydraulic presses and other shellmaking machinery and equipment.

The War Department also announced that the progress of the war was so favorable that 12 new tank factories would not be completed. These plants were scheduled to reach a peak of operations in the last quarter this year. In announcing the cancellation, the War Department emphasized the action was not a cutback in production but the elimination of a planned increase in tank output. Present tank plants "will continue to meet production schedules in full."

The projects canceled include four in Detroit: Chrysler Corp., Chrysler subcontractors, Ford Motor Co. and General Motors Corp. Others are: American Steel Foundries cast armor plant, East Chicago, Ind.; Ford Motor Co., Dearborn, Mich.; General Motors, Fisher Body Division, Flint, Mich.; Oil Gear Co. and subcontractors, Milwaukee; Ordnance Steel Foundry plant and Quad Cities Tank Arsenal (International Harvester Co.), both of Bettendorf, Iowa; Waukesha Motor Co., Waukesha, Wis.; and Standard Steel Spring Co., Coraopolis, Pa.

The Navy recently reduced a new warship construction program 75 per cent.

Military officials said the shell and tank program reductions were not connected with post V-E Day plans but were a cancellation of insurance taken out last year when the Germans launched their counteroffensive.

This was interpreted to mean that the recent cancellations would not be counted in the projected cutbacks to follow V-E Day, estimated by government spokesmen at 15 to 20 per cent in the first quarter after victory and expanding to about 40 per cent within a year after the defeat of Germany. Some analysts believed the war agencies were being conservative in estimating the cutbacks

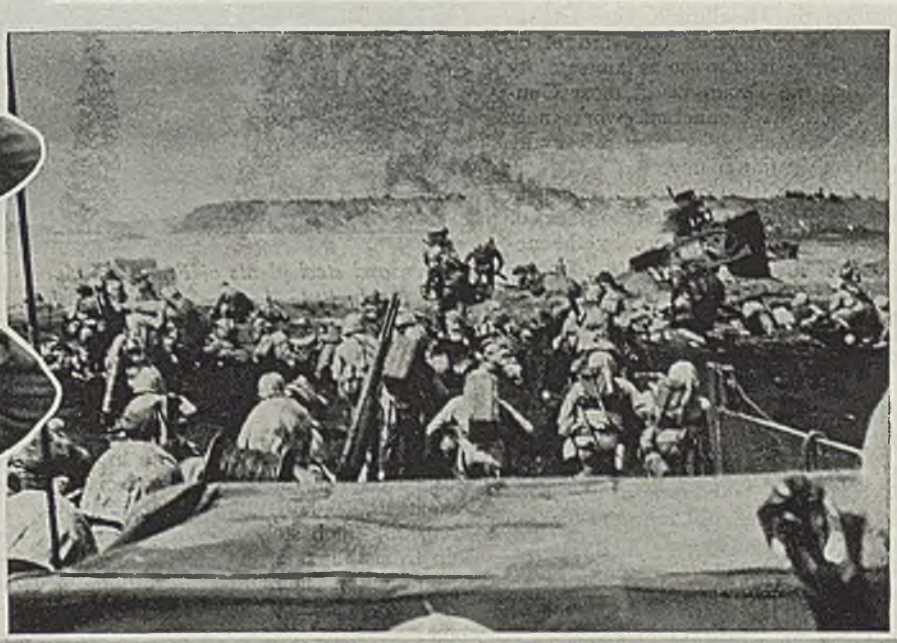
NO IMMEDIATE EFFECT

Reconversion and other governmental policies affecting the civilian economy are unlikely to be immediately affected by the death of President Roosevelt April 12. His successor in office, Harry S. Truman, while described as more conservative in viewpoint, is expected to continue existing governmental agencies much as they now are constructed. From the longer view, however, it is possible that Congress will exert much greater influence in the days ahead in initiating and shaping reconversion policy.

THE APPROACH TO "PERIOD I"

The interval between the collapse of Germany and fall of Japan will bring new and difficult problems to American industry and to the Washington agencies scheduling production for all-out war against Japan while permitting a limited resumption of civilian goods. That interval has been dubbed "Period I" by the Washington phrase coiners.

The accompanying photos symbolize the approach to this period. At extreme left is a scene of the devastation of rail yards at Emmerich Germany; insert portrays the large-scale capture of Nazi soldiers; both are symbolic of the imminent fall of Germany. The task that will remain after V-E Day is indicated by the views below, one of an assault on a Pacific island by Marines and one of the massed might necessary to support such an assault.



in Period 1 and predicted cancellations actually might exceed the estimates by possibly 30 per cent.

One of the current worries of the WPB and other war agencies now is to guard against over-optimism in preparing for the final phase of the war against Japan. Some planners are figuring on a two-year war after Germany falls. They believe the better part of one year will be required to shift armies and equipment in large quantities to the Pacific theatres and that another year will be needed to bring Japan to her knees. The supply problem in the Pacific, they note, is much more difficult than in Europe. Where six weeks suffice to transport supplies from American factories to the European fronts, four months are required to set them down in the Orient.

Hiland G. Batcheller, chief of operations of the WPB, estimates munitions production after V-E Day must continue at about $4 billion monthly, 80 per cent of present output, for some time.

Thus the agencies in control of facilities, materials and manpower are trying to keep their attention focussed in three directions—the war in Europe, the war in the Pacific and on limited resumption of civilian production.

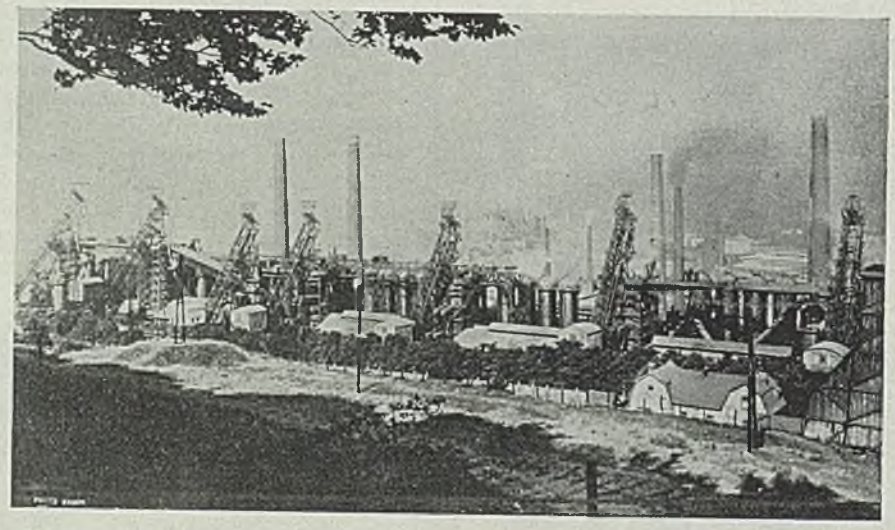
In the preparation for the latter, the Production Executive Committee of WPB has given the green light to the production of critical bottleneck machine tools and related capital equipment necessary to certain peacetime production. The first major items in this reconversion program, as announced by WPB Chairman J. A. Krug, are approximately $50 million worth of machine tools for the automotive industry. The tools involved are those on a screened list of bottleneck items essential to changing the auto plants over to passenger car production.

Virtually all the tools have a long lead time and will require three to seven months for fabrication after they are scheduled by the machine tool builders. Most of this equipment has been on or-

(*Please turn to Page* 196)

French Steel Virtually Unscathed

Industry reported practically intact despite ravages of war. Production negligible due largely to lack of transport



Iron and steel plants of France survived the ravages of World War II with remarkably little damage. Above is shown one of the country's more modern mills, with seven blast furnaces in the foreground, steel mills in the background. Photo from European

THE FRENCH steel industry is practically intact. It has come out almost unscathed from the war and enemy occupation, with the exception of Societe Normande de Metallurgie, the Trignac works and the Acieries du Nord et de l'Est. There is also some uncertainty concerning the Dunes works, near Dunkerque, and the Hennebont works near Lorient, as these regions are still under occupation by the enemy.

Despite this the output of steel in France is negligible owing to lack of transport which is taken up by the necessities of the Allied armies, concurrently with the scarcity of rolling stock, both trucks and locomotives.

Present output is estimated at about 20,000 tons per month, as against 500,000 tons in 1938 and an average of 200,000 tons during the German occupation.

Owing to this very low output of steel, orders for products are accepted only from high priority customers, to cover the needs of the Allied armies or for urgent reconstruction work. Orders are allocated by committees, which give the necessary permits to release the materials required.

Owing to the difficulties of transport, works in northern France are the most active, while works in the eastern region are practically stopped. However, the French government compels these works to maintain their labor. The losses resulting from this situation are considerable and certain companies in the Moselle region estimate their monthly loss at 10,000,000 francs (approximately $200,000). Such steelworks receive some help from the state, but such a situation cannot go on indefinitely, and there is considerable anxiety concerning the outcome.

Recently traffic from north to east and from east to north was limited to three trains per day, which appears to have enabled an exchange of iron ore and coke of some 1000 tons per day.

The works in the center of France produce a few thousand tons of open-hearth steel, using scrap and local coal.

Output of coal has diminished considerably. It is estimated at 65,000 tons per month, whereas, even during the occupation it reached about 100,000 tons. Production costs have greatly increased and there have been many applications to the Price Regulating Commission for higher coal prices. Concurrently, steel prices are bound to go up.

The Comptoir Francais de Produits Siderurgiques (French comptoir of iron and steel products) continues to allocate sales of steel products.

Present day prices are as follows:

	Frs. per ton		
Semifinished steel	1,095	—	$21.90
Rails	3,057	—	61.15
Beams	2,393	—	47.85
Merchant bars	2,501	—	50.00
Plates	3,087	—	61.75
Medium sheets	3,378	—	67.55
Light sheets	3,717	—	74.35

These prices have prevailed since Aug. 28, 1943, and are quoted f.o.b. Thionville.

It is estimated that the tonnage of orders on the books of the Comptoir Francais des Produits Siderurgiques amounts to a million tons.

Swedish Industrialists Feeling Out Market Here on Coal, Coke and Pig Iron Supplies

CUT OFF from their major source of supply in Germany, Swedish industrialists have heavy inquiries before the trade in the United States for coal and coke, with interest also being manifest in pig iron.

However, this is not expected to result in any immediate business. In the first place it would likely prove difficult to obtain licenses from the Foreign Economic Administration, for it is still possible that such materials might accrue indirectly to the benefit of the enemy. Further, despite the apparent need of such materials, the Swedish government Cargo Clearance Committee would not likely approve of space for the reason that there would be still other materials, such as possible food supplies and medical needs which would take a higher priority on ships which might be permitted to pass through the embargo.

There would likely be a still additional barrier to any such purchases, and that is that this country simply hasn't the coal and coke or even pig iron to supply Sweden, all three items being critical here. However, it is fairly possible that such business may be entertained here once Germany finally collapses and embargoes are lifted.

Swedish industrialists want coal primarily, and presumably coking coal. Coke itself would be uneconomical to transport, and Sweden does have coking facilities. They may also want pig iron a little later on, and in this connection it will be recalled that early in the war emergency, Sweden, with her European sources disrupted, turned to this country for iron, obtaining fairly substantial tonnages for a brief period.

Krupp Works in Essen Is Reported "Pulverized"

Press dispatches from correspondents with the Army in Germany indicate that the famous Krupp armaments work in Essen have been virtually destroyed. When troops of the United States Ninth Army entered the city they found the site of the Krupp works "perhaps the most pulverized spot in Germany." It

was reported that not a wheel had turned in the plant since March 11 when 1000 RAF heavy bombers gave the works its finishing blow.

South African Steel Output Is Up Sharply

Steel production in the Union of South Africa, representing ingot output plus molten steel diverted to the manufacture of bombs, rose from 316,991 tons in the year ended June 30, 1941, to 326,154 tons in the comparable period of 1942, 377,300 in 1943, and 466,216 in 1944.

War expansion of the South African Iron & Steel Industrial Corp., has involved additions to mining plant and equipment, installation of a third blast furnace, extensions to the steel-melting department, and extensive additions to rolling mill equipment, including a large cogging mill and a plate mill.

Egyptian Steel Industry Seen Profitable Venture

H. A. Brassert Co., London, reports results of a recent survey on the possibilities of an iron and steel industry in Egypt indicate that such an industry would be profitable.

Test pits and samples made of an iron ore deposit near Asswan on the Nile, about 600 miles from Alexandria, led to ore reserves estimate of 13,500,000 tons.

The Egyptian Minister of Mines believes that the industry would be profitable with a plant either at Asswan, with electrical smelting, or in Cairo, with blast furnace smelting. The ore is said to be of good quality, and can be mined at low cost.

Australia's Steel Capacity Increased

From a prewar annual output of 1,200,000 tons of steel, Australia now has increased the capacity at Newcastle and Port Kembia, New South Wales, to 1,750,000 tons annually, which is said to be more than sufficient for entire commercial needs of the commonwealth.

Manufacture of stainless steel was mastered in Australia in 1940. By 1942 tungsten carbide made from Australian wolfram had rendered the country independent of imports of tungsten-carbide tool tips.

Brazil Excellent Field For Farm Machinery Sales

Postwar Brazil will require millions of dollars' worth of farm machinery, according to foreign service reports of the Department of Commerce.

While Brazil is industrializing, the reports say, that country is primarily agricultural and will continue so. The trend in Brazil is away from coffee as the single most important agricultural product, and toward diversity of crops. Cotton, mint, jute, peanuts, castor beans, babassu nuts and other items now are produced on a large scale in Brazil, and these crops lend themselves well to mechanization. Purchase of farm and related machinery by Brazil also will be helped by the fact that the cost of labor has risen materially in that country during the war.

Denmark's Metal Processing Industry Shows Development

The metal processing industry of Denmark has developed despite difficulties encountered in obtaining supplies of coal and iron, according to trade reports reaching the Department of Commerce.

Production of machines for packing preserves and machinery for processing leather and wood has increased. "Lively activity" in the construction of railway cars and locomotives is reported and there have been some developments in the agricultural machinery field.

Swedish Railways Planning $60 Million Improvement

The Swedish State railways have announced a preliminary development program for 1945-46 which calls for expenditure of about $60,620,000, according to trade reports reaching the U. S. Department of Commerce.

Electrification, double-tracking, construction of buildings and improvement of existing structures and the purchase of new rolling stock are included in the plans.

Present, Past and Pending

■ SHARON STEEL BUYS DETROIT SEAMLESS STEEL TUBES CO.

SHARON, PA.—Sharon Steel Corp. has acquired all the outstanding stock of Detroit Seamless Steel Tubes Co., Dearborn, Mich. Present management will be continued, the plant being operated as a subsidiary of Sharon Steel Corp. The Detroit company has annual capacity of 36,000 tons of hot-rolled and cold-drawn steel tubing.

■ FIRST PICKUP TRUCK NOW IN PRODUCTION SINCE EARLY '42

DETROIT—Dodge Division, Chrysler Corp. is manufacturing pickup trucks under the War Production Board allocation for necessary vehicles for first half of 1945. Rated at one-half ton, the utility Dodge truck will be the first of its kind since production was halted in February, 1942.

■ CUT FARM MACHINERY CONTROLLED MATERIALS ALLOTMENT

WASHINGTON—Allocation of controlled materials for farm machinery this quarter has been cut to 195,000 tons, against net usage of 256,000 in initial three months this year, and 279,000 tons in second quarter, 1944. The amount allotted for repair remains the same.

■ BRASSERT & CO. TO DESIGN BRAZILIAN ALLOY STEEL PLANT

NEW YORK—H. A. Brassert & Co., New York, have a contract with Acos Especiais Itabria, for the designing of Brazil's first alloy and special steel mill. The plan will have initial capacity of 60,000 tons of bessemer and electric furnace steel ingots.

■ METAL TRADES "TESTED RATES" REVISED AT MANSFIELD, O.

CLEVELAND—Revisions of the "sound and tested going rates" for workers in the machinery and metal trades industries in Mansfield, O.—presenting increases in about one-third of the 25 key jobs involved—are announced by Chairman Frederick H. Bullen, Fifth Regional War Labor Board, Cleveland.

■ LESS STEEL FOR ELECTRICAL FOOD PREPARATION EQUIPMENT

WASHINGTON—Commercial electrical food preparation equipment manufacturers will receive 16 per cent less carbon steel this quarter than allotted in the initial three months.

■ GRAHAM-PAIGE PRODUCING ARMOR-PIERCING SHOT

DETROIT—Graham-Paige Motors Corp., Detroit, has begun production on an order for 120,000 units of 76-millimeter, high-velocity, armor-piercing shot.

■ PLAN WAR STANDARDS FOR DRAFTING ROOM PRACTICE

NEW YORK—American Standards Association, New York, at the request of the War Production Board, is developing a series of American War Standards for drawing and drafting room practice that will correlate the practices of the Army and Navy with those of industry.

Breakdown of Steel Mill Product Shipments to the Automoti

(Net Tons)

Products†	1944°	1943	1942	1941	1940	1939	1938	193
Semifinished (ingots, blooms, billets, slabs, tube rounds, sheet and tin bars)	135,700	208,255	114,363	274,223	252,592	.....	.....	.....
Structural shapes and sheet piling	55,300	57,928	73,373	23,461	26,612	26,073	15,488	27,9
Plates (universal and sheared)	239,000	242,250	181,739	116,433	148,137	108,150	81,943	99,4
Hot-rolled bars (carbon, incl. hoops and bands)	272,500	288,649	266,580	761,300	1,007,191	.....	.....	.....
Concrete reinforcing bars	.....	.....	.....	.....	174	1,315	11,301	2
Alloy bars	291,500	381,687	276,747	697,689	627,462	.....	.....	.....
Cold finished (carbon and alloy)	241,500	306,979	207,803	306,557	.....	.....	.....	.....
Total bars	805,500	977,315	751,130	1,765,546	1,634,827	1,382,539	817,788	1,844,0
Pipe and tubes	121,000	145,882	104,438	82,923	72,451	47,967	26,095	63,8
Wire rods	3,300	8,095	11,881	51,246	35,540	.....	.....	.....
Wire and wire products (incl. fence posts)	46,000	64,060	46,255	69,170	225,241	162,636	83,190	186,9
Black plate	5,200	1,402	1,004	409	2,032	4,728	2,930	4,7
Tin and terne plate (hot and cold reduced)	1,000	7,697	2,769	2,234	29,495	.....	.....	.....
Sheet and Strip:								
Hot-rolled	384,800	471,261	508,778	1,986,692	2,931,177	.....	.....	.....
Cold reduced	218,800	236,959	240,278	1,553,958	1,704,973	.....	.....	.....
Galvanized	22,900	7,819	11,986	16,584	9,261	26,923	5,168	6,5
All other	.....	36,965	36,122	98,379	56,849	.....	.....	.....
Total	626,500	753,004	797,164	3,655,613	4,702,260	4,167,937	2,425,254	5,044,8
Tool steel bars	950	2,562	5,366	22,189	4,478	.....	.....	.....
Wheels and axles	10	47	535	272	16,024	.....	.....	.....
Forgings	.....	47,448	29,646	19,360	.....	.....	.....	.....
Steel castings	.....	525	485	72,105	.....	.....	.....	.....
All other steel products	500	1,501	1,520	15,024	45,650	93,560	81,927	68,2
Grand Total	2,039,960	2,517,971	2,121,668	6,170,208	7,195,339	5,993,590	3,534,615	7,339,9

†Includes sales to aircraft industry for 1940 through 1943. °Estimated.

Pent-up Car Needs Assure Heavy Postwar Automotive Steel Demand

STEEL requirements of automobile builders and parts suppliers are expected to reach new peak levels during the early postwar years. However, consumption of steel in the automotive field will depend on a number of factors which are intimately interwoven into the reconversion problem which confronts the industry. In any event, nevertheless, the industry will present a tremendous demand for steel once it gets launched on civilian passenger car production.

The industry's best prewar year, from the standpoint of steel purchases, was in 1937 when 7,339,927 net tons, or 20.04 per cent of the total steel produced for sale, was distributed to automotive car builders and suppliers. During that year automobile output totaled 5,016,437 units. Peak in motor vehicle production of 5,621,715 units occurred in 1929, but the industry's steel purchases of 7,115,087 net tons for the period was slightly below the 1937 peak volume.

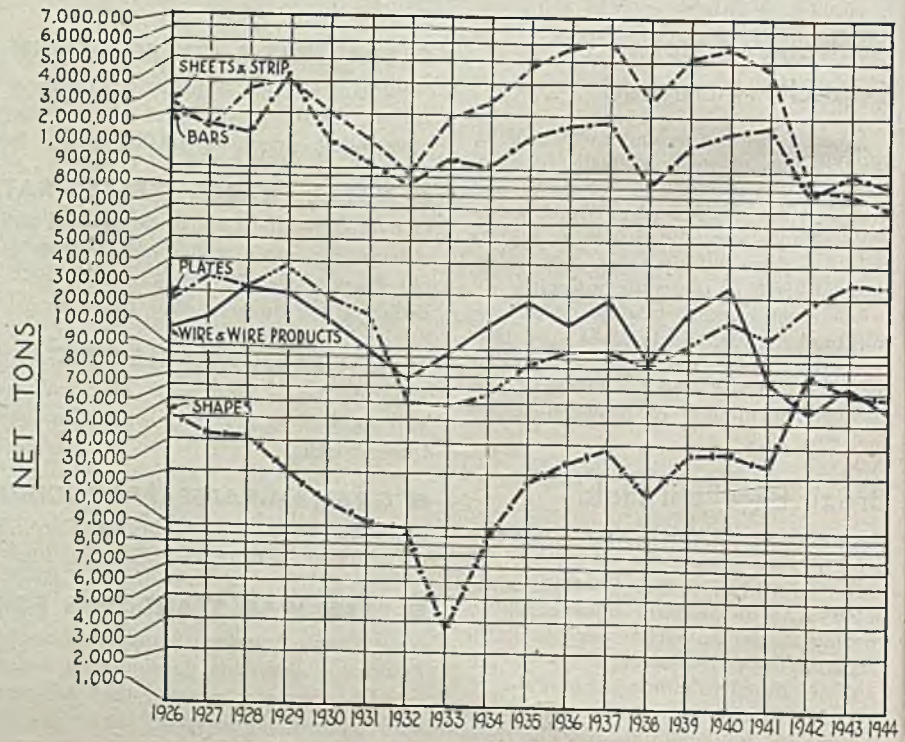
It is estimated that about 3 years' production will be necessary before the number of automobiles in this country will match the prewar total. Motor car registrations at the close of this year are likely to be close to 23.5 million, compared with the peak of 29.5 million on Dec. 31, 1941.

The average age of passenger cars in use today is nearly eight years, against about 5.5 years in peacetime. Automobiles currently are being scrapped at a rate of 4000 daily.

Total postwar automobile requirements will be influenced by employment levels, private savings, taxes, credit policies and all other factors affecting individual purchasing power. With private monetary savings at an all-time peak and the average age of passenger cars the greatest in the history of the industry, it is obvious that the biggest problem in the postwar period will be one of meeting the huge pent-up demand.

Another favorable factor in the postwar automotive outlook is the efficient dealer set-up which is still functioning. Only 22 per cent of the dealers have closed down since Pearl Harbor. Many

Automotive Steel Consumption Trend



Industry by Product Classification from 1926 Through 1944

(Net Tons)

1936	1935	1934	1933	1932	1931	1930	1929	1928	1927	1926
23,311	18,295	8,594	2,718	9,653	10,631	13,498	20,934	32,510	33,040	42,003
96,329	83,161	56,691	48,406	51,505	115,801	193,489	287,161	218,234	241,479	197,948
612	231	73	109	30						
,761,251	1,520,567	1,036,564	1,125,012	808,748	1,098,031	1,493,195	3,288,565	1,562,174	1,716,791	2,038,844
31,890	29,957	87,926	10,539	14,204	30,139	38,860	96,678	65,695	55,390	102,292
137,556	181,294	137,301	92,933	67,071	97,488	149,748	200,306	214,763	145,234	125,674
8,996	5,909	983	1,623	1,505	6,276	11,330	17,717	30,470	31,498	
13,041	5,979	9,091	5,608	2,965	5,060	9,428	31,557	8,577	6,592	
,723,531	3,760,288	2,370,458	1,935,406	924,890	1,499,067	2,084,622	3,155,764	2,742,696	1,695,100	2,302,128
13,508	7,008	10,463	8,582	16,772	22,276	84,649	47,960	71,662	137,640	80,102
,796,369	5,606,478	3,708,980	3,225,219	1,894,350	2,879,710	4,069,391	7,115,087	4,938,207	4,056,172	4,888,990

Figures for 1926-39 compiled by STEEL; for 1940-43 by American Iron and Steel Institute.

were small organizations and do not affect materially the total reservoir of dealer facilities.

A large accumulated demand for automobiles also has been built up in South America during the last four years, estimated at 500,000 passenger cars and trucks, valued at more than $650 million. Some competition is expected from European automobile builders whose prewar share of the market was about 15 per cent. Some of these interests are controlled by companies in this country.

Automobile manufacturers believe that in the first 12 months after full-scale output for civilian supply is resumed production will approximate 6 million motor vehicles, and in the second year about 5.4 million. Two or three 4.5 million car years may follow, after which it is expected annual production will drop to something like the prewar "normal" of 3 million. Everything will depend, at the beginning, on what manufacturing facilities can be used prior to the surrender of Japan.

First automobiles produced in the early reconversion period are expected to be slightly modified 1942 models, and will be somewhat more expensive due to increased labor and material costs. In time, volume production may offset some of these cost increases. The early postwar cars may have the same body design as their 1942 predecessors except for some minor "face-lifting" changes, but improvements in metals learned from war experience will be incorporated into the mechanical parts.

The postwar motor car will likely be neither radical nor dramatic in appearance, but will be lighter in weight, more attractive inside and out, with smaller engine to use higher octane gasoline. Weight reduction will not come about so much through use of lighter metals but through more painstaking use of prewar materials.

The industry is putting war production first and obviously all planning for reconversion is contingent on military requirements. But in fairness to the industry, so that the transition to automobile production can be accomplished as quickly as possible with a minimum period of employment, the government reconversion policies should be perfected as soon as possible.

The automobile industry is short about 7500 new machine tools to successfully effect its plant reconversion process. The military and lend-lease machine tool requirements have extended the delivery promises for most of these tools already placed with machine tool builders. However, this situation has been eased with the recent cutback in the tank and ammunition facilities expansion programs.

Since Sept. 1, 1939, through the close of last year the industry produced about $24 billion of war products. The industry ranks first in war production among the ten largest metalworking industries, producing about 26 per cent of the war products made by all metalworking industries.

In the final quarter last year the industry's output, broken down percentagewise, was as follows: Aircraft engines and parts, 44.3 per cent; tanks and part., 12.7; motor vehicles and parts, 27; guns, 3.1; marine equipment, 7.1; ammunition, 2.4; and all other, 3.4 per cent.

The automotive industry's overall reconversion job divides itself into four principal phases: Planning, pre-reconversion work, partial reconversion of plant, and partial resumption of civilian passenger car production.

Steel Industry Employment Increases During February

Employment increased in the steel industry during February, according to the American Iron & Steel Institute, when an average of 566,300 employes received wages and salaries, compared with 564,000 in January and 583,000 in February, 1944. The latest reported figure was the highest since last August when employment averaged 569,200.

Wage earners received an average of 125.0 cents per hour in February, compared with 123.3 cents per hour in January and 116.1 cents per hour in February, 1944. Hours worked weekly averaged 47.2 in February, against 47.7 in January and 47.0 in February, 1944.

Payrolls in February totaled $138,414,800, compared with $150,266,500 in January and $137,615,200 in February, 1944. The decline from January payrolls was caused chiefly by the fewer number of days in February.

Young Named Engineering Head by National Tube Co.

Appointment of John L. Young as vice president in charge of engineering for the National Tube Co., Pittsburgh, was announced last week. Mr. Young has been vice president in charge of industrial research and development for the United Engineering & Foundry Co., Pittsburgh, with which company he has been associated since 1936.

Steel Output in March Was Near Record Level

Weather and labor shortage cut first quarter tonnage million tons below same period last year

STEEL production in March was third largest for any month on record, totaling 7,724,756 net tons, according to the American Iron and Steel Institute. The March total was exceeded only in March, 1944, when 7,820,226 tons were produced and by October, 1943, when output was 7,814,117 tons.

High rate of production in March failed to offset the adverse effects of bad weather and labor difficulties early in the year and first quarter production fell more than a million tons below the corresponding quarter in 1944. In the first three months this year steel output was 21,581,859 tons, compared with 22,595,283 tons in first quarter, 1944.

In March, steel plants operated at an average of 95.2 per cent of capacity, compared with 90.8 per cent in February and with 98.5 per cent in March, 1944. Average production per week in March was 1,743,737 tons, compared with 1,663,200 tons per week in February and 1,765,288 tons per week in March, last year.

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								Calculated weekly produc- tion, all companies Net tons	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.		
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										
1945										
Jan.	6,468,814	90.5	379,062	76.0	356,427	76.8	7,204,303	88.8	1,626,253	4.13
Feb.	5,967,842	92.4	347,227	77.1	337,731	80.6	6,652,800	90.8	1,663,200	4.00
Mar.	6,937,797	97.0	398,392	79.8	388,567	83.8	7,724,756	95.2	1,743,737	4.43
1st qtr.	19,374,453	93.3	1,124,681	77.6	1,082,725	80.5	21,581,859	91.6	1,678,216	12.86
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.	6,409,981	98.4	409,781	85.2	368,555	87.0	7,188,317	96.9	1,736,308	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.	20,155,869	98.6	1,304,700	86.4	1,134,714	85.3	22,595,283	97.0	1,738,099	13.00
April	6,788,433	100.6	437,472	87.8	362,118	82.5	7,588,023	98.7	1,768,770	4.29
May	6,878,251	98.7	437,444	85.0	380,960	84.0	7,696,655	97.0	1,737,394	4.43
June	6,462,108	95.8	419,699	84.2	347,028	79.0	7,228,835	94.1	1,685,043	4.29
2nd qtr.	20,128,792	98.4	1,294,615	85.6	1,090,106	81.9	22,513,513	96.6	1,730,478	13.01
1st hlf.	40,284,661	98.5	2,599,315	86.0	2,224,820	83.6	45,108,796	96.8	1,734,287	26.01
July	6,742,830	96.5	415,543	80.9	334,710	73.7	7,493,083	94.2	1,695,268	4.42
Aug.	6,714,857	95.9	429,672	83.5	348,901	76.6	7,493,430	94.0	1,691,519	4.43
Sept.	6,500,997	96.1	398,058	80.0	330,837	75.2	7,229,892	93.9	1,689,227	4.28
3rd qtr.	19,958,684	96.2	1,243,273	81.5	1,014,448	75.2	22,216,405	94.1	1,692,034	13.13
9 mos.	60,243,345	97.7	3,842,588	84.5	3,239,268	80.8	67,325,201	95.9	1,720,112	39.14
Oct.	6,859,922	98.0	420,105	81.6	335,526	73.7	7,615,553	95.6	1,719,086	4.43
Nov.	6,571,497	96.9	403,908	81.0	298,503	67.7	7,273,908	94.3	1,691,966	4.29
Dec.	6,677,488	95.6	373,323	72.7	310,380	68.3	7,361,191	92.6	1,665,428	4.42
4th qtr.	20,108,907	96.9	1,197,336	78.4	944,409	69.9	22,250,652	94.1	1,693,353	13.14
2nd hlf.	40,067,591	96.5	2,440,609	80.0	1,958,857	72.6	44,467,057	94.1	1,692,693	26.27
Total	80,352,252	97.5	5,039,924	83.0	4,183,677	78.0	89,575,853	95.4	1,713,387	52.28

The percentages of capacity for 1944 are calculated on weekly capacities of 1,572,755 net tons open hearth, 116,182 net tons bessemer and 102,350 net 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 net tons, electric 5,350,880 net tons. Beginning July 1, 1944, the percentages of capacity operated are calculated on weekly capacities of 1,580,042 net tons open hearth, 116,182 net tons bessemer and 102,757 net tons electric ingots and steel for castings, total 1,798,981 net tons; based on annual capacities as follows: Open hearth 82,604,600 net tons, bessemer 6,074,000 net tons, electric 5,372,150 net tons.

For 1945 percentages are calculated on weekly capacities of 1,614,338 net tons of open hearth, 112,658 tons of bessemer and 104,640 tons of electric ingots and steel for castings, total 1,831,636 tons; based on annual capacities as of Jan. 1, 1945 as follows: Open hearth 84,171,590 net tons, bessemer 5,874,000 tons, electric 5,455,890 tons.

Steel Corp. Shipments in March Best for 12 Months

Finished steel shipments in March by the United States Steel Corp. totaled 1,869,642 net tons, an increase of 307,154 tons over February deliveries of 1,562,488 tons and a decrease of 5153 tons compared with 1,874,795 tons shipped in March, 1944. During first quarter this year, shipments aggregated 5,001,245 tons, a decrease of 360,108 tons from the corresponding period last year. March movement was largest since the like month last year.

(Inter-company shipments not included)

	Net Tons			
	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,658,992	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,587
Mar.	1,869,642	1,874,795	1,772,397	1,780,938
Apr.	.....	1,756,797	1,630,828	1,758,894
May	.....	1,776,934	1,706,543	1,834,127
June	.....	1,737,769	1,552,663	1,774,068
July	.....	1,754,525	1,660,762	1,765,749
Aug.	.....	1,743,485	1,704,289	1,788,650
Sept.	.....	1,733,602	1,664,577	1,703,570
Oct.	.....	1,774,969	1,794,968	1,787,501
Nov.	.....	1,743,753	1,660,594	1,665,545
Dec.	.....	1,767,600	1,719,624	1,849,635
Total	.....	21,150,788	20,244,830	21,064,157
Adjustment	.....	.....	*97,214	*449,020
Total	.....	.....	20,147,616	20,615,137

*Decrease.

February Pig Iron and Ferroalloy Output

	Pig iron	Ferrospiegel	Total February	Total Year to date	Per Cent capacity
Eastern	778,146	26,130	804,276	1,660,439	80.7
Pittsburgh-Youngstown	1,829,765	17,213	1,846,978	3,846,486	92.9
Cleveland-Detroit	454,448	.....	454,448	930,624	89.9
Chicago	981,594	.....	981,594	2,060,538	90.9
Southern	311,520	12,519	324,039	686,043	85.8
Western	151,409	.....	151,409	323,632	69.6
Total	4,506,882	55,862	4,562,744	9,507,762	88.4

American Iron and Steel Institute.

February Coke Output Up but Stocks Drop

Daily average output of by-product and beehive coke gained slightly in February, but total production declined to 5,509,742 net tons, compared with 6,033,322 in January and 5,969,897 tons during the like 1944 month.

By-product coke stocks at producers' plants decreased sharply during February to 778,542 net tons, a decline of 14.8 per cent and equivalent to 4.3 days' production. However, stocks were slightly above that recorded on same date last year.

Stocks of bituminous coal at by-product plants receded 84,390 tons during February and on March 1 were sufficient for 21.8 days' requirements at the rate of consumption prevailing during February.

Monthly production comparisons of by-product and beehive coke are presented in the table below.

Coke Output
Bureau of Mines
(Daily Average—Net Tons)

	By-Product		Beehive	
	1945	1944	1945	1944
Jan.	179,879	181,501	14,745	21,933
Feb.	180,727	184,384	16,049	22,248
March	.....	183,123	.....	21,529
April	.....	185,259	.....	20,457
May	.....	184,071	.....	20,783
June	.....	181,891	.....	20,472
July	.....	181,506	.....	19,531
Aug.	.....	181,718	.....	18,572
Sept.	.....	179,234	.....	17,305
Oct.	.....	181,772	.....	16,994
Nov.	.....	182,383	.....	16,199
Dec.	.....	180,746	.....	13,066
Aver.	.....	182,359	.....	19,128

New Coal Wage Agreement Signed But Raise Must Get WLB Approval

Increase of $1.07 per day also dependent upon compensating rise in price of coal. Mine costs seen boosted $150 million annually. Pact followed taking over of 235 mines by government to end wildcat strikes

AFTER weeks of bickering, punctuated with wildcat strikes, a new bituminous coal mine wage agreement was ratified last week by John L. Lewis for the United Mine Workers of America and by representatives of the operators. It was uncertain, however, whether the provisions of the agreement would be acceptable to government stabilization agencies, since it provides for a basic $1.07 per day wage increase which is subject to War Labor Board approval.

Further, the increase in pay is dependent upon approval by the Office of Price Administration of a compensating boost in the price of coal. Mine operators stated they would have to get an increase to meet higher production costs, the additional remuneration to the miners being placed at $150 million annually. Roughly it is estimated the wage increase will up mining costs by 25 cents per ton.

The new contract fixes a wage rate of $10 per day compared with the present $8.50. Actual pay increase, however, spread over a 6-day week and with less than regular rates for underground travel, averages $1.07 a day. Differentials of 4 and 6 cents for the second and third shifts, respectively, are included in the contract. Miners will receive $75 apiece in place of vacation time off, an increase of $25.

Contract Could Be Continued

An important feature of the new contract is an open-end provision which calls for continuation of the contract beyond next March 31 unless either party wants to negotiate for some reason or other. In event of such, the party seeking to open negotiations would serve 10-days' notice of a call for a conference. The conference would then run 15 days at the end of which if no agreement had been reached the talks could be continued by agreement or either side could serve notice that the contract would terminate in five days.

Signing of the agreement came within a few hours after the government had officially taken over operation of 235 mines at which operations were halted by strikes. Idle mines were taken over in Pennsylvania, Ohio, Tennessee, Virginia, Kentucky, Indiana and Alabama.

Flags were raised over the struck mines Tuesday night and Wednesday. Miners were ordered to report for work Thursday, to start coal moving again to the steel plants and coke ovens which had been singled out by the mine union as the weakest point from a stockpile standpoint, and the area to be used as a pressure point in the negotiations.

Actual steel production loss was confined principally to subsidiaries of United States Steel Corp., and largely in the Pittsburgh district. Loss has been estimated at 6500 tons of steel per day in open hearths and bessemers, over a 7-day period, or 50,000 tons total. The iron loss, of course, was considerably greater since nearly all blast furnace and coke oven operators were affected.

In all probability, there will be some lag into this week because of the lack of stockpiled coal to refill the coke ovens, as well as the fact that beehive operations will not start producing coke before 48 hours after initial charging. Blast furnace operations, deeply cut by the coke situation, will not reach pre-strike levels until sometime this week. About 15 blast furnaces, in the Pittsburgh and Cleveland districts for the most part, were banked during the strike period. This aggravated an already tight pig iron situation and will further hamper steel production in the weeks ahead, it was said in the industry.

Late last week five blast furnaces in Alabama were idle because of the coal strike.

Republic and USA-CIO Sign Bargaining Agreement

Collective bargaining contract covering wages, hours and working conditions between Republic Steel Corp., Cleveland, and the United Steelworkers of America, CIO, was signed last Wednesday by J. A. Voss, director of industrial relations, representing Republic and by William F. Donovan, Cleveland district director, USA-CIO, and by 14 presidents for the local unions. The contract expires Oct. 15, 1946. The contract covers approximately 44,000 employes working in 25 plants.

Important provisions of the contract include: Granting of vacations to eligible employes on their return from military service; a liberalized vacation plan for wage roll employes; an increase in holidays from three to six; and a shift differential of 4 cents per hour for the afternoon shift and 6 cents for the night shift.

The contract also contained a provision calling for elimination of strikes and work stoppages on the union's part and specified that there would be no lockout on the company's part. Another feature is formation of joint committees of company and union representatives to study wage rate inequalities in the individual plants of the corporation.

POSTWAR PREVIEWS

RECONVERSION—"Period I", interval between defeat of Germany and fall of Japan, will present difficult problems as industry will operate on part-war, part-peacetime basis. See page 77.

AUTOMOTIVE STEEL DEMAND—Auto builders and parts suppliers expected to require record steel tonnages in immediate postwar years. See page 82.

WEST COAST—Employment levels in manufacturing industries on Pacific Coast after the war will be higher than prewar but lower than wartime peak. See page 99.

POWDER-METAL PARTS—Wide variety of precision tools, gages, bearings and other parts, made of powdered metal up to 200 times faster than by conventional methods, favors widespread applications of such parts in future. Increased physical properties have been achieved through better methods of powder manufacture and control. See page 106.

WELDING PROPELLER SHAFT STRUTS—To speed production of vessel stern frames, rudders and propellers, awkward method of casting in a single piece has been replaced by casting sections to be joined by Thermit welding. Satisfactory production record suggests many possibilities. See page 110.

IMPROVED LADLE NOZZLE—Changeable nozzle affords uniform speed in teeming of individual ingots, insuring uniform quality in finished product. A British idea, both simple and practical, it is expected to see use in America's melting shops. See page 130.

Lack of Co-ordination Confuses Government Plant Disposal Policy

Senate Small Business Committee concludes hearings on future of light metals. No intention of government to operate facilities after the war indicated. Uncertainties make industry hesitate to buy or lease plants

WHETHER the government's plant disposal policy, as incorporated in the Surplus Property act, needs amendment and clarification, and how better co-ordination between the administrative agencies charged with disposition of the government-owned plants are the prime questions brought before Congress by the Senate Small Business Committee's hearing on light metals.

Guy Gillette, former senator and now chairman of the Surplus Property Board, believes that under the present law government-owned plants cannot be disposed of until they have been declared surplus. The Defense Plant Corp., he says, not only has been conducting negotiations for the disposal of these plants prior to their being declared surplus, but has not kept the Surplus Property Board informed about such negotiations.

Hans A. Klagsbrunn, executive vice president and general counsel, Defense Plant Corp., explained the DPC interpretation is that the law is intended to facilitate disposal of plants quickly that they may become productive and provide employment in the postwar era. He believes plants should be sold or leased before their present operating personnel is dispersed. "We feel we understand the purposes of the law," said Mr. Klagsbrunn, "and we are trying to anticipate actual conditions in order to carry out those purposes."

Mr. Klagsbrunn said further that the DPC regularly, twice a month, gives complete information to the Surplus Property Board on its activities.

In view of this situation, the committee's report to Congress probably will propose revision of the present law so as to make it "stronger," by containing more definite instructions to guide the responsible agencies.

One fact was emphasized in the hearings. It is that there is nowhere, in any responsible quarters, any intention to have the government operate its war plants in the postwar period. Sen. James E. Murray (Dem., Mont.), the committee chairman, made this clear after a number of witnesses had stressed the advisability of turning these plants over to private industry.

"I do not hear anywhere of any plans under which the government would operate these plants," declared Senator Murray. "All that the government wants to do is to aid and encourage business in preparing for the postwar period, and I do not know of any contrary thinking in Congress. There has been a lot of propaganda about prospective government operation of these plants for which there is no basis in fact."

Mr. Klagsbrunn's testimony was interesting in a number of particulars, first because he expressed his hearty approval of a policy of leasing these plants in the beginning rather than trying to sell them at once. The postwar economic picture still is uncertain, said Mr. Klagsbrunn, so that it is difficult to set a price now that will prove fair when peace conditions return. The important thing, as he saw it, is to get these plants as quickly as possible into the hands of people who will operate them. The most practical arrangement, therefore, is to have them operated under lease. Then, as time goes on, he said, the peacetime economic picture gradually would emerge and it would become possible, at some future date, to fix a price that the potential buyer can afford to pay.

Numerous Questions Plague Officials

He testified that in studying problems of plant disposition, DPC officials are plagued by numerous questions. One is that of disposing of plants to encourage smaller business and not encourage monopoly and economic concentration. Another question, as yet undetermined, is what facilities must be held in reserve to meet future military needs. Another is the present uncertainty as to electric power rates in the postwar world. Another is the future sources of bauxite, and the outcome of the experiments to produce alumina economically from clay. Another is the uncertainty as to future transportation costs. And finally, there is the question of extent to which existing plants will have to be rearranged or moved to new locations.

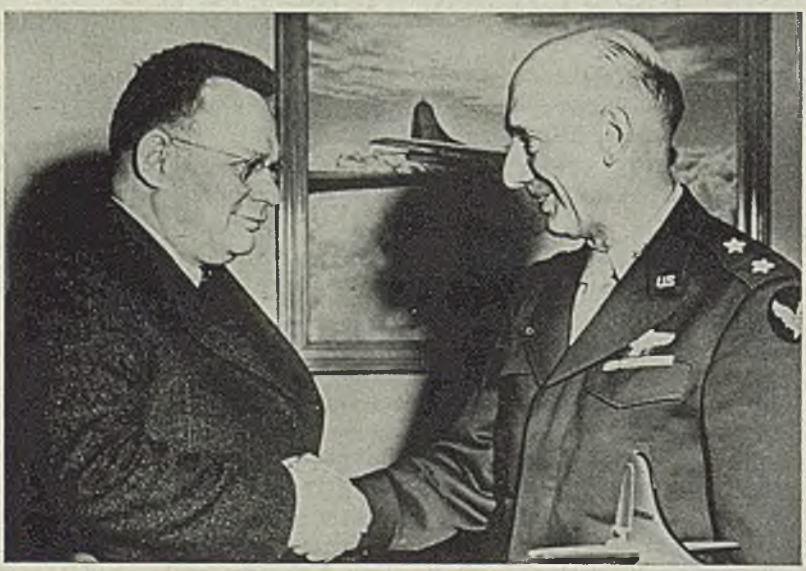
Mr. Klagsbrunn said DPC wants to be as liberal as possible in reaching agreements, either through sale or lease, under which these plants can be turned over to private concerns for operation. Almost any terms within the means of the prospective buyer or lessee, he indicated, can be accepted by the DPC.

During the hearings, various spokesmen referred to the action of the United States government in financing development of the Shipshaw aluminum facilities in Canada. The help given by our government, it was stated, will enable the Canadian producer to undersell American producers in world markets after the war.

A spur to the committee in its effort to find ways and means to promote production and use of the light metals after the war was a joint statement from the Army and Navy read by Brig. Gen. F. M. Hopkins. This was a 3-point "must" program:

1—Peacetime demand for aluminum and magnesium must be sufficient to promote aggressive development of their production;

2—Rapid acceleration of output of



CONTRACTS FOR SMALL PLANTS: Maj. Gen. Kenneth B. Wolfe, chief of engineering and procurement, Air Technical Service Command, Dayton, O., welcomes Maury Maverick, chairman, Smaller War Plants Corp., at Wright Field. Maverick visited ATSC headquarters to discuss placement of war contracts with small companies. NEA photo

THE 6TH AVENUE "EL" WAS NOT SENT TO PEARL HARBOR!

In the January 22nd issue of TIME Magazine, we ran this illustration with a headline reading: "Remember when we sent the 6th Avenue 'El' to Pearl Harbor?"

This was a mistake.

The 6th Avenue "El" was *not* sent to Pearl Harbor — thanks to the straight thinking and vision of Mayor F. H. LaGuardia, Stanley M. Isaacs, Manhattan's Borough President, the support of the other members of the Board of Estimate of the City, and the strict adherence of the Harris Structural Steel Company, contractors for this work. The contracts for the demolition of the "El" stipulated that the scrap iron would not be sold or exported directly or indirectly to any foreign country with the exception of Great Britain. Not one pound of this scrap ever left the United States.

And that was three years before Pearl Harbor — back in the "appeasement" days!

It's too bad there weren't more men thinking straight in those days. Because more than 6 million tons of scrap was sold to the Japs during those three years. And many an American boy was hit by fragments of that American steel — fragments of our own weak thinking in the past.

Well, we're strong now. America will come out of this war the most powerful force on earth, and the time to start *thinking* strong is now.

Our greatest immediate contribution to American strength in the future—strength here at home—must be the provision of jobs for our returning fighting men; jobs and security for all!

And today, the engineers of the machine tool industry can greatly help the men of government and of industry to provide those jobs . . . to plan now for the reconversion of our tremendous resources in materials and plant equipment to all-out production for a better America! One of these engineers *is* a Bryant man. We urge you to call him now.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

these metals must be possible in the event of another war; and

3—Domestic bauxite reserves, because they are limited in quantity, must be held for emergency use.

Aluminum scrap disposal may be simplified after the war by a process now being worked experimentally by the Aluminum Co. of America, said General Hopkins. Major assemblies, such as aircraft wings and fuselages, are charged into a caustic solution and the resultant alumina is claimed to be the same as that from bauxite, capable of conversion to pure aluminum by the usual electrolytic method.

Disastrous effects may be in store if Section 22 of the Surplus Property Act is not changed, the committee was told by C. H. Burton, secretary, Aluminum Research Institute, Chicago, an association of smelters comprising about 80 per cent of the country's remelt aluminum alloy ingot capacity. This section now permits government-held minerals or metals "to be put into forms best suited for storage."

Losses to the government from such a policy would far outweigh any saving in storage charges, said Mr. Burton. The scrap should be held in its original form so that it can be inspected by ingot men who can classify it for effective use. Melting down of the scrap without such classification, he declared, "would result in a variety of haphazard analyses unfit for further use without a difficult and expensive re-alloying operation."

Expects Increased Postwar Business

His industry,—if it is allowed to function as free, competitive enterprise, said Mr. Burton, looks to postwar output of somewhere between 250,000,000 and 325,000,000 pounds of remelt aluminum ingot per year—or two to three times the 1940 level.

"Given opportunity freely to compete for and develop new uses and markets," he said, "there is every reason to envision a prospective annual production of 500,000,000 pounds of aluminm ingot from smelters in the not too distant future."

Magnesium is in a unique position to play a part in the postwar world and one of the reasons is that its supply is unlimited, C. Donald Dallas, president, Revere Copper & Brass Inc., told the committee. This is important, he said, for the reason reserves of copper, zinc and some other metals are being depleted.

"Its importance will depend upon when and how quickly manufacturers will begin to use it in real volume," he said. "We have done and wish to continue to do everything in our power to bring about an early civilian use of, and not just talk regarding, magnesium. It is for this reason that we have been investing further funds in research in an endeavor to stimulate the imagination of manufacturers, of engineers and of the public with regard to its advantages. It is our conviction that if public interest can be aroused it will stimulate the creativeness of inventors, engineers and designers."

COL. ALFRED E. HOWSE

Recently appointed surplus property administrator, Colonel Howse has had a wide experience in large-scale merchandising programs. Since the summer of 1941 he has been serving the Army, both as a civilian and on active duty. He played an important part in the V-Loan program which involved making loans totaling $15 billion to war contractors

To determine the potential future of magnesium, said Mr. Dallas, "we have written to our entire active list of nearly 9000 users of metals to inquire regarding their interest in magnesium. More than 3500 firms indicated an interest in its future use. These manufacturers form the nucleus around which we hope to build.

"But I want to stress that they were only 'interested,'" continued Mr. Dallas. "Few had specific plans.

"But I am sure that they must come in time to employing this metal. You have been told by some manufacturers that they see limited use for light metals in their business. This is a conservative viewpoint of adhering to established practice and must be respected. But it cannot prevail against the irresistible force of progress.

"We are beginning to realize that needless weight is one of the most costly ways of wasting money. Through magnesium our energies can be vastly expanded by eliminating unnecessary and surplus weight. Through magnesium we can conserve human energy. Through magnesium we can save time and effort that are needlessly expended throughout the land. Therefore, it is inevitable that in time we must come to its widespread use. That is why we have taken the lead in the advertising and promotion of magnesium. For if, through our effort, and that of others who are working along similar lines, we can bring about an early use of magnesium, we will be able to continue to do our part in turning the large investment which the nation has made into new products and new jobs for the American people."

To a question by Sen. Tom Stewart (Dem., Tenn.), Mr. Dallas stated opposition to government operation of plants in competition with private industry. Asked if Revere would be interested in acquiring any of these facilities, Mr. Dallas said the answer is definitely "yes," but in the lack of information as to all factors he did not go into detail.

Difficulties and uncertainties with which "small" companies are confronted in looking ahead to postwar business often were mentioned by industrialists who appeared before the committee. The story was told with exceptional clarity by E. H. Holzworth, president, Frontier Bronze Corp., Niagara Falls, N. Y.

"We must have a clearer picture of the postwar policy of taxation on profits, corporate and individual, before we risk capital on expansion which then becomes a frozen asset, which cannot be recovered except through net profits, after taxes," said Mr. Holzworth.

The company, he said, would like to expand, particularly because its Frontier 40-E aluminum alloy has properties which give it a wide range of usefulness. But there are important reasons why it is forced to hesitate.

Taxes Stifle Initiative

"Present high tax rates, corporate and personal, do not present a very great incentive to initiative and enterprise and the assumption of risks," he said. "The risk for small business is greater than for big business in this respect. Generally, a small business is owned by a comparatively few individuals. They have their own money invested in the business. They own and operate it.

"Big business depends on the capital of others. It is an attractive medium of investment because it is liquid; shares of stocks and bonds of the larger companies have a ready and known market. People hesitate to invest in a small business unless they do own and operate it. They cannot get their money out when they wish or are obliged to do so. The result is that small business must depend, for the most part, upon the capital of its owners. It may obtain bank credit for operating purposes but not loans for plant investment or capital assets. Comparatively few banks or individuals consider a long-term loan on bond and mortgage, to a small business, for plant acquisition or expansion, a sound investment.

"The owners of a small business must, to a very large extent, finance themselves. When they die or retire there is, more often than not, a very considerable shrinkage in the value of their investment. Particularly is that the case with the medium-sized or a fairly large 'small business.' It is too big for the average individual to buy, and too small for a stock or bond issue for sale to the public. The plant is worth what the owners, out of long experience, hard work and skill, could make out of it; and when those owners

die or retire, and that experience and skill is lost, it is entirely problematical what new people can do with that plant.

"And yet in determining the evaluation upon which inheritance or estate taxes must be paid, the earnings record and the book value are considered to be the most important factors.

"The small businessman, considering these matters, realizes that to a very considerable degree he will not be able to recover his principal investment in any other way than through profits in the operation of the facilities in which he has invested his money. Therefore, he will not risk his capital to any great extent unless he has a fair assurance (1) that he can retain a large share of the profits to be derived from the operation of the facilities in which he has invested and (2) that there will be a period of continued prosperity.

"I believe that the average small businessman, in view of all these considerations, will be very hesitant to use his own capital for any great expansion."

Under these circumstances, said Mr. Holzworth, the most helpful course to induce small business to take over government war plant facilities "would be to enable it to operate such facilities on a reasonable lease basis, with a purchase option clause whereby it could effect a purchase over a considerable period of years, with application on the purchase price of any rental payments paid in the meantime."

Suggests Government Testing Agency

Government also can help small business by establishing an agency which would test the products of small business and verify the claims made for these products.

Because of the research facilities of large industry, he said, "their statements regarding their products, and their claims for them, are generally accepted without question." With a proper government endorsement, he said, small business would be in a better position to promote its products.

Mr. Holzworth also advanced the opinion that a large corporation, with its subsidiaries so set up that its operations include all phases from smelting of the ore to the manufacture of finished products, is not fair competition to a smaller corporation when that corporation confines its operations to one phase of manufacturing. "When supply exceeds the demand a loss is often taken in one operation to keep another operation producing at a fair profit; the result is that the smaller corporation, which competes with the one phase of the larger corporation where price has been reduced, must reduce its price accordingly, resulting in a loss which makes it harder for the smaller corporation to stay in business," he said.

Pessimism about the future of small business in the fabrication of aluminum was expressed by Maury Maverick, president and general manager, Smaller War Plants Corp. Reason, he said, is the current high price of the metal; aluminum must come down to around 6 cents a pound before it can furnish business in large volume to small companies, said Mr. Maverick. It is extremely doubtful whether costs could be lowered sufficiently with the use of the present process of producing aluminum. Cheaper processes will have to be developed, he said, and he urged that the government defray the cost of the necessary research work.

S. D. Den Uyl, secretary-treasurer, Bohn Aluminum & Brass Corp., Detroit, believes "The future era will be a light metal era" but told the committee that various uncertainties prevented him from discussing the future outlook intelligently. These uncertainties include postwar wages, taxes and other costs in relation to prices.

The government should dispose of its plants to private enterprise, said Mr. Den Uyl, and "we don't want government to finance industry after the war." Cost of the government plants was abnormal, he said, and recommended that the government take the necessary loss and charge it to the cost of the war. He recommended that Congress establish definite policies for disposing of both plants and materials, and to bear in mind that "we can't play with the old law of supply and demand too long without getting into trouble."

Bohn, said Mr. Den Uyl, might be interested in acquiring some of the government fabricating plants but has not had time under war production pressures to give this matter consideration.

Thomas E. Covel, deputy director, Aluminum and Magnesium Division, War Production Board, told the committee that government-owned stocks of primary aluminum at the end of the war are likely to be in the neighborhood of 250,000,000 pounds. He estimated bauxite reserves of the world in excess of 1 billion tons.

Dr. R. S. Dean, assistant director, Bureau of Mines, estimated Arkansas bauxite reserves at 34,000,000 long dry tons "which can be effectively used in the most up-to-date alumina recovery plants."

In response to a questionnaire the committee received a number of letters:

D. W. Moll, Hills-McCanna Co., Chicago, wrote that this company expects to stay in the business of making magnesium alloy sand castings, and possibly permanent mold castings, but wonders whether it would be worthwhile for it to purchase the Defense Plant Corp. facilities in its plant in view of constant increases in the cost of labor, possible increases in cost of materials, and unknown future taxation. In the view of Mr. Moll, magnesium alloy sand castings should sell after the war at a range of 75 cents to $1.50 per pound, compared with the present range of $1.25 to $3.50. For widespread postwar use of magnesium, Mr. Moll wrote, there must be a better understanding of the uses and handling of this metal.

T. E. Coleman, president, Madison-Kipp Corp., Madison, Wis., predicted heavy postwar demand for aluminum die-cast parts for equipment such as household appliances, and said there would be some delay in getting into production since it would take anywhere from six months to a year to produce the necessary dies. Mr. Coleman wrote that postwar business prospects would be improved by adoption of a tax policy that will permit building up of financial surpluses.

George M. Umbreit, executive vice president, Maytag Co., Newton, Ia., reported his company was devoting its aluminum foundry temporarily to pro-

STUDY PUBLIC WORKS: Members of the House subcommittee on public works are shown conducting a hearing in Chicago on the relations between municipalities and the federal government in the planning of postwar works. Testifying is Chicago's Mayor Edward J. Kelly, in foreground. Committees members, left to right: A. J. Sabath (Dem., Ill.); Walter A. Lynch (Dem., N.Y.); John E. Fogarty (Dem., R.I.); Jay LeFevre (Rep., N.Y.); William Rowan (Dem., Ill.); Martin Gorski (Dem., Ill.). NEA photo

duction of aircraft castings. After the war the company will reconvert so as to produce aluminum castings for its regular peacetime products, washing machines and ironers; it does not plan to make castings for sale. It will take the company between four and six months to reconvert.

S. H. Carbis, president, Aluminum Ladder Co., Worthington, Pa., wrote that his company plans to resume fabrication of aluminum products after the war. He did not believe the company's business volume would be much influenced by the price of pig aluminum.

J. L. Barrett, president, Extruded Metals, Detroit, wrote that he would favor a policy of permitting operators to switch DPC-owned plants to commercial business after termination of war orders only to the extent that privately owned plants are unable to take care of demands.

The best thing the government can do to encourage full production after the war, wrote Mr. Barrett, is to remove confiscatory tax structures. "With any business paying out 80 per cent of its net income in taxes," he wrote, "there is absolutely no prospect of expansion and providing more jobs."

S. G. Brooks, president, D. L. Auld Co., Columbus, O., which now manufactures aluminum forgings for the war program and which expects to go back to production of steel forgings for the automobile industry, also possibly aluminum forgings if there is a demand for them, reported to the committee that the situation in aluminum scrap already has become serious. Instead of being able to sell its scrap, Mr. Brooks wrote, his company had to pay to get it hauled away.

Steel Wage Commission To Oversee Bargaining

A tripartite commission to oversee the collective bargaining on intraplant wage inequities ordered by the War Labor Board in its steel wage decision last November has been created by the board. The commission is charged with seeing that the specific limitations laid down by the board are observed.

Co-chairman and public members of the commission will be Theodore W. Kheel, WLB executive director, and William E. Simkin, former chairman of the WLB shipbuilding commission.

Industry representatives will be R. C. Cooper, Pittsburgh, assistant vice president of the United States Steel Corp. of Delaware, and Lauson Stone, president, Follansbee Steel Corp. J. Paul Cain, American Rolling Mill Co., Middletown, O., and A. H. Roosma, Republic Steel Corp., Gadsden, Ala., will serve as alternates. Substitutes will be A. M. Tredwell Jr., Sharon Steel Corp., Sharon, Pa., and Sydney Evans, Bethlehem Steel Co., Bethlehem, Pa.

The commission's jurisdiction will apply to the 86 companies covered by the basic steel wage decision and any others the board may designate.

Seek House Support for Federal Statute of Limitations Measure

H.R.2788 would limit period in which public and private actions based on federal law can be brought. Enactment would protect many employers from financial difficulties resulting from damages assessed under Fair Labor Standards act

MANY businessmen are writing to their members in the House, urging them to support H. R. 2788 which would limit the period of time within which public and private actions based upon federal law could be brought. For public actions, the time would be "2 years after the cause of action accrued," and for private actions "1 year after such cause of action accrued, unless a shorter time be fixed in any applicable state statute."

The bill, if enacted, would materially reduce payments exacted from partnerships and corporations under the "liquidated damages" principle under which courts customarily award double the amount of the damages, plus attorney's fees. The bill is intended particularly to protect many thousands of companies from bankruptcy, or serious financial impairment, as a result of damages assessed against them under the Fair Labor Standards act.

Author of the bill is Rep. John W. Gwynne (Rep., Iowa) who in his introductory speech told of a case of recovery of wages, double damages and attorney's fees in "a suit filed more than 3 years after the employment terminated and 6 years after the cause of action accrued.

"This situation," he said, "comes about by reason of the extension of laws through interpretation and application by administrative agencies. It is often where a new interpretation is applied that an employer for the first time finds himself liable for large sums for past services of individuals, many of whom he no longer has in his employ but whose right to collect can be asserted as much as 12 years later.

"Under the Fair Labor Standards act the concepts of worktime, overall damages and the administrative authority are constantly being enlarged by new interpretations. Each enlargement is given effect as of the date the act became effective

REBUILDING DAMAGED BRIDGE: United States Army man works on the reconstruction of a damaged bridge in Germany. Army engineers already are rebuilding many of the structural casualties of the war, and in some cases are using steel from German mills. NEA photo

(October, 1938). Consequently employers are finding themselves liable for damages, doubled, for events which were lawful when they occurred but unlawful in retrospect. No federal statutes of limitations protect them except state laws."

During the past year employers have been dismayed by numerous interpretations of the wage and hour administrator holding that employes are at work during the time they use shower baths installed by the employers, that lumberjacks are at work while on their way to and from cutting sites, that men are at work while changing their clothes to go to work or go home, and in such cases the employers have been ordered to pay double damages for time so spent since 1938. The situation has been complicated further because of long delays while the wage and hour administrator was in process of determining under what circumstances unpaid wages could be collected.

The bill also would affect treble damage suits brought under the Sherman act, and actions under other federal laws where "confusion as to limitations exists."

There is no organized opposition to the bill so far as known. Furthermore, it has been assigned to the House Judiciary Committee which usually takes a constructive view of measures of this kind.

Surplus Property Disposal Agencies Are Designated

Government agencies which will dispose of the various types of surplus property are designated in Regulation No. 1, issued by the Surplus Property Board. With the exception of real property disposal and the disposal of surpluses in United States territories and possessions, Regulation No. 1 continues the domestic disposal assignments that have been exercised for the last year under the authority originally derived from the old Surplus War Property Administration.

Within the United States proper, the disposal agencies will carry on as before, except for real property sales. Consumer goods will be disposed of by the Treasury Department. Consumer goods, which include automotive equipment and construction and farm machinery, are an important part of the surplus from the civilian market standpoint.

Capital and producers' goods, including aircraft, are assigned to the Reconstruction Finance Corp. Ships and maritime goods will be sold by the Maritime Commission. Agricultural commodities and food are assigned to the War Food Administration. Housing property will be disposed of by the National Housing Agency.

In U. S. territories and possessions, the RFC will have charge of sales of aircraft and parts, the Maritime Commission of ships and maritime goods, the WFA of food and agricultural commodities. All other types of surplus property will be disposed of by the Department of the Interior.

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

CMP REGULATION

SHEET: CMP regulation 1, direction 67, has been amended to limit the production of hot-rolled pickled sheets or strips for distributors by 50 per cent each month. (CMP. Reg. 1, direction 67 amended).

L ORDER

TIRE CHAINS: Increase in production for farm tractors authorized in amendment to limitation order L-201. In the order paragraph (d) (3) is amended to read: "For farm tractors. Between April 1, 1945, and March 31, 1946, a producer must not use in the production of tire chains for farm tractors more than 120 per cent of the total weight of metals used in the production of all tire chains for farm tractors shipped by him during the calendar year 1944." Other amendments to the order include a minor change in paragraph (c) permitting producers to ship specially sized tire chains ordered either directly or indirectly by the consumer. (L-201).

M ORDERS

TUNGSTEN: As a result of urgent military programs requiring large quantities of tungsten, use of the metal in high speed tool steels is restricted through order M-21-j. Provisions follow closely requirements of the old order, M-21-h, which was revoked last August, except that in the new order the melting and deliveries of high speed steel must be in the proportion of 85 per cent of Class A and 15 per cent of Class B high speed steel as compared with 75 per cent Class A and 25 per cent Class B in the old order. Class A high speed steel is defined as an alloy steel containing not less than .60 carbon and 6.75 or less tungsten, and more than 3 molybdenum. Class B is described as an alloy steel containing not less than .55 carbon and more than 12.0 tungsten. (M-21-j).

STAINLESS STEEL: Stainless steel is redefined in a newly-amended M-126 order to bring it into conformity with the stainless steel definition in the steel order M-21-a. In the amended order, the term "stainless steel" means heat or corrosion resisting steel containing 4 per cent or more of chromium with or without nickel, molybdenum or other elements. (M-126).

CONTAINERS: Packer's quota for use of tin plate or terneplate cans for packing paint products is reduced to 60 per cent of 1941 usage in a revision of conservation order M-81. Previous quota was 100 per cent of 1941 usage. Paint products covered by the quota include pigment oil paint, varnishes, aluminum paint, paste water paints and lacquers. The amended order also sets a quota of 25 per cent of 1941 usage for cans for packing motor oils, and 100 per cent of 1944 usage for packing insecticides and fungicides. The definition "black plate" in order M-81 is broadened to include electrolytic waste-waste, terneplate waste-waste, and terneplate waste. This action was taken to assure use of these materials. Amended order also permits use of hot dipped tin plate waste-waste when tin plate specifications of 0.50 or heavier are indicated. Direction 7 to order M-81 is revoked and its provisions incorporated in paragraph (g) (2) of the order. (M-81).

P ORDER

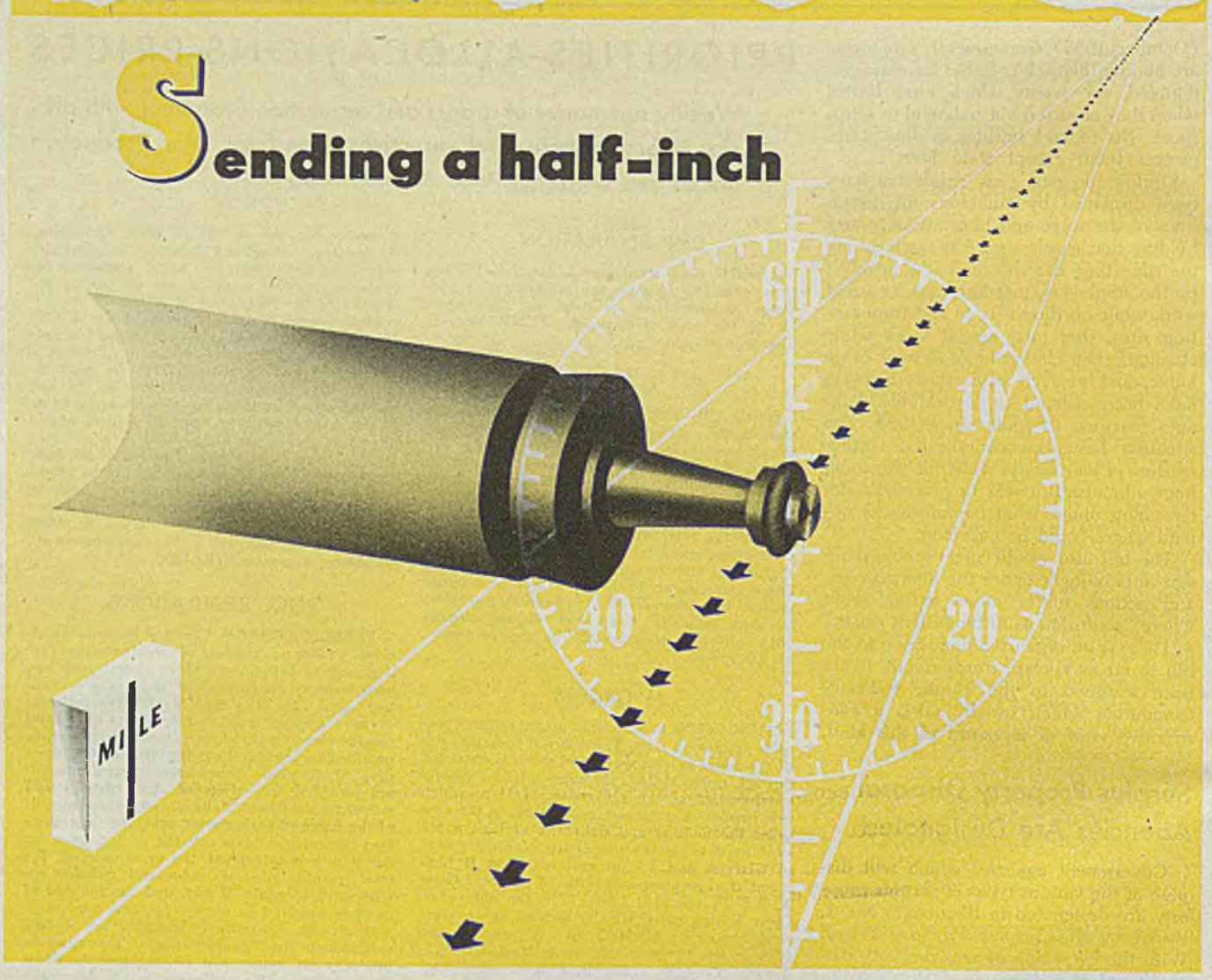
METAL STRAPPING: Because demand has exceeded supply, preference rating order P-152 has been issued to insure that the most essential needs are cared for first. Order permits any person to use an AA-1 rating to obtain metal strapping for the functional uses: carloading, skidloading, baling and bundling. Order also permits persons who use metal strapping for container reinforcement to use the rating assigned for the container it reinforces in accordance with preference rating order P-140. It also permits use of an AA-5 rating for procurement reinforcement edgings. Preference ratings assigned or permitted to be used by P-152 may be applied or extended to any unfilled order for strapping tools, accessories or fittings placed prior to April 6. Orders placed after that date must be re-rated in accordance with the new order within a period of 45 days. Certification form is provided for use in applying or extending ratings. Inventories held by persons other than distributors, manufacturers or the Army and Navy are limited to $300 worth of strapping, or a 45 days' inventory, whichever is greater. (P-152).

PRICE REGULATIONS

STEEL CASTINGS: Changes in some provisions governing pricing of steel castings are designed to bring them more closely into line with industry practice. The changes are effective April 14. They include: 1. Manufacturers of steel castings produced to Navy of federal specifications may charge the ceiling prices provided for such castings for Navy or Ordnance use. 2. Specific record-keeping requirements are provided for sellers of steel castings and railroad specialties. Sellers must keep records of the name of each casting sold, the item number, the method by which the ceiling price for the item was calculated, the price charged, the total quantity of each order and monthly requirement schedule, if any, and the number of castings involved in each order and total shipping weight. Quantity differentials are revised to eliminate the "production run" provision. A producer no longer will be required to await the completion of a production run to determine the quantity differential to invoice a particular sale, but may use a quantity differential based on the production schedule by the purchaser for any one calendar month. Provisions for transportation charges or allowances on steel castings and railroad specialties sold on delivered basis are clarified. Amendment No. 15 to revised price schedule No. 41, effective April 14).

IRON AND STEEL SCRAP: Brokers are authorized to charge their commission of 50 cents per gross ton on scrap sold at the same price at which it was purchased, even though this price may be below the ceiling. Since November, brokers have been permitted their commission on sales only if the scrap was purchased and sold at the maximum prices. The new authorization, effective April 14, is one of several changes in the OPA scrap price regulation designed to facilitate easier movement of material. The other changes, also effective April 14, include: 1. The number of grades and specifications of railroad scrap are revised in line with changes in railroad specifications. 2. Provisions governing dealer sales of railroad scrap are amended to permit dealers or contractors who demolish railroad equipment upon the property of a railroad to sell the heavy melting steel obtained at ceiling prices established for No. 1 railroad heavy melting. This gives sellers an increase of $1 per gross ton over the dealer and industrial ceiling price that previously governed such sales. 3. Preparation-in-transit provisions are broadened to permit in-transit preparation of cast iron in Zone C on all sales, the principal eastern steel industry producing area. 4. Pricing provisions are extended to cover all export scrap or scrap sold to an exporter. The extension makes domestic maximum prices applicable to all export scrap sales. (Amendment No. 2 to MPR-4).

Sending a half-inch



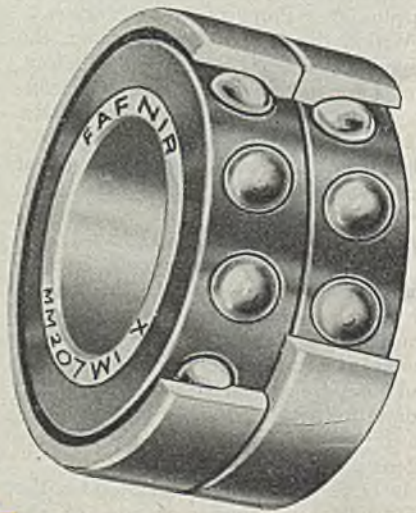
on a mile-a-minute errand

Getting 5000 peripheral feet a minute with a 4-inch grinding wheel poses no serious speed problems. But, to do that with a half-inch grinding wheel, speed must be stepped up to 40,000 r.p.m. And the maintenance of that speed hour after hour is a job for ball bearings.

More than that, it's a job for which Fafnir Super-Precision Bearings were specifically made. In the Fafnir Super-Precision Department, the "factory-within-a-factory," balls for these bearings are matched to unbelievable limits. And pairs of these bearings are matched so carefully that variations between assembled bearings are reduced to millionths of an inch. Properly mounted, these bearings eliminate harmful deflection, maintain inherent rigidity and give *truly accurate* production required today in so many industries.

The same Fafnir engineering skill and experience which made possible our own Super-Precision Department are available to help you lick your bearing problems. The Fafnir Bearing Company, New Britain, Connecticut.

★ 2181



MM200WIX SERIES
Extreme precision, preloaded duplex pairs, for speeds of 40,000 r.p.m. and more.

FAFNIR BALL BEARINGS
Most Complete Line in America

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Meeting of automakers and War Production Board executives concerned with overall war problems, not with new car production. Closer liaison between WPB and industry effected by appointment of Henry P. Nelson as reconversion co-ordinator

DETROIT

AS J. A. KRUG, WPB chief, and ten of his high-ranking aides, stepped from their plane at the airport here enroute to a meeting with about 40 top automotive officials, he was confronted with 8 column streamer headlines appearing in a local paper proclaiming the WPB had agreed to authorize production of 250,000 passenger cars in the last quarter of this year. Mr. Krug stated later he was "flabbergasted" since no such authorization had been granted or even discussed. As a matter of fact he was routed from bed at 1 a.m. the morning before to comment on the headline and brief accompanying story from Washington, and at that time he made a flat denial.

However, he was no more flabbergasted than were General Motors officials and George Romney of the Automotive Council for War Production the evening before at a press conference held by C. E. Wilson, president of General Motors, when early editions of the newspaper were waved before them. From all outward indications, the Washington report was strictly a dud, how it ever came to be accorded credulity by editors here remains a mystery.

Successful Love Feast

The meeting of Mr. Krug and automotive officials, to judge from official joint statements made to the press which waited around WPB offices for nearly two hours until it was released, was an unqualified success as a love feast. The WPB head said it was the finest meeting he had ever had with representatives of a major industry during the war. The industry officials countered with the observation that the WPB's grasp and sympathetic understanding of their problems was "very heartening." It was made emphatically clear the meeting was not concerned with discussion of new car production but rather with overall war problems, and the planning and preliminary steps necessary to permit smooth readjustment when war production schedules can be reduced substantially. When that will be is a matter for conjecture. Much will depend on when General Eisenhower declares organized German resistance at an end—perhaps even now a reality. Mr. Krug estimated war production schedules might be reduced 12 per cent in the first quarter after termination of hostilities in Europe, 20 per cent the second quarter, 25 the third quarter, and 35 per cent the fourth quarter, but he admitted these were only estimates, and actual reduction might be appreciably more.

A much closer liaison between the auto industry and WPB has been effected with the appointment of 37-year old Henry P. Nelson, director of the WPB Aircraft Division, as Detroit administrator of automotive reconversion for the WPB. He is a former production executive of International Harvester Co., now on leave, having been with this company since 1925. Since 1942 he has held a variety of top positions in the WPB and the Army Air Forces. His production experience should stand him in good stead in his new activities, in the opinion of some officials of automotive companies.

Two principal efforts of Mr. Nelson and his assistants here at first will be in the direction of easing the procurement of $25 million worth of key machine tools the industry needs—or at least loudly maintains it needs—before any cars can be built, and the readjustment of war production schedules equitably among different companies. Under direction of John S. Chafee, head of the WPB Tools Division, the first is now being given intense scrutiny, and while it is not likely any special priority assistance can be extended for these tools, Mr. Krug indicated he was confident some means could be found for expediting their scheduling and delivery, even if it means deferring military requirements which are some distance away.

Obviously the WPB is not alone on this reconversion program. The Army, Navy, AAF, War Manpower Commission and other governmental agencies all have their fingers in the pie and will have to be consulted continuously. At least the air has been cleared perceptibly, and the industry should now move ahead more harmoniously with the WPB.

Another corollary matter now being given concentrated attention is the perfection of better plans for the prompt and equitable disposal of government-owned machinery in operation in plants through industry. It is likely the clearance of obstacles on this road could lessen the urgency of the 7500 new machines which industry must have before production can start.

Impending election among general foremen, assistant foremen and special assignment men at the Packard plant on the question of whether they desire to be affiliated with the Foremen's Association of America for purposes of collective bargaining has touched off a determined effort on the part of automotive managements, particulary Packard and General Motors, to dissuade their supervisory help from such a course. If the majority vote in the election should go to the foremen's union, it is the intention of the motor companies to carry the case to the courts for final determination of management's contention that unionization of foremen would be harmful to supervision of all levels, to industry in general, to the war effort and to the country. Should the case be carried to

OUTLINES RECONVERSION: J. A. Krug, chairman, War Production Board, center, talks to war plant operators in Detroit on reconverting to civilian production. He is flanked by John D. McGillis, of the Detroit WPB office, and George Romney, managing director of the Automotive Council for War Production. NEA photo

this length and the courts uphold the unionization of foremen, and the logical absorption of their union into the CIO, there doubtless would be instituted an entirely new form of organizational chart in the plants affected, with some means developed to maintain the power to direct operations by management, exclusive of foremen and free from external influences.

Letters have been dispatched to all foremen in both Packard and General Motors plants from George T. Christopher for Packard, and C. E. Wilson for GM, clearly and calmly stating the position of management.

From Mr. Christopher's letter: "Levels of supervision differ only in the amount of responsibility assigned to them. The foreman level of management, which is charged with the responsibility of carrying out company policies and instructions, must have the same interests and allegiance as those of higher management. To split it, is not even rational unionism."

From Mr. Wilson's letter: "Whenever there is confusion as to the authority and responsibility of supervision, the sound way to correct it is to define clearly such authority and responsibility. From our experience prewar and during the war we are certain that our plan of decentralizing and delegating managerial authority and responsibility to foremen is the best and the only sound method of handling the day-to-day management relations with thousands of factory employes."

In Embarrassing Position

The automotive industry finds itself in a rather embarrassing position on this question of union organization of foremen, since the Ford Motor Co. has signed a contract with the Foremen's Association and has been operating under it for better than a year, without too much apparent difficulty. Thus, for its part, Ford cannot talk too openly about the foreman problem because after all it is still co-operating with other divisions of the industry, while those companies whose foremen are not organized must try to look the other way when queried about the Ford situation.

As groups of employes under direction of a foreman grow larger, he tends to lose personal touch with them and thus in a measure surrenders some control of them to group leaders and shop committeemen. Active consideration is currently being given to ways and means of recultivating the personal touch between foremen and workers—at least in General Motors plants.

Further information on the aims and purposes of the American Society of Industrial Engineers (STEEL, March 26, p.76), supplied by Robert L. Crinnian, national president, reveals certain inaccuracies in the original comment here on this organization. There are, at present, eight active chapters of the group, in numerical order: Detroit, New York, Milwaukee, Allentown, Pa., Los Angeles, Saginaw Valley, San Francisco and Seattle. At one time membership of the Detroit chapter, now in its third year, was in excess of 600, but it has since shrunk as the result of increasing emphasis on quality rather than quantity of membership.

HENRY P. NELSON

National officers, in addition to Mr. Crinnian, are: Vice presidents, R. A. Trumpis, Trumpis & Collar, Burbank, Calif.; G. J. Parker, Sperry Gyroscope Co., New York; W. R. Blommel, Ford Motor Co., Detroit; Ivan N. Cuthbert, Smith, Hinchman & Grylls, Detroit; Ethelbert Favary, Lockheed Aircraft Corp., Burbank, Calif; and James Campoli, Roseville, Mich.; secretary, Fred L. Etchen, Kelsey-Hayes Wheel Co., Detroit; treasurer, Russell Moore, Vascoloy Ramet Corp., Chicago; and chairman of the board of governors, Robert D. Seeley, Eclipse Counterbore Co., Detroit. The board comprises two members from each chapter, and is the directing authority of the society.

Mr. Crinnian explains the society has established itself to perform the following basic functions:

"1. Standardize the professional status of the industrial engineer throughout the country.

"2. Standardize the work of the industrial engineer through a research organization whose main purpose is to establish standards of practice on plant layout, processing, time study, management practices and various phases which make up the industrial engineers' activity to provide economy of operation.

"3. Establish a basic standard which can be used to evaluate industrial engineers equally in all sections of the country where industry exists.

"4. Establish and promulgate a sixth basic science besides the present five basic sciences represented by organized engineering fraternities covering civil, mechanical, electrical, and mining and metallurgical engineering."

The industrial engineer of today, as viewed by Mr. Crinnian's group, represents "A composite engineer of many varied knowledges and skills whose entire operation and practice is comprised within the walls of a plant from the original product design to the time the product is available to the public."

Selection of Hamilton, O., as site for a new postwar body stamping and sheet metal component plant of the Fisher Body Division of GM has been confirmed, after earlier reports this plant would be built in Cincinnati. The plant will be located on a tract of 145 acres 3 miles south of Hamilton on the Baltimore & Ohio railroad. It will cover 1,200,000 square feet of floor space, one story in height, and will house heavy stamping presses, moderate size tool and die shop, and modern facilities for employes. The plant will bring to five the number of stamping units operated by Fisher, others being in Cleveland, Grand Rapids, Flint, Pontiac, Detroit.

Plan Car in Australia

News wires from Australia report the first definite move to manufacture automobiles in that country has been made with General Motors Holdens Ltd. informing the commonwealth government it is prepared to proceed immediately to manufacture motor vehicles, including chassis and engines. The company plans to produce a five-seat sedan and a related utility car.

General Motors Holdens will obtain from General Motors Corp. in the U. S., which controls it, various manufacturing rights, services of engineers in specialized branches and access to GM factories in the U.S., Canada, and England.

Prime Minister Curtin has informed the company that if its proposals are carried out and a complete car produced within reasonable time, the commonwealth government itself will not engage in the manufacture of motor cars.

Dividends in time, work, and lives saved result daily from efficient operation of the tank salvage section of Peninsular Base Section Ordnance Base Shop No. 3 in the Mediterranean theater of war.

Returning to combat two tanks or "half-tracks" per day with a minimum of 310 man-hours represents not only time saved but takes part of the load from tank manufacturers in the U. S.

Because many parts cannot be obtained quickly from the United States, the American soldiers at the base shop have applied their mechanical ingenuity in making modifications discovered as necessary under battle conditions.

Tank retrievers operating in the front lines pull tanks and some other equipment back to the depot salvage yards. High priorities are placed on the reconditioning, and work at the base is on three eight-hour shifts.

Final step in the reconditioning is a seven-hour road test and the making of any necessary last-minute adjustments. Delivery of the reconditioned unit is made to the front line within a few hours after the test is completed.

Beat Competition by BEATING RUST

Plan your product to be a winner .... in the face of keen future competition....by using Harper Everlasting Fastenings—the fastenings that (1) resist rust and corrosion, (2) stand up in the presence of many acids, alkalies and other tough conditions, (3) add years of service life AT LOW COST, (4) can be removed with ordinary tools and used again and again. Every Harper fastening is made of either brass, copper, naval bronze, silicon bronze, Monel or stainless steel (nothing in common steel).

4360 ITEMS IN STOCK

Harper is known as "Headquarters for Non-Ferrous and Stainless Fastenings" .... carries large and complete stocks of 4360 different items and is continually adding others ....maintains large stocks of metal in bars, rods, wire, sheet and other basic forms from which special fastenings can be quickly made. Write for 1945 Catalog.

THE H. M. HARPER COMPANY
2646 Fletcher Street, Chicago 18, Illinois

BRANCH OFFICES: New York City • Philadelphia
Los Angeles • Milwaukee • Cincinnati • Houston
Representatives in Principal Cities

HARPER

EVERLASTING FASTENINGS

ARMY E NAVY

BRASS • BRONZES • COPPER • MONEL • STAINLESS

MEN of INDUSTRY

L. J. PURDY

S. L. MYERS

E. L. SPRAY

L. J. Purdy has been elected director and vice president in charge of trucks of Dodge Division, Chrysler Corp., Detroit. Mr. Purdy has been general manager of Dodge truck plant, Detroit.

—o—

Fayette Leister has been advanced to the position of engineering manager, Fafnir Bearing Co., New Britain, Conn. For the past 10 years Mr. Leister has been manager of the company's Detroit territory.

—o—

Louis A. Traxel, formerly personnel director of Saginaw Steering Gear Division, General Motors Corp. at Saginaw, Mich., has joined American Airlines Inc., New York, in a similar capacity.

—o—

Lt. Commander David E. Robinson, who has been granted inactive status by the Navy Department, has joined Harrington-Wilson-Brown Co., New York. Before going into the Navy, Mr. Robinson was associated with William Sellers & Co., Philadelphia, for 13 years.

—o—

M. T. Deames has been named assistant general parts manager, Caterpillar Tractor Co., Peoria, Ill. Assisting him as parts managers will be **A. H. Yingst**, for export and governmental sales; **T. H. Hodgins** for the Central Sales Divisions; **C. M. McKnight** for the Western and **B. W. Kramm** for the Eastern Sales Divisions. Other appointments include **E. L. Mason**, **H. F. Haven**, and **C. D. Byrns** to the positions of assistant parts managers of the Central Western and Eastern Sales Divisions respectively.

—o—

Lester L. Doughty, industrialist specialist for the Foundry Division of the War Production Board in Alabama, has resigned to become district sales manager, Reynolds Metals Co., Richmond, Va.

—o—

Robert G. Allen has been appointed general manager, Southwark Division, Baldwin Locomotive Works, Eddystone, Pa., to succeed **Frederick G. Schrantz**, resigned.

—o—

S. L. Myers, formerly vice president in charge of export sales, LaPlant-Choate Mfg. Co. Inc., Cedar Rapids, Iowa, has been appointed vice president and general manager, succeeding **H. H. Buchanan**, resigned. Mr. Myers has served LaPlant-Choate in various capacities for over 22 years, having started as helper in the machine shop in 1923.

—o—

Maynard E. Montrose of Los Angeles has been elected president and general manager, Marion Steam Shovel Co., Marion, O., succeeding **Carl F. Lamarche**, who has resigned. **Harvey T. Gracely** of the sales department has been elected vice president.

—o—

W. A. Elliott, formerly vice president in charge of sales, Elliott Co., Jeanette, Pa., has been elected executive vice president. **Ronald R. Smith** has been elected vice president in charge of engineering. **M. G. Shevchik** has been named secretary and treasurer and **F. W. Dohring**, general sales manager, has been elected assistant to the executive vice president.

—o—

J. D. Zaiser has been made general manager and executive vice president, Ampco Metal, Inc., Milwaukee, succeeding **C. J. Zaiser** who has resigned as general manager, but who will continue as president. **Reinhold Kunz** has become first vice president and **George Dreher** has become second vice president.

—o—

Glenn Cordon has been named purchasing agent for Ingalls Iron Works Co. and Ingalls Shipbuilding Corp., Birmingham, Ala.

—o—

R. L. Mitenbuler has been named district manager of sales in Wisconsin for Bliss & Laughlin Inc., Harvey, Ill. His headquarters are at room 505 First Wisconsin Bank building, 743 N. Water street, Milwaukee. **L. E. Meidinger**, district manager at Milwaukee for the past 31 years, has retired.

—o—

Ellis L. Spray has been elected a vice president, Westinghouse Electric & Mfg. Co., East Pittsburgh, in charge of elevator and air-conditioning activities. Mr. Spray has been vice president and general manager, Westinghouse Electric Elevator Co., Jersey City, N. J., which is to be dissolved.

—o—

C. F. Larsen has been named service manager, general service department, of Mack Trucks Inc., New York. Other recent appointments by Mack are: **S. H. Bridges** as manager of the Poughkeepsie, N. Y., branch, replacing **H. E. Weatherwax**, resigned; **G. L. Murphy** as manager of the Utica, N. Y., branch, succeeding Mr. Bridges; **R. J. Meinert** as manager of national account sales in the Central Division with headquarters in Chicago.

—o—

R. M. Darrin has been appointed district manager of the Transportation Division, New York district, General Electric Co.

—o—

J. B. Gray, executive vice president, Fairfield Engineering Co., Marion, O., has been elected president, succeeding **H. B. Walker**, founder of the company, who has become chairman of the board.

—o—

Martin L. TerBush Jr. has been appointed field representative of the American Photocopy Co., Chicago. He will have charge of activities in Detroit and surrounding territory.

—o—

L. Burton Sandaners has been appointed manager of the Statistical Section of the Employe Accounts Division of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

—o—

Dean E. Carson has been named director of business research of the B. F.

G. H. BOCKIUS

S. B. HEPPENSTALL

D. W. VERNON

Goodrich Co., Akron, O., succeeding **Ward Keener** who recently became assistant to the president of the company.

—o—

George H. Bockius, formerly vice president and general manager, has become president and general manager, Diebold Inc., Canton, O. Other officers elected were: **Eliot Ness,** chairman of the board of directors; **A. W. Jackson,** vice president in charge of sales; **Lyman H. Clark,** vice president in charge of industrial relations; **John P. Paca,** vice president in charge of product engineering; **John H. Raber,** vice president in charge of factory operations and **Harry C. Weible,** secretary and treasurer. New board members elected were: **Orville H. Foster Jr.,** secretary and director, Koestlin Tool & Die Corp., Detroit, and **J. Brenner Roote,** president and director, Harter Bank & Trust Co., Canton, O.

—o—

R. E. W. Harrison has rejoined the Chambersburg Engineering Co., Chambersburg, Pa., as vice president in charge of sales following his release from duty from the Navy where he served the past four years as staff officer with the rank of commander in various Navy bureaus and offices.

—o—

Ernest Murphy, vice president, the Pressed Steel Car Co., Pittsburgh, has been elected president of the company to succeed **J. F. MacEnulty,** who becomes vice chairman of the board.

—o—

Claire L. Barnes, founder and former president of Houdaille-Hershey Corp., has been elected chairman of the board of Bendix Helicopter Inc., succeeding the late **Vincent Bendix. Robert J. Newhouse** has been elected chairman of the Bendix executive committee.

—o—

Earl E. Diehl has been named Northwestern District treasury manager for the Westinghouse Electric & Mfg. Co., Pittsburgh. In his new post he will have charge of Treasury department activities in an area comprising eight middle-western states, succeeding **John T. Hayes,** who becomes Pacific Coast District manager at San Francisco.

—o—

S. B. Heppenstall Jr. has been elected vice president of the H. K. Porter Co. Inc., Pittsburgh. He formerly was vice president in charge of sales of the Heppenstall Co., and is a member of the Association of Iron & Steel Engineers and the American Iron & Steel Institute.

—o—

Robert E. Ruzen has been appointed factory superintendent, Wilson Foundry & Machine Co., Pontiac, Mich., and **George E. Thierry** has been appointed quality supervisor for the company.

—o—

Max W. Parmalee has been appointed New York district manager of Square D Co., Detroit, to succeed **H. R. Allen** who died March 14. Mr. Parmalee was formerly manager of the Cleveland district and has been replaced by **Earle J. Rooker.**

—o—

Charles A. Packard has been elected vice president and comptroller of Worthington Pump & Machinery Corp., Harrison, N. J. He is also vice president of the Controllers' Institute of America.

—o—

Carl A. Salmonsen, assistant manager of the General Electric Co.'s River works at Lynn, Mass., has been named manager of the company's Philadelphia works, effective May 1. **Robert Paxton,** Philadelphia works manager, has been named manager of the company's Pittsfield, Mass., works, effective July 1 at which time **L. E. Underwood** will retire as manager. From May 1 until July 1 Mr. Paxton will be assistant manager of the Pittsfield works.

—o—

H. S. Chase, vice president in charge of manufacturing and **Drew L. Hines,** vice president in charge of transportation and supplies, have been elected directors, Tide Water Associated Oil Co., New York. **K. R. Hankinson,** vice president and treasurer, has been appointed a member of company's Eastern Division operating committee.

—o—

Douglas W. Vernon has been appointed general manager of sales for A. Leschen & Sons Rope Co., St. Louis.

—o—

Henry E. Hull, formerly design engineer with the Parker Appliance Co., Cleveland, has joined the staff of the Battelle Memorial Institute, Columbus, O., where he will be engaged in research on production methods and processes.

—o—

A. W. Taylor, formerly purchasing agent, Rotary Steel Co., Detroit, has been appointed purchasing agent for Crucible Steel Co. of America, New York.

—o—

H. O. Bercher, formerly manager of order department, Wisconsin Steel Division, International Harvester Co., Chicago, has been appointed assistant to the vice president in charge of the division.

—o—

Luther B. Martin has been appointed director of tire development and research, United States Rubber Co., with headquarters at Detroit. Mr. Martin is at present chairman of the Ordnance Advisory Committee, Tire and Rim Association and a member of the Tire and Tube Technical Consulting Committee, War Production Board.

—o—

Harry I. Lutz has been elected a board member of Edgcomb Steel Co., Philadelphia, and Carl S. Vogel has become manager of sales.

—o—

William P. Feeley, executive vice president since 1941, has been named president, Great Lakes Dredge & Dock Co., Chicago, to succeed **Edward M. Markham,** who has resigned both as president and director. **Aaron Colnon,** a director since 1935, has been elected

chairman to succeed **Dr. Walter G. McGuire**, resigned. **Eugene K. Kydon**, a vice president since 1938, has advanced to executive vice president. **Charles E. Trout**, New York office manager, and **Martin H. Brennan**, Buffalo office manager, have been elected vice presidents.

—o—

D. Arthur Williams, president, Continental Steel Corp., Kokomo, Ind., has been named a director of the Public Service Co. of Indiana, Indianapolis.

—o—

Elmer Greene has been made second vice president and consultant on factory matters for the Ferry Cap & Set Screw Co., Cleveland. Associated with the screw, bolt and nut industry for 56 years, Mr. Greene has been with Ferry for 25 years. **Maj. John R. Haysack**, recently returned from the quartermaster corps which he has served since 1942, has been made vice president in charge of manufacturing to succeed Mr. Greene. He joined the company in 1918. **William J. Murphy**, with the company for 36 years, has been promoted to factory manager.

—o—

William T. O'Connor has been elected vice president in charge of purchases of Manning, Maxwell & Moore Inc., Bridgeport, Conn.

John J. Heffernan has been appointed purchasing agent of Universal Atlas Cement and Atlas Lumnite Cement Co., New York, succeeding the late **Richard B. Hayes.**

—o—

Charles C. Layman has been elected president and general manager of Aeronautical Products Inc., Detroit, succeeding the late Alfred Jackson. He was formerly vice president and sales manager. **M. J. Whitfield**, formerly secretary, has been promoted to executive vice president and **Byron Layman**, treasurer, named secretary-treasurer.

OBITUARIES . . .

Prof. Albert V. de Forest, 56, noted engineer, member of the mechanical engineering faculty at Massachusetts Institute of Technology, and president, Magnaflux Corp., Chicago, died at his summer home in Marlboro, N. H., April 5.

He was best known in engineering for his development of the magnaflux test, a magnetic method of discovering defects in metals. Many engineering honors were conferred upon him, including the Modern Pioneers Award in 1940, in "recognition of meritorious service to industries and to mankind in the creation of numerous new industries and countless jobs."

He was born in New York and was graduated from Massachusetts Institute of Technology in 1912. He began his career in the drafting department of the New London Ship & Engine Co., New London, Conn., and a year later became an instructor in engineering at Princeton University. He was associate research engineer, Union Metallic Cartridge Co. from 1916 to 1918 and for ten years thereafter was research engineer for the American Chain Co. He was founder of the Magnaflux Corp.

In 1936 Prof. de Forest won the Longstreth medal of the Franklin Institute for inventions and meritorious improvements in machines and mechanical processes. The Institute of Aeronautical Sciences awarded to him in 1938 the Sylvanus Albert Reed prize for the development of a method generally used by the aircraft industry for testing metals magnetically. He was also recipient of the Dudley medal of the American Society for Testing Materials.

—o—

Leon Fraser, 55, president, First National Bank of New York, former president of the World Bank for International Settlements, and well known in the steel industry as a director and member of the Finance Committee, United States Steel Corp., New York, died in North Granville, N. Y., April 8.

Walter J. Conlon, 57, who retired in 1936 as president, Conlon Corp., Cicero, Ill., died April 7 in Manistee, Mich.

—o—

Swift Miller, 69, research engineer, Square D Co., Milwaukee, died recently in that city.

—o—

Roy Wolvin 66, chairman of the executive board of Canadian Vickers Ltd., Montreal, Que., died April 7 at Toronto, Ont. Mr. Wolvin was also president of Kingston Shipbuilding Co. Ltd., Kingston, Ont.; Collingwood Shipyards Ltd., Collingwood, Ont.; Port Arthur Shipbuilding Co. Ltd., Port Arthur, Ont.; Midland Shipyards Ltd., Midland, Ont.; and the Canadian Shipping & Engineering Co.

—o—

Frank Berry Allen, 58, since 1921 president, Allen-Sherman-Hoff Co., Philadelphia, died recently at Tampa, Fla. Last year Mr. Allen received the Franklin Institute Longstreth Medal for perfecting a water seal pump.

—o—

Charles W. Scribner, formerly a professor of mechanical engineering at the Universities of Pennsylvania, Iowa and North Carolina died recently in New York. He was a life member of the American Association of Mechanical Engineers.

—o—

Gene B. Hassler, chief chemist, General Metals Corp., Oakland, Calif., died there recently.

—o—

Leo Bingham, 77, who retired five years ago as vice president, Remington Arms Co., Bridgeport, Conn., died recently at East Orange, N. J. Mr. Bingham had been associated with the company since he was 15 years old.

—o—

Herbert M. Dibert, secretary-treasurer, W. & L. E. Gurley Co., Troy, N. Y., died April 7 in that city.

—o—

Amedee H. Smith, 76, pioneer West Coast industrialist, died March 25 in Portland, Oreg. He was chairman of the board of the Hyster Co.; president of the Willamette Iron & Steel Co.; a director of the Portland General Electric Co. and president of the Oregon Paramount Corp. In addition to his business connections he was active in social and civic activities, and was one of the formulators of the Oregon Workmen's Compensation act.

—o—

Leroy F. Johnson, 53, for the past 10 years Chicago District sales manager of the Vanadium Corp. of America, died recently at Elmhurst, Ill.

—o—

Samuel H. Gibson, who retired four years ago after serving for 35 years as general superintendent of the Fanner Mfg. Co., Cleveland, died in Lakewood, O., April 5.

—o—

Walter Ewing Miller, former vice president, treasurer and director of Fairbanks, Morse & Co., Chicago, and a director of Canadian-Fairbanks-Morse Co. Ltd., Montreal, Canada, died recently after a brief illness in St. Luke's Hospital, Chicago. He was 81.

—o—

G. Tel DuBois, for 15 years Detroit manager of the Potter & Johnston Machine Co. and for 25 years prior to that identified with various phases of automotive production, died in Detroit, April 3.

—o—

Ralph L. French, president, Plume & Atwood Mfg. Co., Waterbury, Conn., died there April 2. He was 84.

—o—

G. Burt Read, founder of Portable Elevator Mfg. Co., Bloomington, Ill., in 1898, died recently in Vermont.

—o—

William H. Marquardt, 62, consulting engineer for Houdaille-Hershey Corp.'s Houde Engineering Division, Buffalo, died April 3 at Clarence, N. Y. Mr. Marquardt was works engineer for Remington Arms Corp., Hoboken, N. J., from 1914 to 1918. Then he became superintendent of Worthington Pump & Machinery Corp., Buffalo, and in 1927 joined Houde, becoming factory superintendent in 1928 and consulting engineer in 1943.

Postwar Industrial Employment In West To Be Half Wartime Peak

Survey indicates jobs for 780,000 people in factories, compared with 560,000 in 1939 and 1,590,000 in 1943. Few shipyards or aircraft plants expected to convert to the manufacture of peacetime products

WEST coast manufacturers will have postwar employment only half of that at the wartime peak, but still it will be 40 per cent higher than prewar. That is the deduction drawn from a survey just completed by the Federal Reserve Bank of San Francisco in co-operation with the Committee for Economic Development.

Report shows prospective employment of 780,000 persons in manufacturing, which would be 51 per cent below the highest wartime total of 1,590,000 in 1943, but 40 per cent above the 1939 aggregate of 560,000. This figure is believed, moreover, to be a conservative estimate as only the intentions of present manufacturers are involved and no attempt is made to allow for entrance of new firms into this region. The basic sample was from 857 companies, representing 45 per cent of employment in California, Oregon and Washington.

The figure of 780,000 is based on an average good business year. Under poor business conditions, employment is expected to drop to about 500,000. Conversion of war plants to postwar production of new products is expected to be negligible. Investment outlays planned in the changeover to postwar operations are indicated to be fairly substantial, however, with about one-third of the total being for inventory accumulation. Funds are expected to be provided in large part from manufacturers' own resources.

Little Conversion of War Plants

The result of this survey, the Federal Reserve Bank says, suggests little can be expected in the way of conversion of war plants. So far as the survey shows, no major shipyard or aircraft plant is to be changed to large scale manufacture of new products.

For manufacturing as a whole, plants accounting for about 42 per cent of the total value of production in February, 1944, are to be closed down; plants with 54 per cent to be used in producing prewar products; and plants accounting for 4 per cent to be used in making new peacetime products. These figures include shipbuilding and aircraft. Excluding those two industries, the figures are as follows: 3 per cent of the plant capacity will be closed; 91 per cent will make prewar goods; 6 per cent will produce new items.

It is estimated that up to $430 million will be spent on capital outlays by West Coast manufacturers in postwar. This is exclusive of any allowance for the new integrated steelworks at Fontana or for the new nonferrous metals plants in California and the Pacific Northwest, which may require additional heavy investments if they are to be kept in operation. Somewhat more than half of the total outlay is indicated to be for plant and equipment. This amount, exceeding $200 million would be about twice as large as expenditures of Pacific Coast manufacturers for plant and equipment in 1939.

About $7 million of the $430 million is intended for the purchase of government-owned plants and equipment, with the aircraft industry being the most important single buyer. Another $70 million is intended for new plant construction; $85 million for structural additions, alterations and repairs; $60 million is for retooling, much of it in the plane industry; $155 million is for accumulation of working inventories, particularly by the lumber and timber industry and in aircraft plants; and $55 million is intended for other purposes.

No reporting manufacturer expects difficulty in raising the necessary funds.

Shipbuilders expect to have less than 10 per cent as many jobs as in 1943, and aircraft manufacturers 14 per cent.

California, because of the greater importance of war industries, is expected to experience a greater reduction, both in absolute and percentage terms, in the number of manufacturing jobs than Washington and Oregon, although California's gain over 1939 is expected to be greater.

$17 Million in Contracts Approved by WPB Agency

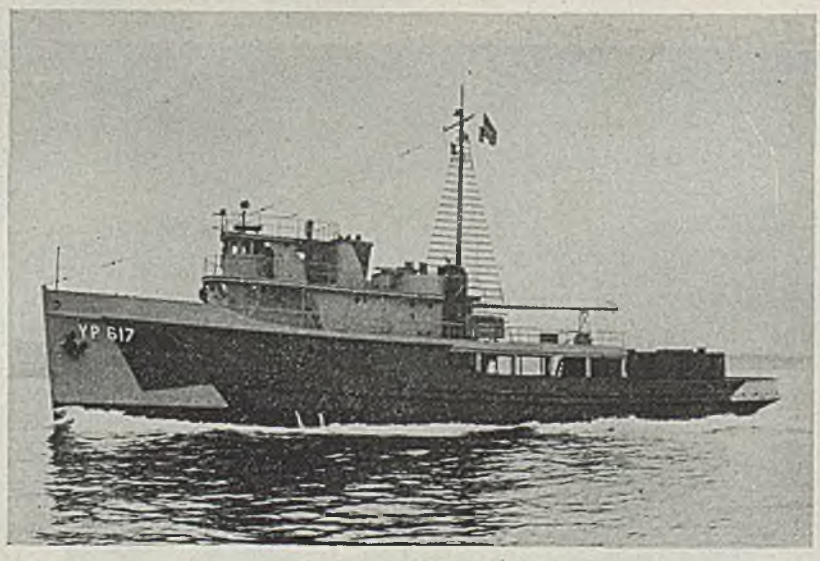
War contracts totaling $17,047,967 were approved last week for Los Angeles county plants by the WPB.

Largest single award was one for $7 million to Rheem Mfg. Co., for wing panel units for a new type Navy plane. Another was a $2,024,550 contract with the Thermidor Electric Co. for water and sand-filled practice bombs. A third award was for $1,074,000 worth of Navy rockets to be produced by subcontractors.

Officers Elected by Pacific Northwest Warehousemen

Officers have been elected by the Pacific Northwest chapter of the American Steel Warehouse Association Inc.

They are: President and chapter director, O. J. Ulrich, Pacific Machinery & Tool Steel Co., Portland, Oreg.; vice president, Harry Wolf, Pacific Steel Warehouse Co., Portland, Oreg.; and secretary-treasurer, H. F. Morrow, Pacific Metal Co., Portland, Oreg.



REFRIGERATED VESSEL: Ships of this type are being built in 16 yards on the Pacific Coast for use in delivering perishable food to the armed services in the Far East. They are equipped with ten refrigerated compartments with a capacity for 250 tons. Bethlehem Steel Co. developed a special refrigeration pipe which is used in the cooling coils

WING TIPS

Wright Aeronautical prepares to produce 2200-horsepower Cyclone engine at Cincinnati plant. Factory floor plan is duplicated on immense wall chart. Rearrangement of plant for new job is major operation

HAVING built more than 50,000 Cyclone 14's and shipped more aircraft engine horsepower in a three-month period than any other single aircraft engine plant, Wright Aeronautical Corp.'s Cincinnati plant is currently making ready to add a new "first" to its engine-building string—the first Cincinnati-built 2200-horsepower Cyclone 18, or Wright 3350 model. When the first engine will roll out of the plant's conveyorized assembly line to join the 10,000 or more such engines already produced at Wood-Ridge, N. J., and Chicago cannot be disclosed but the handwriting is on the wall—on 14-foot layout plans that tell a story of production lines rearranged and machine tools moved. In brief, the conversion to the job of building the "3350" is a major operation. But the plant must go right on working during the switch.

To realize how thoroughly conversion must reach into every department, compare the retooling with that of an auto firm changing its productive mechanism from one year's model to the next. To accomplish the change—which may embody a dozen or more redesigns of fenders and bodies and instrument panels—the auto plant goes through the labor pains of retooling for many weeks. During that time, no autos are turned out.

At Cincinnati, the change from the Cyclone 14 to the Cyclone 18 reach into hundreds of items. First, there is more to the Cyclone 18; it has 952 parts, composed of 9607 pieces; the Cyclone 14 has 891 parts, made up of 8492 pieces. Second, the parts are different; the Cyclone 18 is not the smaller engine plus four cylinders; it is a different engine.

Conversion therefore begins in the production-planning process; it winds up at the last stages, in the readying of test cells, the preparation of new types of engine cradles and packing boxes. Between the start and the finish, the separate items to check and change make a list as thick as a mail order catalog.

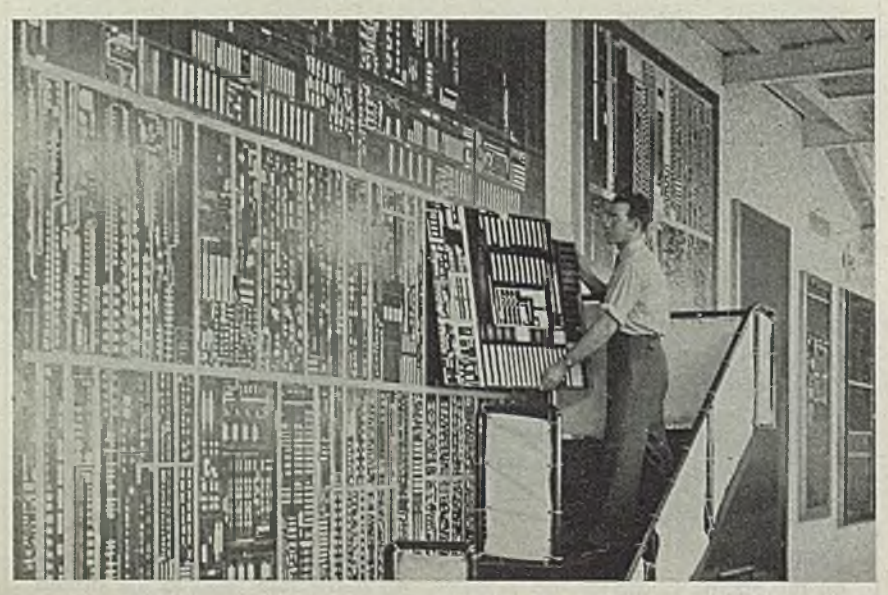
Machine tools must be rearranged so that production may continue to flow progressively, instead of backtracking all over 186 acres of plant. Some tools must be ripped up and moved. Machines must be reset and retooled, since the parts for the 18 and those for the 14 in the main do not match. For a single change in specifications, there may be many changes in tooling. Additional machine tools also must be installed; 300 new tools have been added to the existing 6000 or more in the plant.

Hundreds of outside suppliers of parts and materials must be briefed on the requirements for 18's, must have their work scheduled into the intricate pattern that makes the composite timetable. Parts must not get to Cincinnati too early, to clog storage facilities; must not get in too late, to hold up engines.

The vast maze of plant utilities—comparable to the equivalent public works in a city of 50,000—must be made to serve the new purpose. In this category are more than 15,000 separate jobs to do: miles of pipe, conduits, cables, and conveyor lines. Heat-treating furnaces, with all their appurtenances, must be shuffled about.

In such functions as materials control and production engineering, conversion looms large. Each piece of the production picture becomes a piece in a jigsaw puzzle; but it is a puzzle with a fourth dimension—time. The flow of parts toward assembly represents a conquest of time; at best, the parts move so as to reach assembly evenly, parts in line with other parts to make engine after engine. At worst, the tributaries supply either too much or too little.

Monitor over all the timetabling is a master plan. That master plan lives in thousands of phone calls, reams of blueprints, hundreds of operations sheets. It lives on a wall chart 76 feet long and 15 feet high. Made up in removable sections 2 by 3 feet in size, this chart is the factory floor in miniature. Each tool and piece of equipment is represented aboard it by a cardboard template scaled one-eighth inch to the foot and identified by name.



Fourteen-foot layout plans tell the story of Wright Aeronautical Corp.'s preparations to produce the new Cyclone 18, a 2200-horsepower model. The wall chart, made of removable 2 x 3-foot sections, duplicates the factory floor in miniature

L. C. Goad May Be New President of Boeing Co.

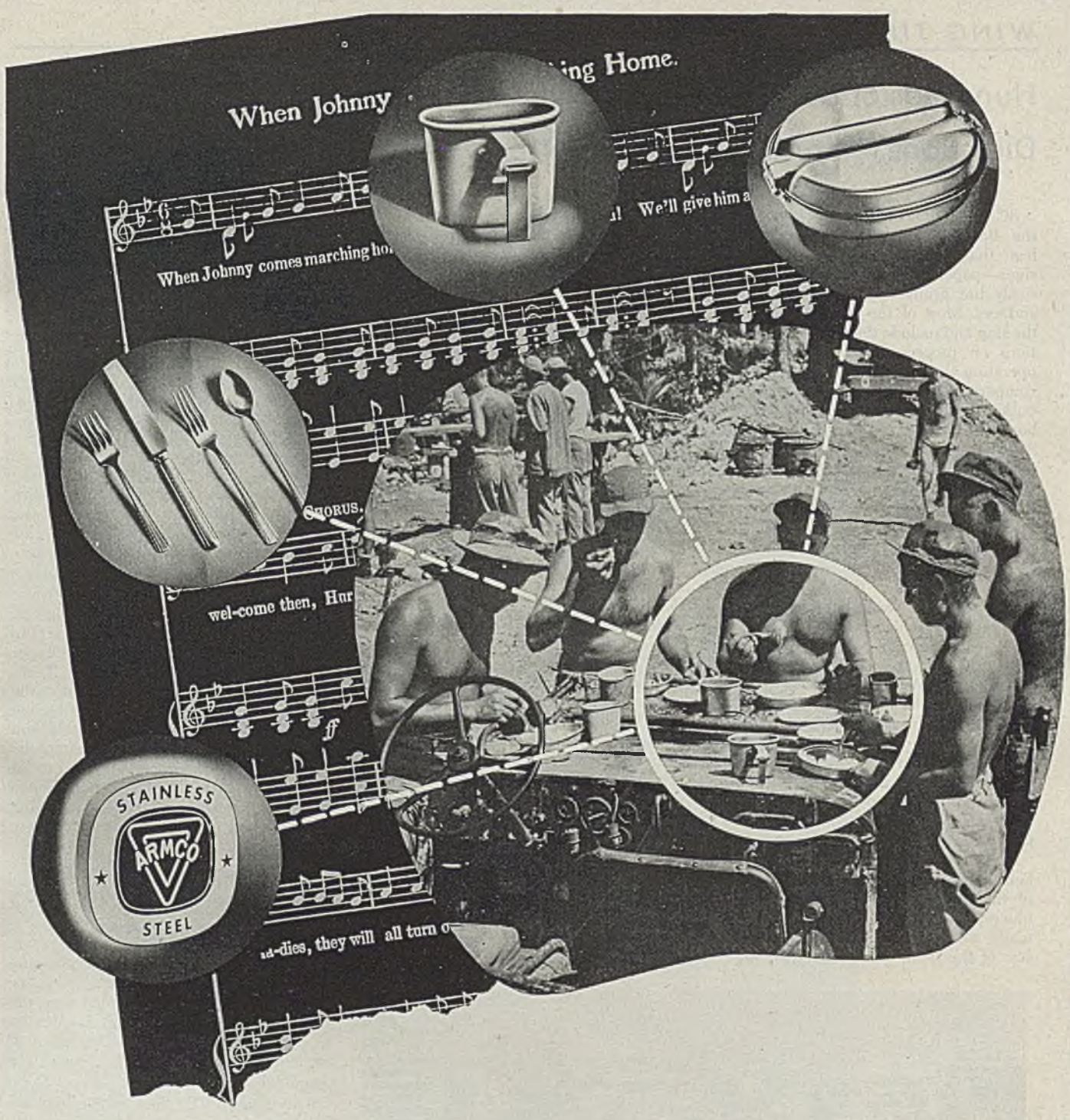
Reports are heard in aviation circles of the possible selection of L. C. Goad, general manager of the Eastern Aircraft Division of General Motors Corp., to assume the presidency of Boeing Aircraft Co., Seattle, whose dynamic president, Philip G. Johnson, died unexpectedly some months ago.

Mr. Goad, 44, is one of the ablest plant layout men on the GM managerial staff, having had a prominent part in the planning of the modern AC Spark Plug Division plant in Flint, Mich., where he served from 1933 to 1941. Prior to this he was a plant engineer at the Delco-Remy Division, Anderson, Ind., and assumed direction of Eastern Aircraft Division early in 1942. The latter organization has made notable contributions in mass production of various types of carrier-based fighter airplanes for the Navy. Mr. Goad is also a vice president of General Motors.

Luscombe Boosts Output Of Precision Components

Production of all-metal precision components for combat and military transport aircraft by Luscombe Airplane Corp., Trenton, N. J., during the first quarter of this year was more than double the volume produced in the same period of 1944, Leopold H. P. Klotz, president, announced.

Now delivering war materials at the highest rate in its history, Luscombe recorded sales of $1,937,594 in the first quarter of this year.



IT'LL BE A BRIGHT DAY FOR STAINLESS TOO

When ten million veterans come marching home, many of them will know a lot about the advantages of stainless steel. They'll be "sold" on the merits of this bright rustless metal.

One reason is that the Services give their men the best for eating equipment. ARMCO Stainless Steel is used in mess equipment because it is so easy to keep clean and sterile. Possessing great strength, it can be fabricated into light-weight utensils, so important on a march. And this hard rustless steel is highly resistant to denting, scratching and corrosive conditions.

These advantages of ARMCO Stainless can add distinction and durability to many peacetime products—make them more salable and therefore more profitable. Consider it for your products. Let us talk with your designers so they will have complete information on the various types of ARMCO Stainless Steels and their qualities.

For data on these steels address The American Rolling Mill Co., 1021 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

The American Rolling Mill Company

Hundreds of Decalcomanias Give Operating Directions, Warnings on Superfortresses

SCATTERED over various locations on the Boeing B-29 Superfortress, are no less than 2700 decalcomania transfer signs—paper-thin adhesives which can be easily but firmly applied to all types of surfaces. Most of the "decals" are inside the ship and include diagrams and instructions on procedures to be followed in operating the plane. The forward control compartment has decals in profusion, outlining procedures to the pilot, co-pilot, bombardier, flight engineer, radio operator and navigator. The most prominent decal in the bomb bays is a "No smoking" strip, while others include bomb rack location marks and an elaborate cable color chart in six or seven colors.

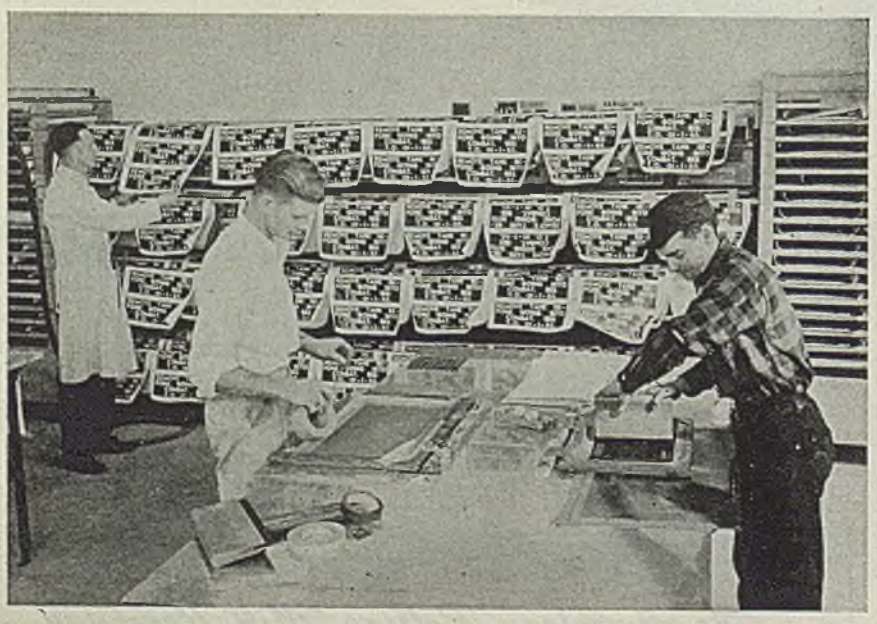
The most noticeable decals on the outside of the B-29 are those on the bomb doors which read "Danger—Air Operated Doors" and several at various places on the plane which read "Cut Here for Emergency Rescue."

With B-29 output at the Boeing Seattle and Renton, Wash., plants stepping up every month, the company found it increasingly important to have a ready supply of the film-like legends available to take care of emergency requirements and modifications. As a result, decal-making has been added to the multitude of processes which are part of the complex job of building the Superfortresses.

The first step in the process is for the finishing shop to prepare a paste-up layout of the particular decal desired, using a blueprint guide. This paste-up layout is made slightly more than five times the size of the decal to be produced, so that sharper images will be obtained.

The layout then is taken to the photo template department, where it is photographed by a large 6-ton camera. The resulting negative is made the same size as the finished decal and contact prints are produced from this negative. The images of these prints then are transferred by a chemical process to a silk screen, the number of prints on each screen depending upon the size of the decal and the quantity required.

This transfer process, briefly stated, involves the use of a gelatin paper which has been placed in a potassium bichromate solution to sensitize the gelatin. This gelatin, with its paper backing, is then placed on a temporary support, either of copper or Plexiglas. The paper backing is removed, leaving the gelatin to dry on the support. Then the positive prints, which have been laid out on glass, are forced into contact with the gelatin through use of vacuum frame. The next step is exposure of the layout to a powerful arc light for periods varying from 5 to 10 minutes. The portion of the gelatin immediately beneath the lettering remains soft while the remainder is hardened as it is struck by the light. Then the temporary support is placed in warm water to wash away the soft gelatin. The silk screen, which is merely a wooden frame with pure silk stretched taut over it, is then pressed into the wet gelatin on the temporary support and allowed to dry. After drying, the frame is lifted off the support, taking the gelatin and its image with it.



Here are two of the final steps in the intricate decal-making process. In the foreground, the man at left tapes up a stenciling jig while his co-worker applies the several coats of lacquer which each decal receives

These silk screens, containing as many as 40 decal images in case of small ones, then are used for the actual decal making. This is done by laying them over special decal paper and applying three or more coats of lacquer, allowing each coat to dry separately. The lacquer is forced through the screen by running a blade-like lacquer applicator across its surface. The finished decals then are trimmed to proper size and issued to the Boeing shops where they will be applied to planes.

Using this process, the finishing shop has turned out as many as 17,000 decals in one day.

New Gunsight Helps Protect Allied Ships from Aircraft

The Navy has permitted the Sperry Corp., New York, to reveal that the Mark 14 Gyro Gunsight helped compel the enemy to restrict short range daylight air attacks on armed surface vessels and made the Allied fleet relatively invulnerable to attack from aircraft.

The gyroscopic sight was developed by engineers of the Sperry Gyroscope Co. in collaboration with Dr. C. Stark Draper of the Massachusetts Institute of Technology, Cambridge, Mass. The automatic computing sight extends the mental powers of the operators by quickly and automatically calculating and applying the angle by which the guns must lead to hit a fast-moving target. The types of gun mounts to which the Mark 14 sight has been adapted include almost all of those used for antiaircraft fire.

6000th Bomber Produced by North American Aviation

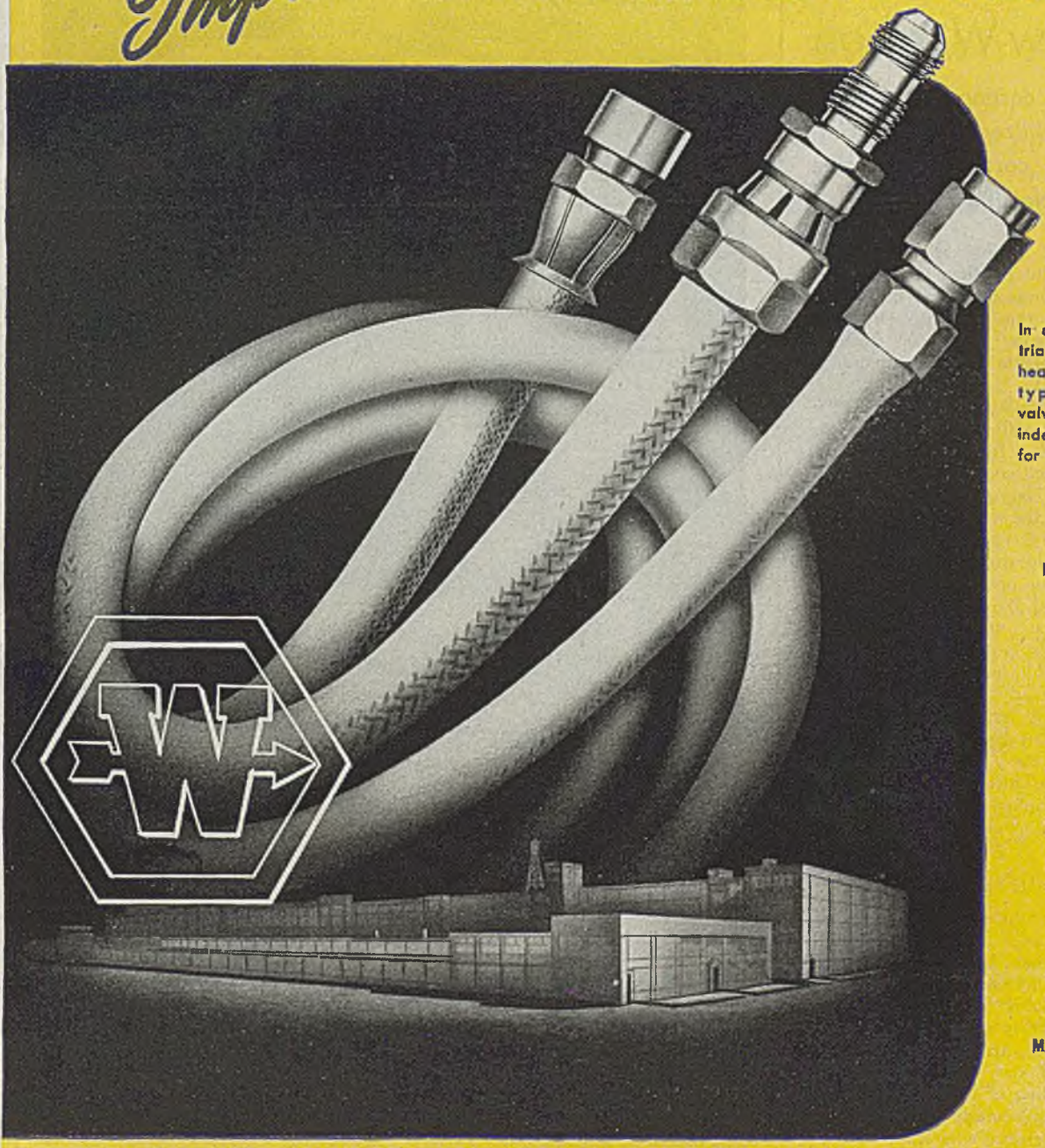
While extensive tooling and planning for a new jet-propelled fighter plane for the Army Air Forces were under way, the six-thousandth B-25 Mitchell bomber to be produced at the Kansas City plant of North American Aviation Inc. rolled out the doors.

The Kansas City factory has met its bomber schedule for 18 consecutive months. Even while tooling and production planning for the jet-propelled Lockheed P-80 Shooting Star were being pushed, the bomber schedule was maintained.

One Plane in Nine Becomes Obsolete

American air power has advanced so rapidly that one out of every nine planes manufactured in this country since the beginning of the war program has become surplus because of obsolescence of war weariness. The surpluses will increase sharply when the European war ends and the strengthening of the war effort against Japan calls for continuously improved planes.

Improved INDUSTRIAL HOSE LINES



In addition to industrial hose, Weatherhead plants make all types of fittings, valves, hydraulic cylinders and other parts for these industries:

AUTOMOTIVE
★
REFRIGERATION
★
RAILROAD
★
MARINE
★
FARM EQUIPMENT
★
ROAD MACHINERY
★
DIESEL
★
L. P. GAS
★
APPLIANCE MANUFACTURERS

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND 8, OHIO
Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada — St. Thomas, Ontario

New uses are being found daily for the application of our *improved* industrial hose lines on machinery of all kinds. We manufacture hose assemblies of all types to withstand pressures up to 10,000 P.S.I. They can be equipped with either permanent crimped ends or with re-usable, quick-attachable hose ends. For information or literature write or phone any Weatherhead branch office.

BRANCH OFFICES: NEW YORK • PHILADELPHIA • DETROIT • CHICAGO • ST. LOUIS • LOS ANGELES

Carboloy Getting Additional Plant For New Weapon

Facilities costing $6 million will be utilized in producing tungsten carbide projectile cores at Natrium, W. Va.

DETAILS of its new $6 million "ore to-core" plant to produce tungsten carbide artillery projectile cores have been announced by the Carboloy Ordnance Division, Carboloy Co. Inc., Detroit, which will operate the new plant in Natrium, W. Va.

The structure, which will occupy 250,000 square feet, will be on a 72-acre site, and will enable a further large increase in output of shell cores when completed. It will be the largest tungsten ore reducing plant in the world and will be able to process every type of tungsten bearing ore. Its location at Natrium will dovetail with the operation there of Columbia Chemical Works, producing chlorine. Hydrogen, needed for the reduction of tungsten ores, is a by-product in producing chlorine. Necessary tungsten ore has already been provided.

Production of tungsten carbide shell cores was undertaken by Carboloy last July. Since that time, requirements for tungsten carbide cores by the Army have been multiplied many times to combat the new series of German Tiger and Panther tanks.

Developments Speed Production

Ability to produce shell cores in the quantities already manufactured and contemplated has been made possible in large part by several developments by the Carboloy company. Among these is the ability to produce tungsten carbide cores to Army specifications as to weight and size tolerances, without requiring grinding of the extremely hard core. This is particularly important since diamond impregnated wheels are virtually the only type which could be used to cut this hardest of man-made metals. Ability to use more readily available nickel instead of critical cobalt for the binder is of major value too, while even more important in some respects is a process developed by Carboloy through which "scrap" tungsten carbide can be used in core production similar to the use of scrap metals in the production of steel and aluminum alloys. New compositions, improving the ballistic qualities of the shells, have also been developed. The new shell with its tungsten carbide core is said to be considerably more accurate than previous steel armor piercing shells in addition to its higher armor piercing qualities.

WINS FOURTH STAR: Mary Flannigan, national vice president of the WOWS and chief inspector of the Spring Division, Borg Warner Corp., shows M. O. Gillett, production manager, the 325,000,001th 50-caliber ammunition belt link produced by the company. Company has been awarded the fourth white star for its Army-Navy "E"

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

St. Paul Engineering & Mfg. Co., St. Paul, has changed its name to St. Paul Foundry & Mfg. Co. The firm fabricates structural steel and manufactures various types of machinery.

—o—

Western Electric Co., New York, has moved the headquarters organization of its traffic department from Chicago to the company's general headquarters at 195 Broadway, New York.

—o—

Murchey Machine & Tool Co., Detroit, has expanded operations into a government owned plant at 19660 Eight Mile road.

—o—

Peninsular Chemical Products Co., 6795 East Nine Mile road, Van Dyke, Mich., has been organized to make protective coating materials for the plating industry and for other industrial uses. President is M. C. Brennan, who also is president of General Industrial Products Co., New York; International Railway Car & Mfg. Co., Kenton, O.; and B & D Gage & Tool Co., Detroit.

—o—

Briggs Clarifier Co., Washington, has appointed Mack Sales, headed by F. F. Mack, Tampa, Fla., as distributor for Florida.

—o—

Freyn Engineering Co. has moved to the Garland building, 58 East Washington street, Chicago 2.

—o—

Bendix Radio division of Bendix Aviation Corp., Detroit, has expanded its West Coast quarters at North Hollywood,

Calif., to provide complete shop facilities for assembly and production of special equipment, mockups and experimental radio installations for aircraft, railroad, marine and other applications.

—o—

Maguire Industries Inc., Bridgeport, Conn., has purchased from Burgess Battery Co., Freeport, Ill., the Thordarson Electric Mfg. Co., of Chicago and Antioch, Ill.

—o—

Ultra-Lap Machine Co., Detroit, has been purchased by E. H. Welker, president of Welker Machinery Co. Inc., Detroit, and associates.

—o—

Industrial Lining Engineers Inc. has moved its offices, laboratories and shops from Pittsburgh to Edgeworth, Pa., where enlarged facilities are available.

—o—

Gerotor May Corp., Logansport, Ind., has appointed Compressed Air Products, Newark, N. J., as exclusive sales representative for New Jersey and Greater New York.

—o—

Surface Combustion, Toledo, O., has changed its name to Surface Combustion Corp.

—o—

Fruehauf Trailer Co., Detroit, has purchased Trombly Truck Equipment Co., Portland, Oreg.

—o—

B. R. Engineering & Sales Co., Baltimore, has moved to new quarters at 307-309 East Saratoga street where increased space is available for its work of assembling hydraulic couplings.

—o—

Perry Machinery Co., Dallas, Tex., has been named special distributor of Tocco process induction heat treatment equipment, the Ohio Crankshaft Co., Cleveland, announced.

Company Expects Improved Earnings in Postwar Era

Prospects for improved earnings after V-Day are favorable for Basic Refractories Inc., Cleveland, even in the face of continued heavy federal taxes, H. P. Eells Jr., president, said at the company's annual meeting recently.

"Four advantageous factors in the company's situation prompt this statement," Mr. Eells declared. "First, the company anticipates no renegotiation difficulties. Second, we have no reconversion problems. Third, whereas we anticipate appreciably less than the present rates of production in the steel industry after the war, we believe that demands for steel and hence for basic refractories will be sufficiently great and sustained to permit satisfactory profits in the postwar period. Lastly, the company has in view new products and processes by which it hopes to reduce its costs in its existing operations while expanding the scope of its activities in diverse markets."

Directors were re-elected as follows: John H. Briggs, Howard P. Eells Jr., Samuel Eells, and Richard Inglis, all of Cleveland; John W. Garrett II, New York; and Dan P. Eells and Douglass Van Dyke, Milwaukee.

Officers re-elected are: Dan P. Eells, chairman; Howard P. Eells Jr., president; Samuel Eells, vice president; J. E. Heidgen, secretary; William P. Kelly, treasurer; M. J. Ludwig, assistant secretary and assistant treasurer; and Richard Inglis, general counsel.

ADDRESSES ORDNANCE GROUP: Gen. Joseph Stilwell, chief of the Army Ground Forces, recently addressed the Cleveland post of the Army Ordnance Association. On the left is Maj. Gen. K. B. Wolfe, Wright Field, and on the right, Albert J. Weatherhead, president, Weatherhead Co., Cleveland, and chairman of the ordnance group's membership committee

21 Firms Made Parties to Lake Pollution Action

Amended complaint filed with Supreme Court to insure execution of agreements to stop polluting Lake Michigan

AN amended complaint filed before the U. S. Supreme Court in Washington April 7 by Illinois Attorney General George F. Barrett made 21 industrial companies of East Chicago, Gary and Whiting, Ind., parties to the lake pollution action of the State of Illinois against the State of Indiana and four Indiana cities.

Negotiations already have been instituted with some of the companies to correct dumping of raw sewage and industrial wastes in Lake Michigan. The amended complaint is to make any agreements reached with these industries a matter of court record and to insure execution of the agreements.

Since the original complaint was filed in October, 1943, Attorney General Barrett reports agreements have been reached with the four cities of Hammond, Gary, East Chicago and Whiting, providing for treatment of all sewage from these cities as soon as plants can be completed. But additional sewage and industrial wastes come from the large industrial plants at the foot of Lake Michigan, he says.

Most Are in East Chicago

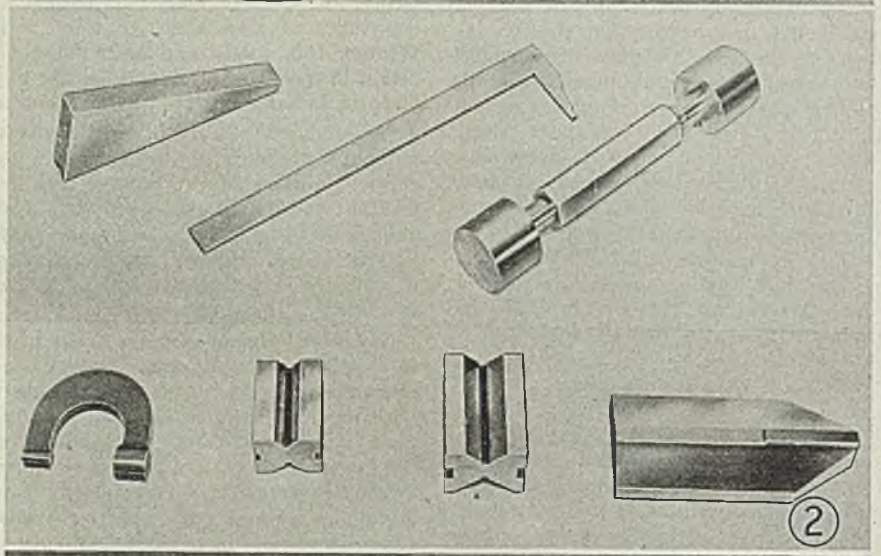
Of the 21 companies named in the amended complaint, 14 are in East Chicago, five in Gary, and two in Whiting. East Chicago companies include: E. I. du Pont de Nemours & Co. Inc.; Shell Oil Co.; Cudahy Packing Co.; Inland Steel Co.; Texas Co.; Youngstown Sheet & Tube Co.; United States Gypsum Co.; Socony-Vacuum Oil Co.; U. S. S. Lead Refinery Inc.; Cities Service Oil Co.; Bates Expanded Steel Corp.; Rogers Galvanizing Co.; Sinclair Refining Co.; and Fruit Growers Express Co.

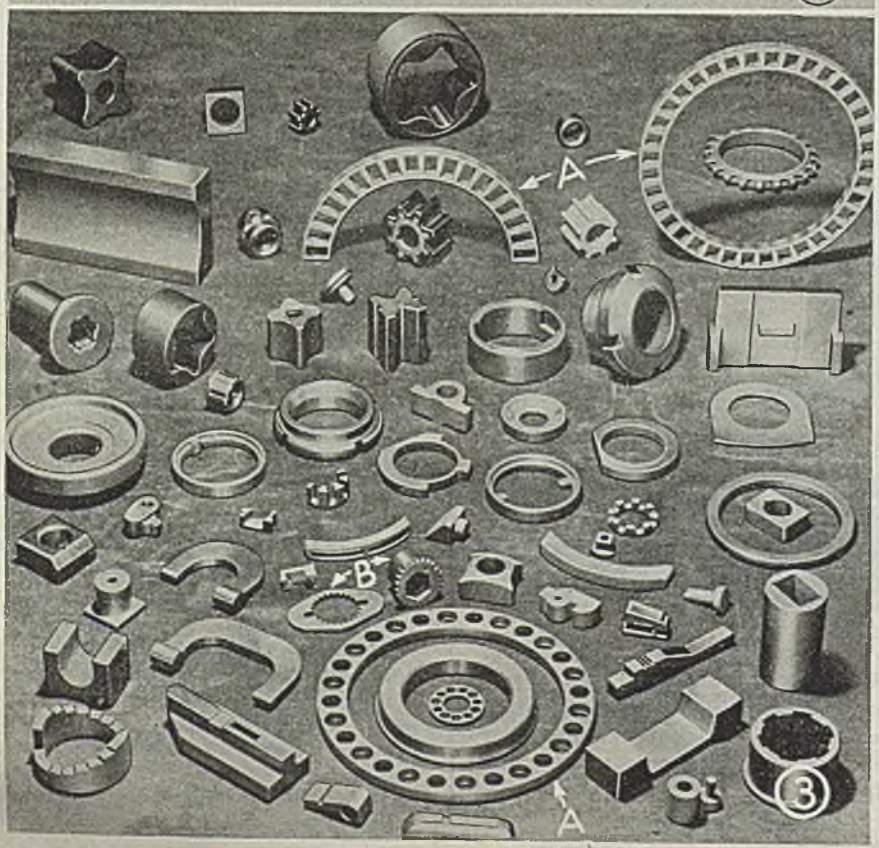
Gary companies are: Carnegie-Illinois Steel Corp.; American Bridge Co.; Universal Atlas Cement Co.; National Tube Co.; and Elgin, Joliet & Eastern Railway Co, all subsidiaries of United States Steel Corp. Whiting companies are: Standard Oil Co.; and Carbide & Carbon Chemicals Corp.

Attorney General Barrett states an agreement has been reached with American Maize Products Co., Hammond, for installation of equipment costing $500,000 for treatment of industrial wastes. Five Gary industries have submitted a plan for piping sewage and industrial waste to the Gary city sewage plant.

By G. W. BIRDSALL
Associate Editor, STEEL

POWDER-METAL





PARTIALLY withdrawing the veil shrouding significant new powder metallurgy developments, A. J. Langhammer, president, Chrysler's Amplex Division, recently revealed some of the important contributions of powder-metal parts to the war effort. Described briefly below are some of the applications now winning wider recognition for this method of making mechanical parts and demonstrating its important possibilities.

Toolmakers' V-Blocks: When machine tool builders hit their stride late in 1942, a serious shortage of toolmakers' V-blocks, micrometers and other precision tools developed. It was licked by Chrysler Amplex engineers who were in production of the essential parts in 6 weeks, reports Mr. Langhammer. He points out that this fast tooling up is a valuable feature of powder-metal fabrication methods. Certain items can be tooled up for production in such a short time as 2 days.

Fig. 2 shows some of the precision tool parts made at Amplex to fill this vital wartime need. These include various sizes of V-blocks, micrometer frames, plug gages, caliper frames and other

Fig. 1—The pile of powdered metal at right makes up the bearing in center, which then can absorb the oil seen at left. The girl is using a phone fitted with many parts made from powdered metals

Fig. 2—These are some of the different powder-metal parts for precision tools as made by Amplex to help relieve critical shortage of toolmakers' V-blocks, micrometers, gages, etc. Hardness ranges up to 65 rockwell C

Fig. 3—Showing typical powder-metal parts supplied by Amplex. At A are anti-friction bearing retainer rings which eliminated lengthy machining operations. At B, are eccentric and the flat mating part for a gun turret. Other items include gears; precision pump rotor and stator; miscellaneous gage, gun, and mechanical parts—made up to 200 times faster than by standard methods

PARTS

. . . . become more useful due to increased physical properties made possible through development of better methods of powder manufacture and control, and greater knowledge of processing accumulated in supplying wartime demands. Size and strength limitations prove unfounded

similar items. Not only are these made to close dimensional tolerances but their hardness of 60-65 rockwell C is sufficient to cut wear to a minimum. And they are made from mill scale, metal oxide cracked off in the first stands during rolling—a nonreclaimable material otherwise thrown out as waste.

Powder metallurgy's contribution in this instance consisted in making immediate large scale output available, in eliminating practically all machining and in use of waste products as the raw material.

Anti-Friction Bearings: A similar bottleneck developed in the production of anti-friction bearing components such as the retainers shown at "A" in Fig. 2. These retainers or spacer rings are for use with roller bearings, those in the foreground are for ball bearings.

Important factors here are life—a 200 per cent increase—and elimination of lengthy machining operations, for the Oilite powder-metal parts come from the coining dies sized so accurately that further machining is unnecessary.

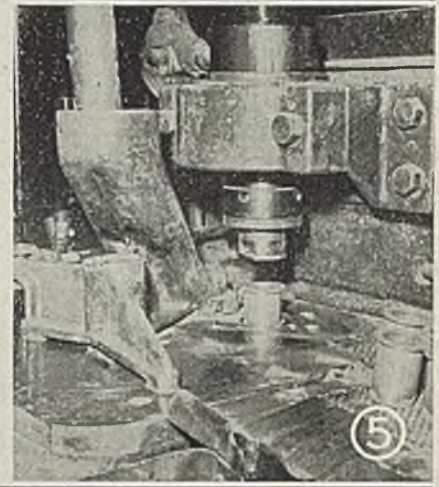
Gun Turret Parts: The fast, low cost mass production of parts difficult to machine is one of the most important applications of powder-metal parts. For instance at "B", Fig. 3, are two mating parts, the flat piece being mounted on one portion of a gun mechanism, the cylindrical piece on another. The hole through the cylindrical piece is eccentric and has a recessed hexagonal space. Outer teeth mesh with those of the flat piece. Turning the inner piece in the outer piece changes the relative vertical position of the shaft going through the inner piece. Meshing the teeth then holds the adjustment desired.

Producing the cylindrical portion by ordinary machining methods involves a number of extreme difficulties, caused chiefly by the off-center position of the hole and the recess. However, by making these as powder-metal parts, little difficulty is involved and no machining whatever is required.

Splined Parts: Certain items with internal or external splines involved another difficult equipment and machining problem that was entirely obviated by use of powder-metal parts. In one instance, an internal spline extended for only a portion of the bore, the remainder being somewhat larger in diameter. As a powder-metal part, the spline was made to extend entirely through the bore, the portion not wanted then being bored out to the larger diameter—a quick easy method of obtaining the finished form.

Simplified Machining: One of the most striking instances of simplified machining is on the spacer rings previously mentioned. As shown at "A", Fig. 3, as much as 71 per cent of the original part is machined away in finishing. But made

Fig. 4—A. J. Langhammer, president of Chrysler's Amplex division, examines samples of metal powders. Improved control has made possible important increases in quality and uniformity of metal powders



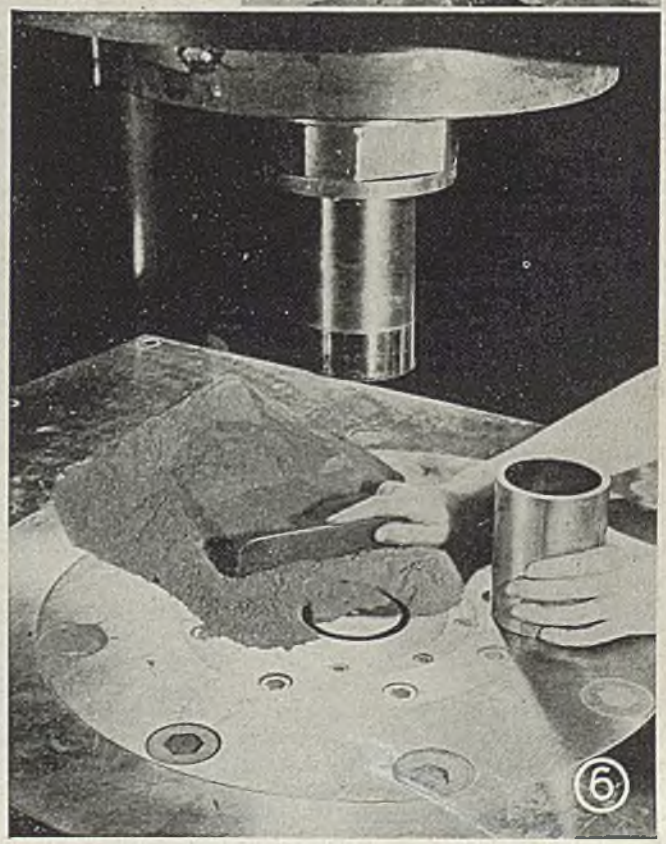


Fig. 5—Closeup of table of briquetting press showing part being ejected from dies. Oscillating shoe to left of die opening will swing over die opening to allow metal powder from overhead chute to fill dies, then will remove excess powder to leave dies level full as shoe swings back to position shown in this view

Fig. 6—On low-production jobs, dies are filled with powder by hand as here. All the powder shown will be put into the dies to make the bearing at right

from powdered metal, no machining whatever is involved.

"Standard manufacturing methods," explains Mr. Langhammer, "show an average machining loss of 20-80 per cent. But a 17-pound powder-metal part requires only 17 pounds of metal. Thus savings in metal at Amplex run into thousands of tons each year."

More than 90 per cent of the powder-metal bearings and parts made by Amplex require no machining. Consider what this means in form of reduced costs by elimination of as many as 20 operations including combinations of turning, facing, drilling, boring, counterboring, countersinking, milling, broaching, profiling, shaping, gear cutting, slotting, grinding, hobbing, chamfering, blanking, flattening, coining, burring, and the like.

High Speed; Great Output: Completely finished powder-metal parts are turned out at Amplex in a matter of seconds, compared with 3 minutes to 3 hours by conventional methods. "This great speed —up to 200 times that usually required —is most significant," Mr. Langhammer points out.

He explains, "It means that we would need 20 times our floor space if we were to obtain our present output of parts by conventional methods instead of by powder metallurgy. We estimate that our present volume of war work would require 30,000 men instead of less than 1000. Thus powder metallurgy releases a mighty force of skilled mechanics for other war tasks.

"An excellent example of the tremendous production savings," he adds, "is the Chrysler-built Bofors anti-aircraft gun for which Amplex produces 106 powder-metal parts. On this one application, Chrysler saved five million man-hours during a 12-month period, compared with time required by standard manufacturing methods."

Self-Lubricating Parts: Powder-metal parts originated as porous metal sleeve bearings where their ability to absorb oil and subsequently to lubricate contacting surfaces regardless of high bearing loads makes them exceptionally useful. This same self-lubricating quality makes powder-metal parts extremely valuable for certain applications other than in bearings.

For instance, on a rotary vane-type pump it was next to impossible to provide lubrication for the rotor slots containing the vanes. But making the entire rotor of powdered metal subsequently impregnated with oil made it possible to assure adequate lubrication to the vanes under all conditions and thus converted a poor pump into an excellent one.

An important ordnance application of this feature is found in the rotating bands used on projectiles to engage the rifling grooves in the gun barrel. Making these rings from powdered metal affords a degree of accuracy and other favorable factors during firing that reduces barrel wear and makes possible an important extension of gun life, thus contributing greatly to reliability of aircraft guns and similar vital armament. Huge quantities of these rings are consumed in ammunition requirements.

Oil Impregnated Rivets: In another instance, there appeared no way to provide lubrication to a certain sliding surface in an intricate yet extremely small and vital mechanism. But by utilizing an oil-impregnated powder-metal rivet of such small size that 10,000 weigh only a pound, it was possible to lubricate the point desired. And such applications can be assured a continued supply of lubricant by wetting the other end of the rivet with oil, using a wick from an oil well or similar device, the oil easily traversing the powder-metal part to the working surface.

Powder-Metal Bearings: As previously mentioned, first application of powder metallurgy was a light duty self-lubricating bronze sleeve bearing. Oilite, the heavy duty bronze bearing introduced by Chrysler in the late twenties was widely adapted by the automotive and aircraft industries, railroads, makers of farm implements, textile machines, small appliances — practically e v e r y where wheels turn.

The original heavy-duty self-lubricating Oilite *bronze* bearing was followed by development of the Super Oilite bearing, using powdered *iron* as a major constituent to obtain even greater load carrying capacity.

Reason for excellent properties of such bearings lies in the ability to control the porosity of the powder-metal part. By proper selection of particle size, shape and material; by controlling the pressures and amount of reduction during pressing; and by choosing proper sintering temperatures, the porosity of parts made at Amplex is varied from 50 per cent down to less than a fraction of 1 per cent.

Orientation, Based On Porosity: Engineers at Amplex point out that the degree of porosity can be used as a convenient and logical basis for orienting or classifying the various applications of powder-metal parts. (Please note this entire discussion is confined to the pressing of metal powders to produce component parts of a machine or product. Use of powdered metals for metallic paints, pyrotechnics, welding thermite, electric lamp and electronic tube filaments, cemented carbide cutting tools, electric contacts, resistance welding electrodes, etc. are all outside the scope of this discussion.)

For Filters, 40-50 Per Cent: The most porous class of powder-metal parts have 40-50 per cent of their volume in the form of voids or spaces. These extremely open or porous structures are widely employed by all industries as filters for they provide an exceptionally effective "straining" or filtering action. Contrasted to a screen which filters in only one plane, the powder metal filters are much more effective since they can be made any depth desired to provide filtering in an indefinite number of planes. Porosities up to 80 per cent can be obtained if desired.

Another important advantage is that they can be made to exact shape and size wanted; also they can be welded, brazed or soldered to mounting rings or otherwise effectively mounted for handling and use.

For Bearings, 25-35 Per Cent: For use as bearings or where the self-lubricating qualities of the part are most important, it is desirable to obtain the greatest possible porosity consistent with the required physical strength. Porosities of 25-35 per cent permit ample strength and provide an immense reservoir for holding lubricant.

An idea of the large amount of oil that such a structure can hold is provided by Fig. 1. Here the pile of powdered metal at the right is compressed and sintered to produce the bearing in the center which then will absorb the oil shown at the left. Such bearings are often called "oil-less" because they can run under the most severe conditions without failure for extremely long periods, capillary action always providing oil at the contacting surfaces from the spaces in the interior.

For Mechanical Parts, 20-30 Per Cent: Where elimination or reduction in machining is the main reason for using a powder-metal part, and where only normal strength is required, porosity may run from 20 to 30 per cent. Of course, the greater the porosity, the easier the

(*Please turn to Page* 150)

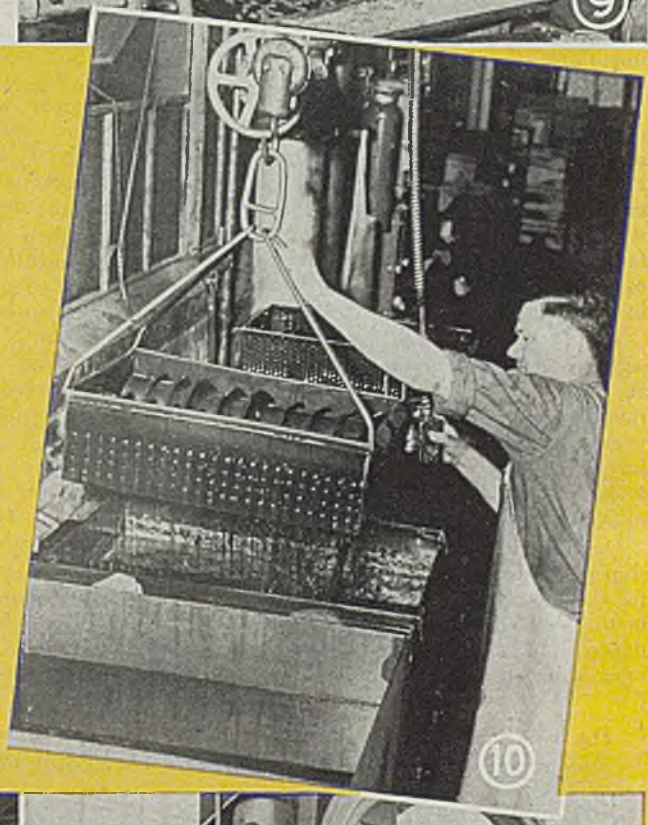
Fig. 7—Overall view of briquetting press in operation. Oscillating shoe feeds powder from tube, pushes the finished parts away from dies on automatic 9-second briquetting cycle. Note high finish of parts

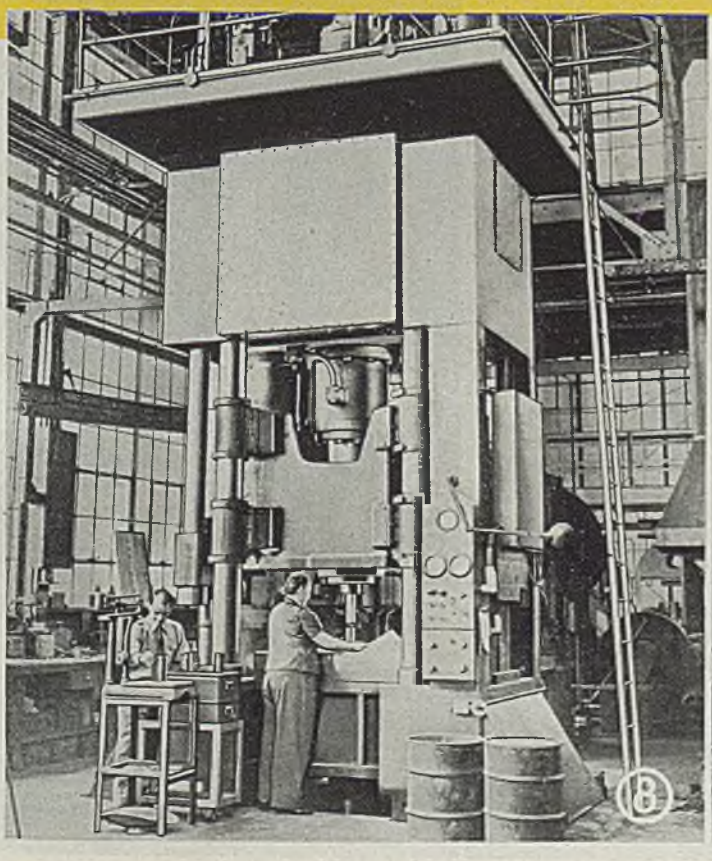
Fig. 8—Large new hydraulic press for briquetting larger-type parts

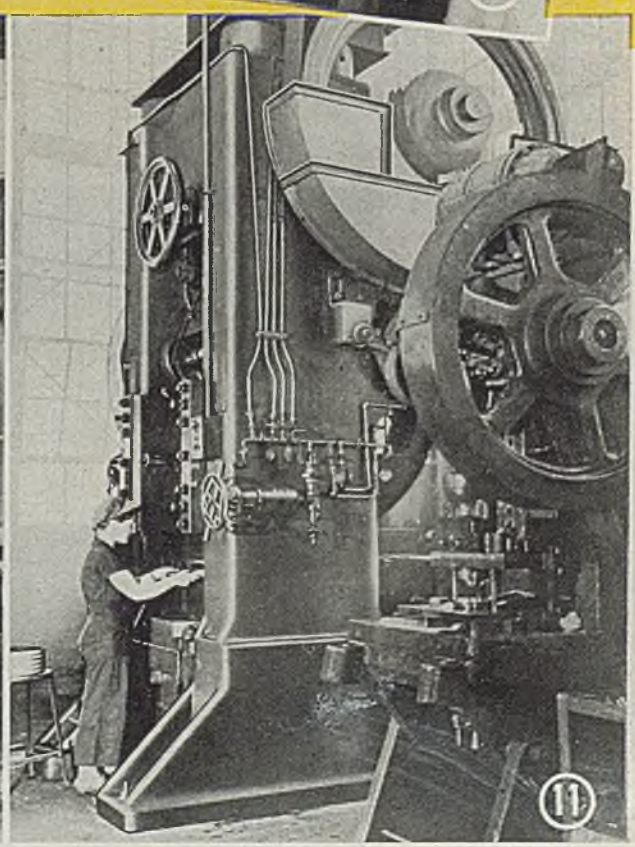
Fig. 9—After pressing to shape, powdered metal compacts are sintered in continuous mesh-belt conveyor furnace to melt one of the elements which then binds the powder particles into a solid mass. Great strength can be obtained

Fig. 10—Where self-lubricating properties are desired, parts of about 30 per cent porosity are impregnated with hot oil by capillary action as shown here

Fig. 11—Sintered parts are sized in huge presses. Size tolerance can be within 5/10,000-inch, thus attaining great dimensional accuracy







PROPELLER SHAFT

. . . . fabricated by Thermit welding

FORMERLY employed largely for making repairs in massive cast iron and steel parts, the demands of the war production program have emphasized the important advantages of Thermit welding in regular production work. One of the most important applications is in making large parts for ships such as stern frames, rudders and propellers. Here the process is employed because making such parts by casting them in a single piece would severely tax foundry facilities and would be a lengthy process with limited output. Also difficulties in shipping would have been serious.

But by casting these large parts in sections and then joining the sections at the shipyard by Thermit welding, foundry and shipping difficulties were greatly reduced. Also in event of a defect, it is not necessary to scrap and remake the entire part, just that section in which the defect appears.

One of the most interesting of the ship parts so constructed is the propeller for cargo-combat vessels being produced in the Walsh-Kaiser Shipyards at Providence, R. I. As shown here, four large arms, each an individual casting of considerable size, are welded to a common hub or center section, Fig. 1.

First step in making these welds is to align the parts accurately. Note heavy plates cut and welded to form the welding fixture, Fig. 3. Next a parallel-sided gap of proper width is cut, Fig. 2. Around the joint a wax pattern is formed, Fig. 3, and a refractory sand mold is built, which provides an annular space at the weld.

Work is then preheated by kerosene torches, a mixture of kerosene and air being blown into the mold through openings as can be seen in Fig. 5. Preheating continues until the parts reach a red heat. This burns out the wax of the pattern and also dries out the mold.

Then the Thermit material, a mechanical mixture of finely divided aluminum and iron oxide (scale), is poured into the crucible above the mold. Some 325 pounds of Thermit are used here. Since a temperature of 2000-2100 degrees Fahr. is required to initiate the Thermit reaction, a special ignition powder is lit by the flare of a match to start the reaction. In about 30 seconds the Thermit reaction has been completed and steel at a temporary near 4500 degrees Fahr. is poured into the mold by knocking out the tapping pin at bottom of the crucible. This temperature shows Thermit steel to be about twice as hot as ordinary molten steel.

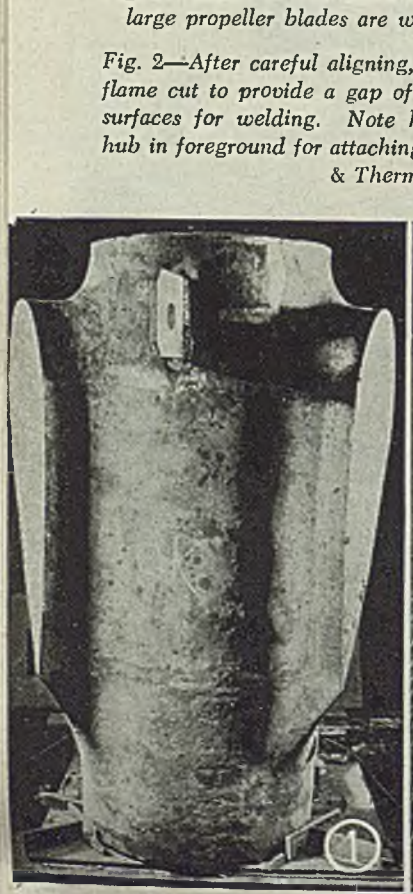
This superheated steel, flowing into the space between the two parts to be joined, melts some of the metal from each part and thoroughly "boils out" any slag before the metal solidifies, thus tending to produce a weld of extremely high quality.

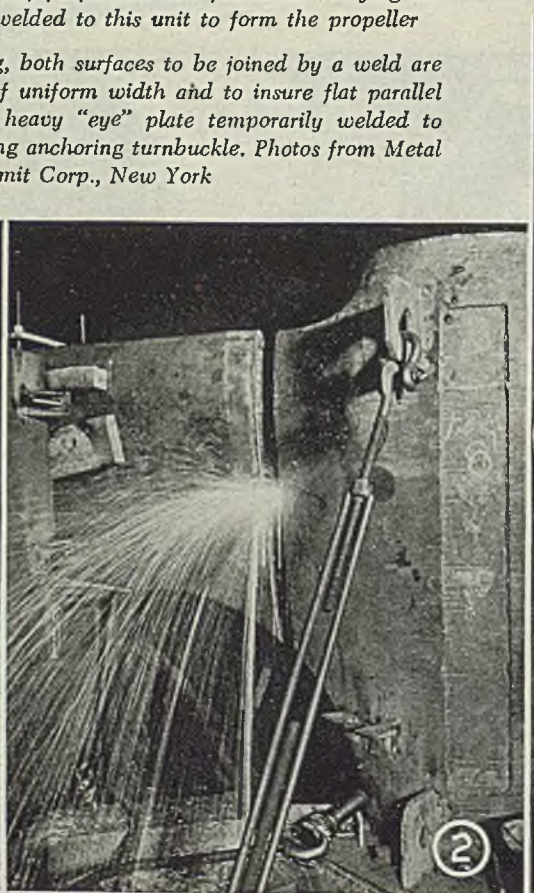
Alloying elements in the Thermit mixture produce a steel in the weld that can be controlled. The range of physical properties made possible includes tensile strengths from 50,000 to 110,000 p.s.i. with corresponding ductilities of over 40 per cent in 2 inches, down to zero. Although cast, Thermit weld metal may be regarded as actually having physical properties closely approaching those of forged steel, it is reported.

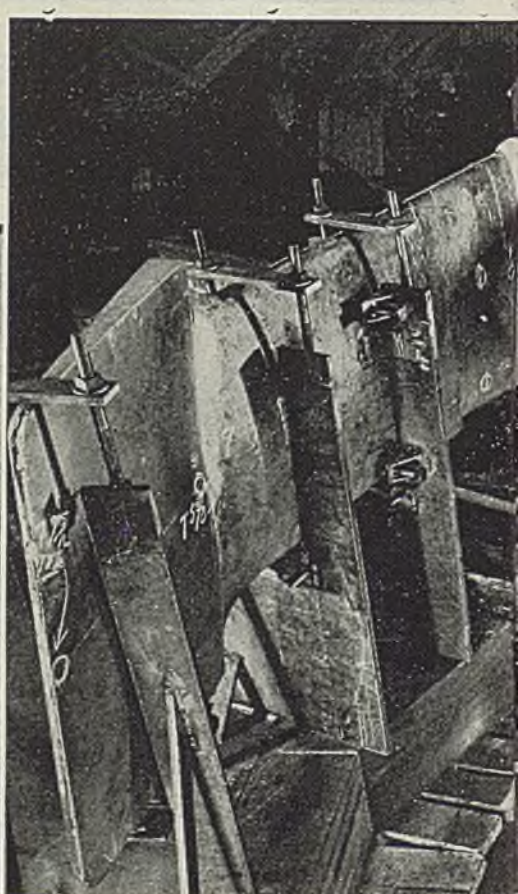
In the case of the propeller struts shown here, the finished welds are said to be stronger than castings of the same cross section.

Fig. 1—Center or hub section of propeller. The four arms carrying the large propeller blades are welded to this unit to form the propeller

Fig. 2—After careful aligning, both surfaces to be joined by a weld are flame cut to provide a gap of uniform width and to insure flat parallel surfaces for welding. Note heavy "eye" plate temporarily welded to hub in foreground for attaching anchoring turnbuckle. Photos from Metal & Thermit Corp., New York





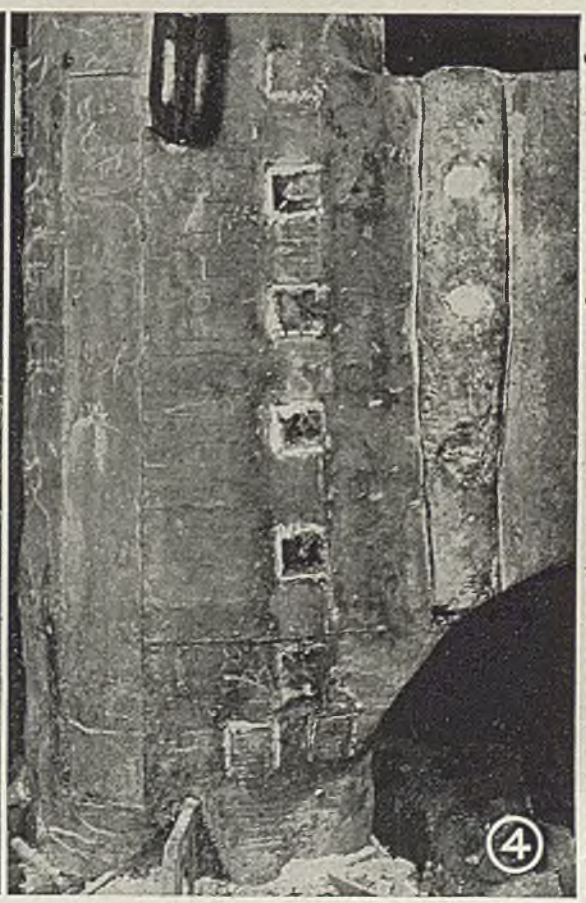


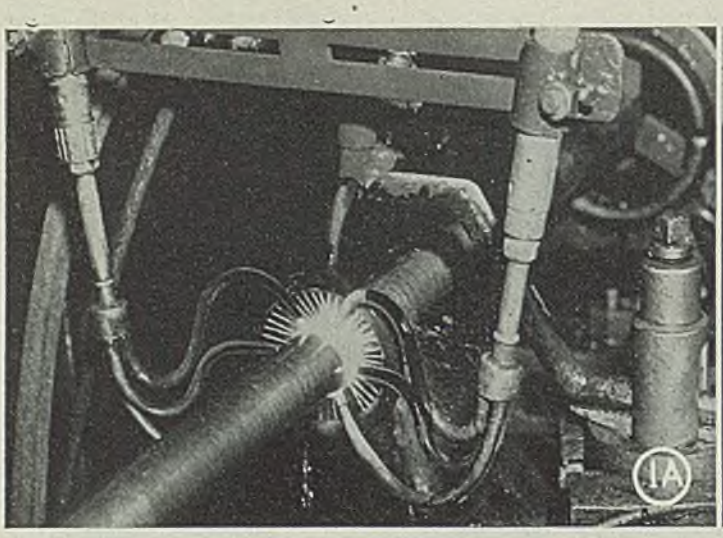
STRUTS

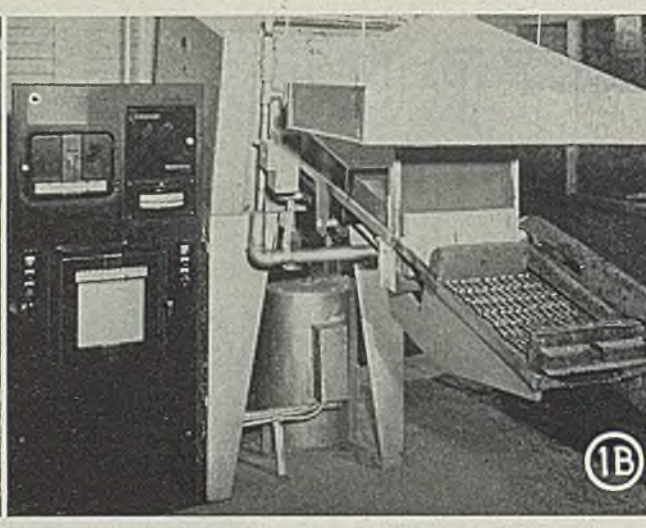
Fig. 3—A wax pattern is now made around each joint to provide an annular space at the weld. Left hub strut joint has already been waxed here. Note heavy U-frames cut from steel plate and fitted with welded on attachments for positioning propeller struts and blades. After positioning, a heavy angle is welded to fixture and strut to anchor firmly

Fig. 4—When welds have been poured, stripped and allowed to cool, gates and risers are then cut off, completing the job

Fig. 5—After molding boxes have been placed and molding sand rammed around waxed joint, 325 pounds of Thermit is poured into each crucible unit







HEAT TREATING Stainless Steels

The data presented here on the correct procedures for heat treating stainless steels are the results of research and long practical experience of the metallurgists of the Rustless Iron and Steel Corp. The user of these steels is provided a ready guide for preparing them to take full advantage of their corrosion-resistant and mechanical properties

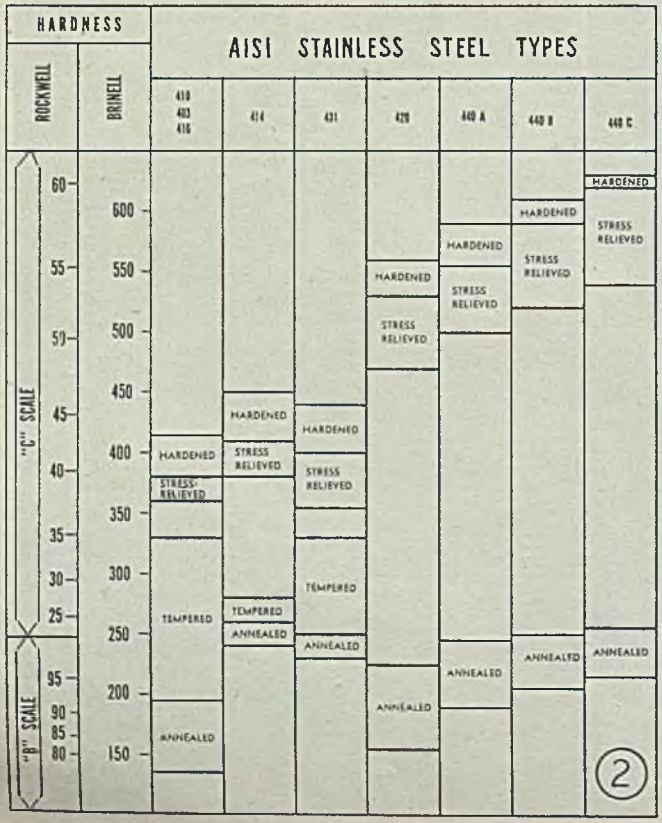
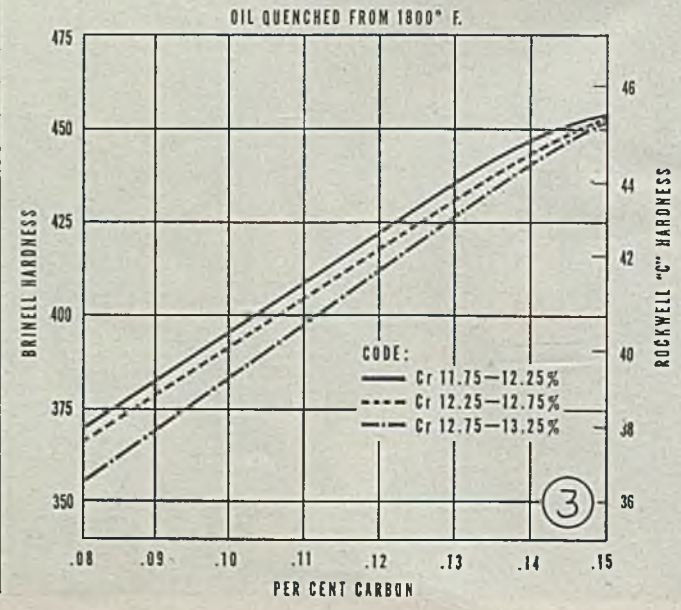
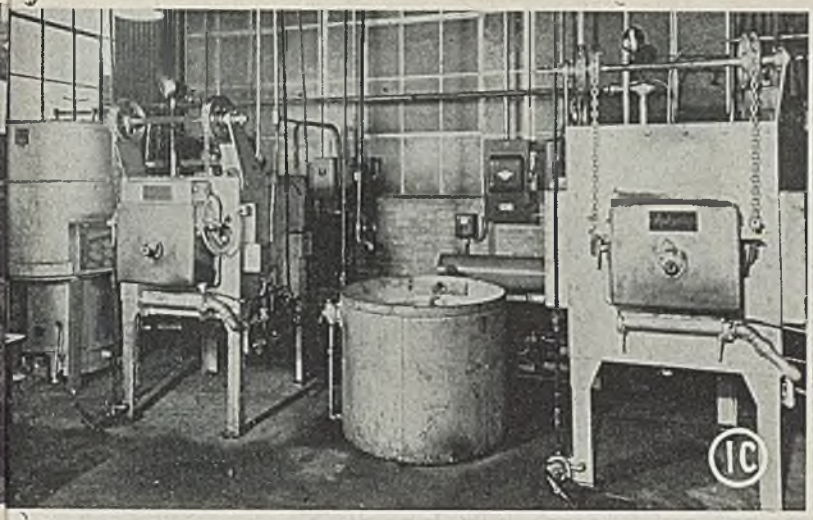


Fig. 2—Hardness ranges of the Group I hardenable grades of stainless steel

Fig. 3—Effect of carbon and chromium on the "as quenched" hardness of stainless Types 410, 403, *and* 416

Fig. 4—Effect of initial hardening temperature on the properties of Type 410 *stainless which is stress relieved after hardening*





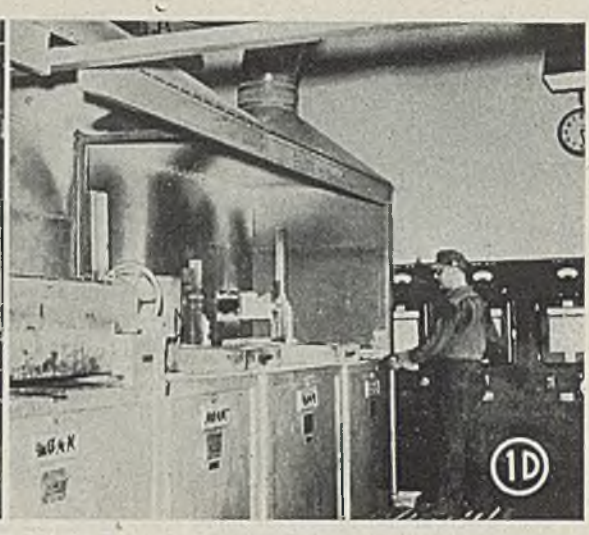


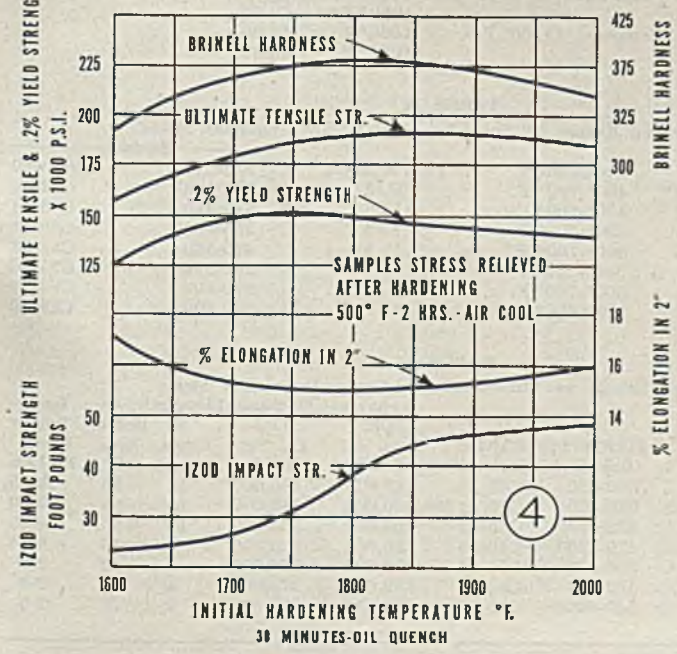
Fig. 1—(A) Straight chromium stainless steels may be flame-hardened readily as indicated by this typical setup; (B) these stainless steel parts have been bright hardened in a controlled atmosphere furnace; (C) typical high temperature electric furnace setup, with gas generator, for hardening and annealing stainless; (D) salt bath furnaces provide excellent results in hardening stainless. Induction heating, not illustrated, also works well

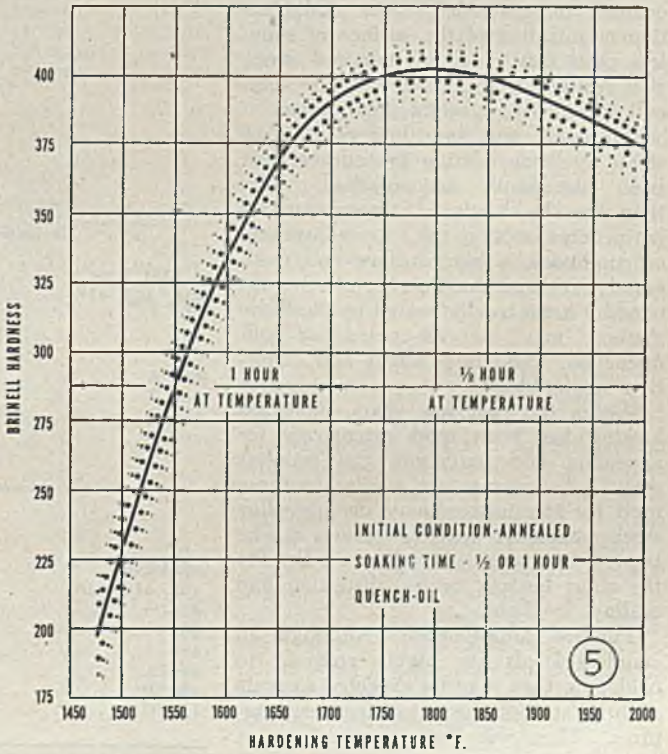
IN heat treating stainless steels, the general methods do not differ from those used with other steels. No special equipment is needed. Anyone with heat treating experience can handle stainless steel successfully. However, to attain full advantage of the excellent corrosion resisting and mechanical properties of stainless steels, proper attention should be paid to certain heat treating variables. These should be followed faithfully if the valuable properties of stainless steel are to be developed to their full extent.

Stainless steels are available in a wide variety of chemical compositions. Each is designed to meet certain industrial requirements of corrosion and oxidation resistance as well as to provide an extensive range of mechanical properties. From extreme softness to high hardness obtained by heat treatment or cold working, stainless steels are remarkably versatile.

Heat Treating Equipment: Heat treatment of stainless steels may be carried out with any conventional type of electric, gas-fired, oil-fired, salt bath, or induction furnace, typical installations being shown in Figs. 1 A, B, C and D. Because of the relatively high temperatures employed in hardening and annealing certain grades, care in furnace operation is required, especially with equipment not specifically designed for high temperature work. Where electric, gas, and oil-fired equipment is employed, the usual precautions should be employed in loading the furnace to insure uniform heating. In gas and oil-fired furnaces the design should be such that the material is not exposed to the direct flame from the burners, to avoid decarburization. Although some latitude in temperature control is possible in hardening or annealing these alloys, the best results are always secured when proper precautions are taken to control temperatures accurately. This is particularly true in tempering the hardenable stainless steels to narrow ranges of hardness and tensile properties where the use of properly located thermo-

Fig. 5—Effect of hardening temperature on hardness of Types 410, 403 and 416





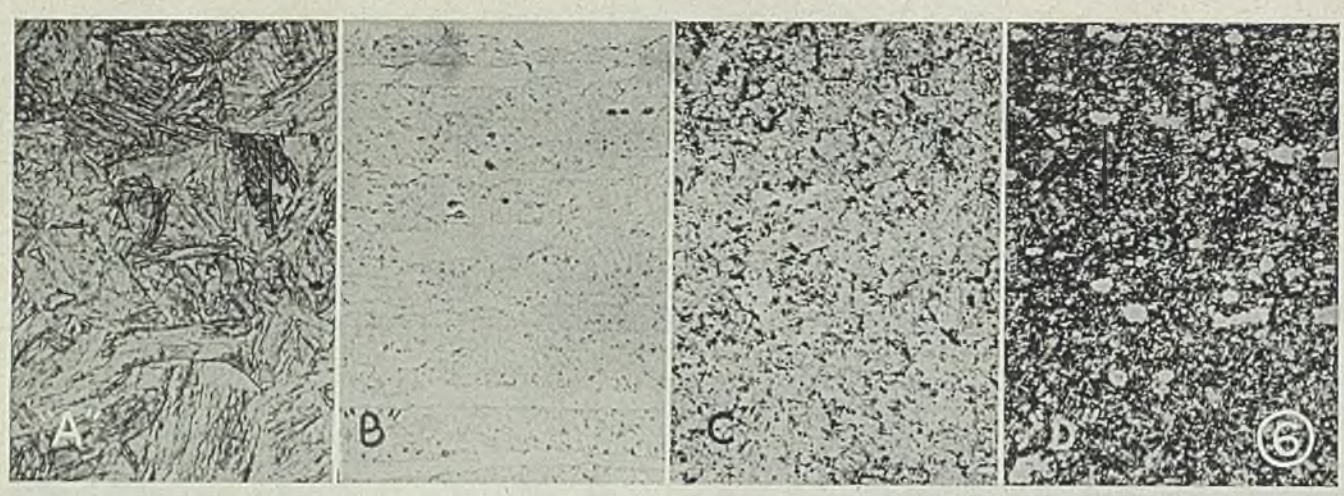


Fig. 6—Structure of several types of Group I hardened stainless steels (A) Type 410, (B) Type 431, (C) Type 420 and (D) Type 440C. Magnification X500

couples and other standard pyrometric equipment is highly desirable to determine temperatures accurately.

Salt baths have been used with excellent success in heat treating stainless steels. Scaling is slight, and the scale formed is easily removed. There are many types of good equipment available, both internally and externally heated, which are well suited for this work. Salts should be chosen which do not contain materials which will introduce carbon or nitrogen into the surface of the work. Chemically neutral salts should be selected and new salts should be checked before they are used in production. Common salts employed in high temperature salt baths include chlorides of barium, sodium, calcium, and potassium. Sodium and potassium nitrates are used for lower temperatures. In no case is the use of any type of cyanide recommended, since carburization or nitriding of the surface of stainless parts may result in impaired corrosion resistance, and parts may be difficult to finish to a bright, high luster.

Hardening and annealing of stainless steels by flame heating procedures have been successfully accomplished. Sections can be hardened throughout the entire cross-section, or, by adjustment of conditions, a hard surface and moderately soft and ductile core can be obtained. Areas locally heated by the flame method may be air-cooled or oil-quenched. Scaling is slight and distortion negligible.

Within the past few years, induction heating has been used extensively for annealing and hardening the stainless steels. Techniques are similar to those used for treating ordinary or low alloy steels. Selective areas or sections can be treated by induction methods. Due to the short heating cycles, distortion and scaling is slight.

Furnace Atmospheres: Although all stainless steels are highly resistant to oxidation, they may be expected to scale slightly at high heat treating temperatures. They will show no evidence of

TABLE I

Chemical Analysis of Group I Straight Chromium, Hardenable Stainless Steels

AISI Type	C	Mn	Si	P	S	Cr	Ni
410	0.15 max.	1.00 max.	1.00 max.	0.04 max.	0.04 max.	11.5/13.0	.....
403	0.15 max.	1.00 max.	1.00 max.	0.04 max.	0.04 max.	11.5/13.0	.....
416	0.15 max.	1.00 max.	1.00 max.	0.04 max.	0.07 min.†	12.0/14.0	.....
414	0.15 max.	1.00 max.	1.00 max.	0.04 max.	0.04 max.	11.5/13.5	1.25/2.50
431	0.20 max.	1.00 max.	1.00 max.	0.04 max.	0.04 max.	15.0/17.0	1.25/2.50
420	0.15 min.°	1.00 max.	1.00 max.	0.04 max.	0.04 max.	12.0/14.0	.....
440A	0.60/0.75	1.00 max.	1.00 max.	0.04 max.	0.04 max.	16.0/18.0	.....
440B	0.75/0.95	1.00 max.	1.00 max.	0.04 max.	0.04 max.	16.0/18.0	.....
440C	0.95/1.10	1.00 max.	1.00 max.	0.04 max.	0.04 max.	16.0/18.0	.....

°Analysis for Rustless Iron & Steel Corp.—Grade 13-C-35; Usual Range 0.35/0.45.
†Analysis for Rustless Iron & Steel Corp.—Grade 12 FM; Usual Range 0.18/0.35.

TABLE II

Normal Hardening Ranges and As-Quenched Hardnesses of Group I Stainless Steels

AISI TYPE	Hardening Temperature	Hardness—Brinell	Hardness—Rockwell
410, 403, 416	1700-1850° F.	380-415	C 39-43
414	1800-1950° F.	400-450	C 42-47
431	1800-1950° F.	400-440	C 42-46
420	1800-1900° F.	530-560	C 53-56
440 A	1850-1950° F.	555-590	C 55-58
440 B	1850-1950° F.	575-610	C 57-59
440 C	1850-1950° F.	620-630	C 60-62

TABLE III

Effect of Quenching Temperature on Type 431 Stainless Steel

Condition	Quenching Temperature	Izod Impact Strength ft. lbs.
Stress-Relieved (600° F.)	1800° F.	15-25
	1950° F.	30-60
Tempered (1100° F.)...	1800° F.	55-80
	1950° F.	45-55

TABLE IV

Recommended Ranges for Stress-Relieving Group I Stainless Steels

AISI Type	Temperature	Time in Hours	Hardness—Brinell	Hardness—Rockwell
410, 403, 416	450°-700° F.	1 - 3	360-380	C37-40
414	450°-700° F.	1 - 3	380-420	C40-44
431	450°-700° F.	1 - 3	355-400	C36-42
420	300°-700° F.	1 - 2	470-530	C48-53
440 A	300°-700° F.	1 - 2	500-560	C51-56
440 B	300°-700° F.	1 - 2	520-590	C53-58
440 C	300°-700° F.	1 - 2	540-620	C55-60

TABLE V

Average Results of Stress-Relieving Group I Stainless Steels

AISI Type	HARDNESS RANGE Brinell	HARDNESS RANGE Rockwell	Average Mechanical Properties—Ult. Tens. Str. P.S.I.	0.2% Yld. Str. P.S.I.	% Elong. in 2"	% Red. of Area	Izod Impact Range Ft. Lbs.
403, 410, 416	360-380	C37-40	185,000	140,000	15	60	20-45
414	380-420	C40-44	200,000	150,000	15	55	30-60
431	355-400	C36-42	180,000	125,000	17	50	30-60
420	470-530	C48-53	250,000	225,000	8	25	8-15
440 A	500-560	C51-56	270,000	260,000	5	20	3-6
440 B	520-590	C53-58	280,000	270,000	3	15	2-5
440 C	540-620	C55-60	285,000	275,000	2	10	2-5

TABLE VI

Average Results of Tempering Fully Hardened Stainless Steel

AISI Type	Hardness Range Brinell	Hardness Range Rockwell	Ult. Tens. Str. P.S.I.	2% Yld. Str. P.S.I.	% Elong. in 2"	Red. of Area %	Izod Impact Range Ft. Lbs.
			1000° F. (4 hours)				
403-410	260-330	C 25-34	145,000	115,000	20	65	35-70
416	260-330	C 25-34	145,000	115,000	16	53	10-30
431	270-340	C 26-35	150,000	115,000	19	58	35-70
			1100° F. (4 hours)				
403-410	210-250	B 95-100	115,000	90,000	22	65	65-90
416	210-250	B 95-100	115,000	90,000	18	53	20-35
414	250-290	B 100-29	135,000	110,000	20	60	25-40
431	245-285	B 99-C 29	130,000	100,000	20	58	45-80
			1200° F. (4 hours)				
403-410	200-230	B 93-97	105,000	85,000	23	67	85-110
416	200-230	B 93-97	105,000	85,000	19	55	30-45
414	245-265	B 99-C 26	125,000	100,000	21	60	30-60
431	230-260	B 99-C 24	120,000	95,000	21	60	55-80
			1300° F. (4 hours)				
403-410	195-220	B 92-96	100,000	80,000	25	69	90-110
416	195-220	B 92-96	100,000	80,000	21	57	35-60
414	240-255	B 99-C 24	120,000	95,000	21	65	55-80
			1400° F. (4 hours)				
403-410	170-195	B 86-92	90,000	60,000	30	72	95-115
416	170-195	B 86-92	90,000	60,000	26	60	50-70

TABLE VII

Annealing the Hardenable Stainless Steel Grades

Process Annealing Procedure

Type	Temperature	Time in Hours	Cooling	Hardness Brinell	Hardness Rockwell
410, 403, 416	1350-1450° F.	1 - 3	Any	170-195	B86-92
414	1200-1300° F.	4 - 8	Any	240-255	B99-C23
431	1150-1225° F.	4 - 8	Any	230-260	B97-C24
420	1350-1450° F.	2 - 6	Any	205-225	B94-97
440 A	1350-1450° F.	2 - 6	Any	230-245	B97-C22
440 B	1350-1450° F.	2 - 6	Any	235-250	B98-C23
440 C	1350-1450° F.	2 - 6	Any	240-255	C22-C27

Full Annealing Procedure

Type	Temperature	Time in Hours	Cooling	Hardness Brinell	Hardness Rockwell
410, 403, 416	1550-1650° F.	1 - 3	Slow cool*	135-160	B75-83
420	1600-1650° F.	1 - 2	Slow cool*	155-180	B81-89
440 A	1625-1675° F.	1 - 2	Slow cool*	190-215	B91-95
440 B	1625-1675° F.	1 - 2	Slow cool*	205-230	B94-98
440 C	1625-1675° F.	1 - 2	Slow cool*	215-240	B95-99

*25-50° F. per hour to 1100° F.

TABLE VIII

Results of Annealing the Hardenable Grades of Stainless Steel

AISI Type	Hardness Range Brinell	Hardness Range Rockwell	Ult. Tens. Str. P.S.I.	0.2% Yld. Str. P.S.I.	% Elong. in 0.2%	Red. of Area %	Izod Impact Range Ft. Lbs.
			Full Annealed				
403	135-160	B 75-83	78,000	40,000	35	73	95-115
410		B 75-83					
416	135-160	B 81-89	78,000	40,000	31	62	80-95
420	155-180	B 91-95	98,000	60,000	28	65	75-80
440A	190-215	B 95-99	105,000	65,000	23	50	10-20
440C	215-240	B 86-92	110,000	60,000	15	30	5-20
			Process Annealed				
403	170-195	B 86-92	90,000	60,000	30	72	95-115
410							
416	170-195	B 86-92	90,000	60,000	26	60	50-70
414	240-255	B 99-C 23	120,000	95,000	21	65	55-80
431	230-260	B 97-C 24	120,000	95,000	21	60	55-80
420	205-225	B 94-B 97	105,000	80,000	23	55	45-75
440A	230-245	B 97-C 22	115,000	85,000	21	50	15-30
440C	240-255	C 22-C 27	125,000	100,000	12	25	5-20

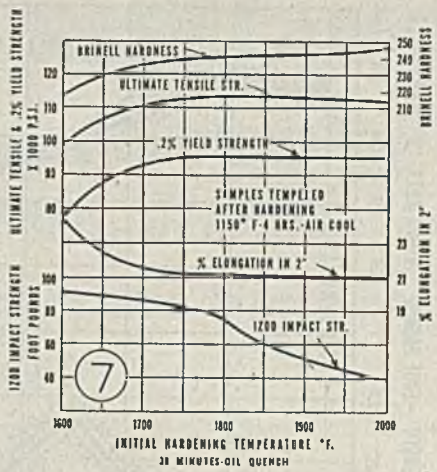


Fig. 7—Effect of initial hardening temperature on the properties of Type 410 stainless which is tempered after hardening

oxidation until a temperature of about 400 degrees to 500 degrees Fahr. is reached. In this temperature range a very thin oxide film is formed which increases in thickness as the temperature is raised. Manufactured atmospheres, prepared from partially burned or otherwise treated fuels which are used to prevent or minimize the scaling of plain carbon and low alloy steels generally will not give satisfactory results with stainless steels. They may produce a scale which is difficult to remove. When completely scale-free heat treatment is essential, specially prepared atmospheres of dry cracked ammonia or dry hydrogen are used. Suitable gas-tight furnaces and equipment for generation of such atmospheres are available commercially and have been demonstrated to give excellent results. Parts finished to a high luster can be heat treated without trace of discoloration.

Degree of scaling which occurs will depend on composition of furnace atmosphere, temperature, time, and alloy content of the steel—the higher chromium-containing alloys, in general, being the least affected. Experience shows good results are secured if definitely oxidizing atmospheres are employed. Scale produced in such an atmosphere is most readily removed by pickling. Reducing atmospheres cause the formation of a thinner but much more impervious scale, which is often highly resistant to pickling.

It is a good practice to avoid carburizing conditions, which often characterize reducing atmospheres. Nor should parts be packed in material which will introduce carbon into the surface. Charcoal, coal and coke dust, boneblack, cast iron turnings and similar material will carburize stainless at heat treating temperatures and will result in serious loss of corrosion resistance. Parts, especially of the austenitic chromium-nickel types, if contaminated with grease, oil, or other organic materials and placed in the furnace, are likely to be carburized locally. Contamination of the surface of the chromium-nickel steels with zinc or

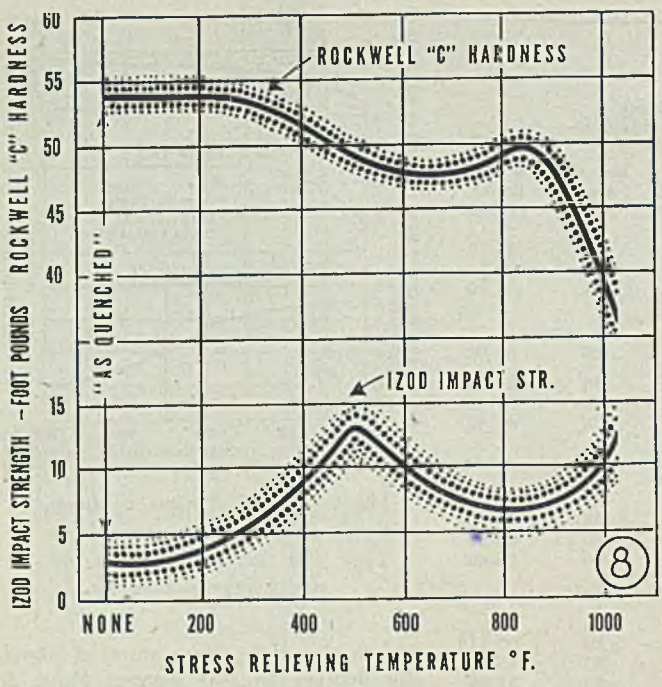


Fig. 8—Effect of stress-relieving temperature on hardness and toughness of Type 420

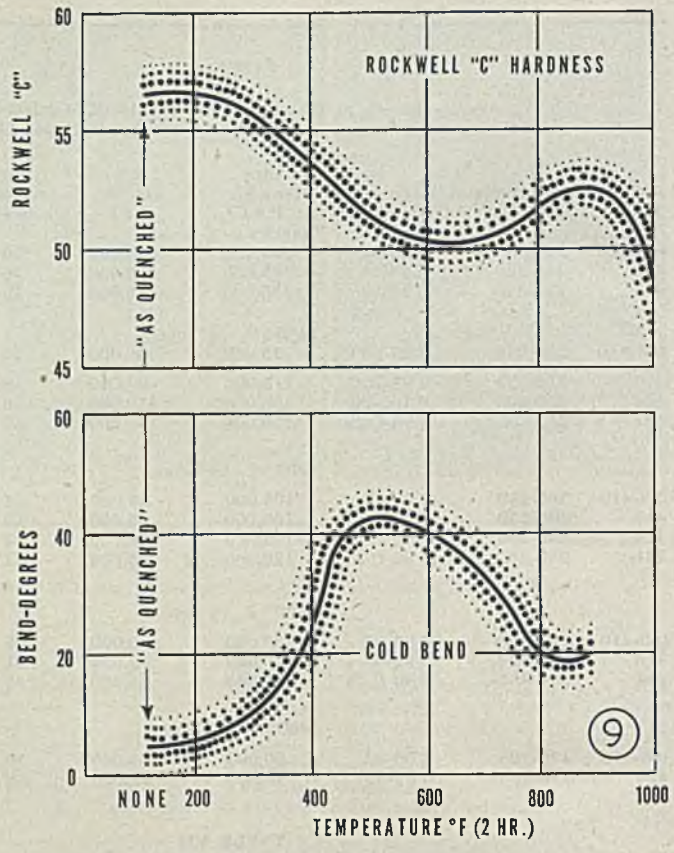


Fig. 9—Effect of stress-relieving temperature on hardness and toughness of Type 440A

zinc-containing alloys should be carefully avoided. Zinc rapidly penetrates along the grain boundaries of these steels at annealing temperatures and results in embrittlement.

Decarburization of the straight chromium steels may occur, usually, however, only under extreme conditions such as direct exposure of parts to an open flame in the furnace. Removal of carbon from the surface of hardenable type stainless steels will result in loss of hardening power in the surface layers. Austenitic chromium-nickel steels are unaffected.

Three Basic Groups: The stainless steels, based on their chemical compositions and response to heat treatment, fall naturally into three groups: (1) Straight chromium, hardenable grades; (2) straight chromium, nonhardenable grades; and (3) chromium-nickel, nonhardenable grades.

Group I, the straight chromium, hardenable grades (martensitic), includes those grades which have chromium as their chief alloying ingredient (from 11.5 to 18.0 per cent) and with varying amounts of carbon, from approximately 0.08 to 1.10 per cent. Nickel is present in Type 414 and Type 431, up to 2.50 per cent but is not included in other alloys of this group as a principal alloying element. Each of these grades can be hardened to a high degree by quenching from high temperatures. They respond to heat treatment much the same as plain carbon and low alloy steels. They are magnetic. Because, when hardened, their crystalline structure is composed primarily of the microconstituent, martensite, they are commonly referred to as the "martensitic" stainless steels. The chemical analysis of this group is given in Table I.

Chart shown in Fig. 2 illustrates the extent to which each of the hardenable grades listed in Table I responds to various recommended heat treatments. To meet a specific hardness requirement of a given application, a grade may be chosen in which the hardened and stress-relieved condition will provide the required range of hardness. Tempering of the four high carbon grades, Types 420, 440A, 440B and 440C, below the indicated range is not recommended because of the adverse effect it has upon corrosion resistance.

Hardening: The term "hardenability," in the sense that it refers to the depth and distribution of hardening, has relatively little significance with the stainless steels. This is because all hardenable stainless steels harden uniformly throughout, even in large sections, when rapidly cooled from above the critical temperature. Degree to which straight chromium Group I stainless steels harden is referred to as the "as quenched," "full" or "maximum" hardness.

Hardening of these alloys is accomplished by heating above the critical or transformation temperature and then rapidly cooling in oil or air. By proper selection of grades and analysis of wide range of "as quenched" hardness is available depending primarily on carbon and chromium contents. As an illustration of this, Fig. 3 shows the effect of these two elements on the "as quenched" hardness of Types 410, 403 and 416. In the case of the high carbon grades, Types 420, 440A, 440B and 440C, small variations in carbon and chromium contents do not have any marked effect on the maximum quenched hardness desired.

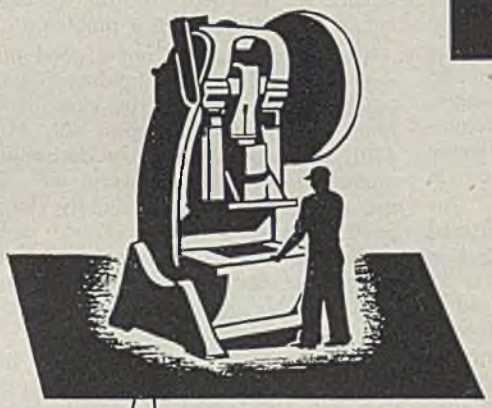
Preheating: Preheating of Types 410, 403, 416 and 431 is generally unnecessary except where large or complicated sections are involved or where materials, such as forgings are being charged in the hardened condition. In such cases, bringing rapidly to full hardening heat may cause thermal stresses sufficient to crack the material. Preheating the high carbon grades is recommended as a general rule because of their high carbon contents. Large sections should be started off at 1000 degrees Fahr. and then raised slowly to 1450 degrees Fahr. Small sections may be brought immediately to 1450 degrees Fahr. The time at preheating temperatures should always be long enough to insure that the parts are soaked through, and in the case of high carbon grades may be extended up to 1 to 2 hours with advantage. After preheating, parts may be raised quickly to hardening temperature.

Hardening Temperature: While hardening of these grades results whenever they are rapidly cooled from above the lower critical temperature, maximum hardness is not secured until the hardening temperature is raised several hundred degrees above this point. As might be expected, parts quenched from intermediate temperatures (1475 to 1700 degrees Fahr.) will develop hardnesses ranging from that of annealed material up to that of fully hardened material depending on the quenching temperature, as illustrated in the chart in Fig. 5. Hardening from this range results in a heterogeneous microstructure which is generally less tough than when fully hardened.

When stress-relieving or tempering

YOU GET CORROSION RESISTANCE

Plus... Easy, Low Cost STAMPING, FORMING, DRAWING *with Carpenter Stainless*



Have you considered the greater utility advantages you can get by using Stainless Steel in your products?

For instance, you can give your products positive protection against heat and corrosion; you can provide them with 50% greater strength than ordinary cold-rolled steel; you can choose from a wide range of physical properties to meet specific requirements.

Just be sure when you select a Stainless Steel that you get one that works easily and economically in your fabricating shop. Carpenter, for instance, has spent years of intensive research developing soft and ductile Stainless Strip that blanks cleanly, forms readily, deep-draws easily. Exacting control through every step in manufacture, gives this Stainless Strip the consistent uniformity, lot after lot, that pays off in faster production runs with fewer rejects and less die wear.

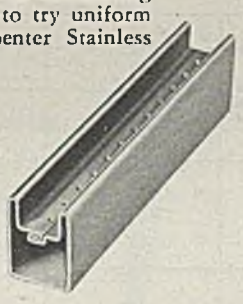
Call in your nearby Carpenter representative today and let him help select the Stainless Strip that will make your production job easier and build extra service life into your products. And if you do not already have a copy of "Working Data for Carpenter Stainless Steels," drop us a line on your company letterhead.

NO PROCESS ANNEALING

was needed to deep draw this steam trap bucket. Have you considered the economies you can gain and the trouble you can avoid by making your deep drawn parts from easy-working Carpenter Stainless Strip?

TOUGH PROBLEM SOLVED

This lock seam presented a difficult fabricating problem until Carpenter Stainless Strip went on the job. If you are having difficulties in fabricating stainless parts, be sure to try uniform soft and ductile Carpenter Stainless Strip.



GIVE YOUR PRODUCTS THESE ADVANTAGES WITH CARPENTER STAINLESS

- Strength and Rigidity
- Heat Resistance
- Weight Saving
- Freedom from Rust
- No Plating to Peel
- Ease of Assembly
- Longer Product Life
- Sales Appeal

The Carpenter Steel Company • 139 W. Bern Street • Reading, Pa.

Carpenter STAINLESS STEELS

BRANCHES AT
Chicago, Cincinnati, Cleveland, Detroit, Hartford, Indianapolis, New York, Philadelphia, St. Louis

operations subsequently are to be performed, the usual practice is to harden from a temperature which gives close to the maximum hardness. Normal hardening ranges and resultant "as quenched" hardness are given in Table II.

The temperature selected for hardening influences to some degree the properties which are later secured on stress-relieving or tempering. This effect is marked in the case of 410, 403, 416 and particularly 431. Quenching temperatures for the latter grade, listed in Table III, should be carefully chosen.

In each case, indicated in Table III, the high side of the hardening range will produce the maximum hardness and toughness after quenching and stress-relieving. Where the material is tempered after hardening, choice of the low side of the hardening range is suggested where maximum impact is desired. The effect of hardening temperature on the hardness, tensile strength, yield strength, elongation in 2 inches and impact toughness of Type 410, after stress-relieving and after tempering, is illustrated in Figs. 4 and 7.

Time: The time which the material is held at the hardening temperature is important. Enough time should be allowed to insure that the part or load is heated uniformly throughout to temperature. Once the load is at temperature, long soaking is not necessary or desirable; from 10 to 15 minutes is adequate for small parts. For large sections this may be increased ½-hour. Prolonging the soaking time beyond this point will not increase the quenched hardness and may result in decarburization and grain growth.

Quenching Methods: All hardenable stainless steels will harden completely and uniformly throughout, even in sections up to about 4 inches square on oil quenching or air cooling. Oil quenching is generally chosen because slightly higher hardness is usually obtained than with air cooling. However, air cooling can be used to good advantage in handling irregular and sharp-filleted sections unable to withstand more rapid quenching, or where distortion or cracking of hardened parts is a problem.

Water quenching is not a good practice and is likely to produce quench cracks, particularly in the case of the high carbon grades, Types 420, 440A, 440B and 440C. It may be desirable to quench these grades in warm oil. The use of oil baths heated slightly (to approximately 250 degrees Fahr.) or air cooling will tend to eliminate any possibility of hardening cracks in these highly hardenable grades and will result in no appreciable loss of hardness.

The hardening transformation from austenite to martensite does not take place on quenching from above the critical temperature until an approximate temperature of 550 degrees to 750 degrees Fahr. is reached. Parts which are subsequently stress-relieved or tempered therefore should not be removd from the quenching tank and transferred to the stress-relieving or tempering furnace until they have cooled below this range and have become definitely magnetic. Photomicrographs showing the structures of typical hardened steels are given in Fig. 6.

Stress-Relieving: Hardening treatments should always be followed immediately by a low-temperature draw (300-700 degrees Fahr.) to relieve stresses set up in the quenching operation. In the case of the high carbon grades 420, 440A, 440B and 440C, this should be done immediately after quenching—preferably while the parts are still warm enough that they can just be handled by bare hands. In no case should fully hardened parts that have not been stress-relieved be allowed to lie around the shop, especially in cold weather.

If this precaution is not observed,

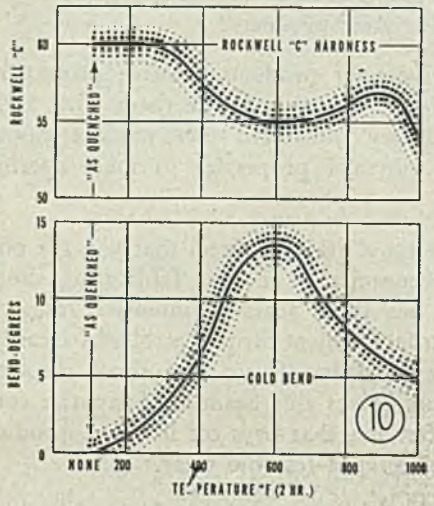


Fig. 10—*Effect of stress-relieving temperature on hardness and toughness of Type* 440C

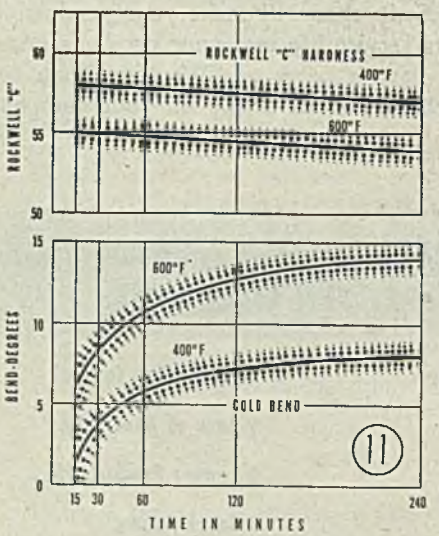


Fig. 11—*Effect of drawing temperature on hardness and toughness of Type* 440C

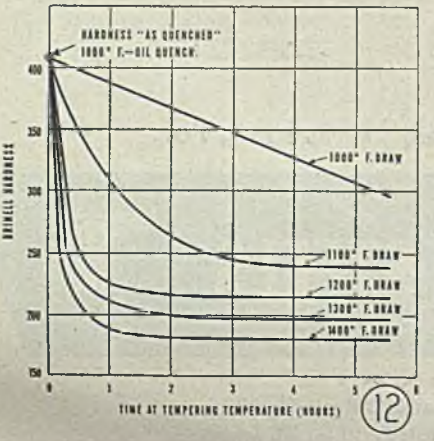


Fig. 12—*Effect of time at temperature on Types* 410, 403 *and* 416

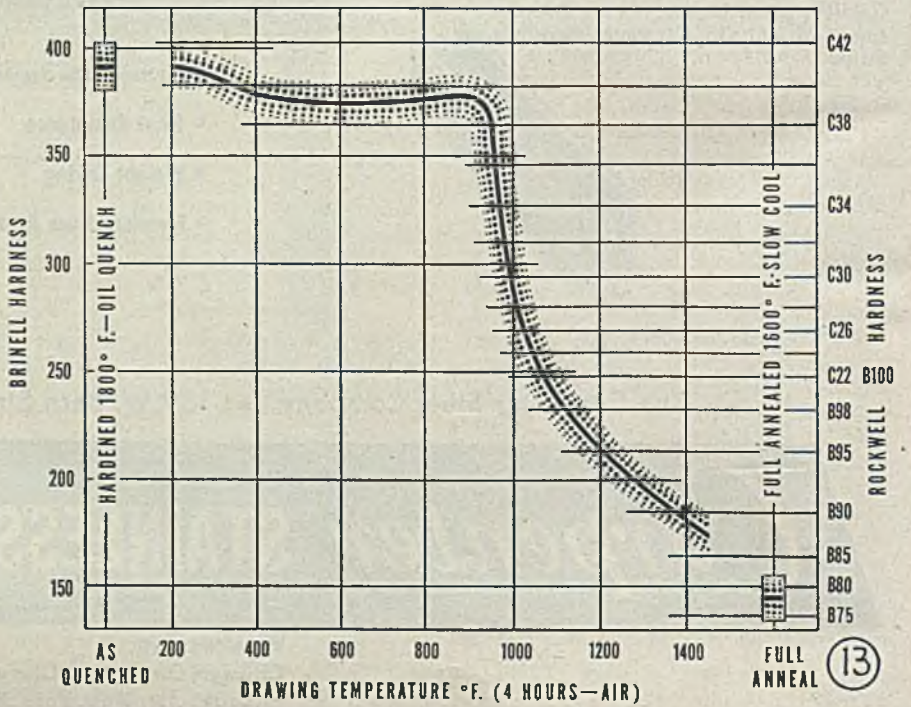


Fig. 13—*Drawing temperature vs. hardness, Types* 410, 403, *and* 416

CORROSION RESISTANT • HEAT RESISTANT • COLD RESISTANT

WEAR RESISTANT • CREEP AND IMPACT VALUES

RESPONSIVE TO HEAT TREATMENT • READILY MACHINABLE

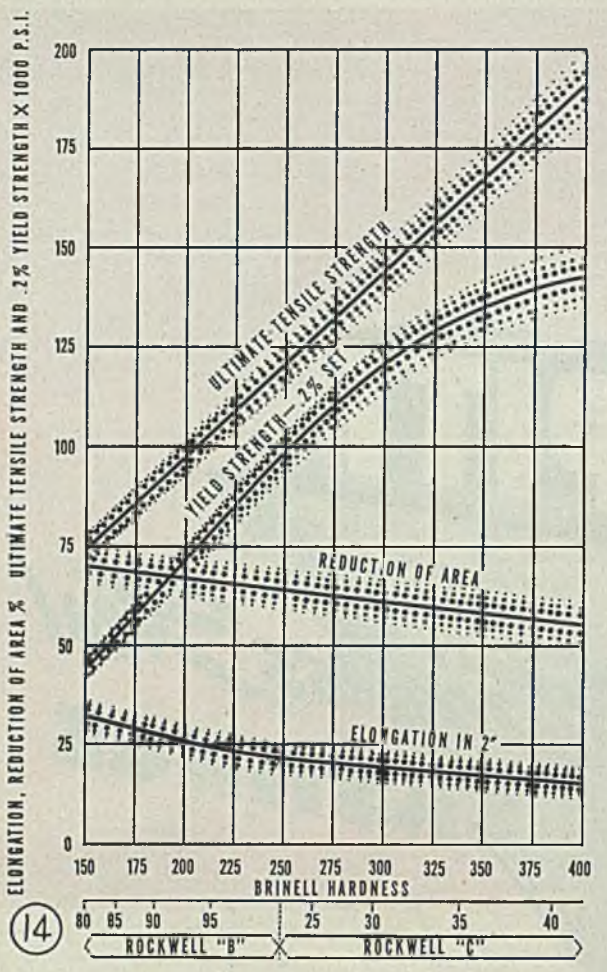
Fort Pitt Stainless Steels have been developed to meet the growing demand for corrosion-resisting steels with higher physical properties. Close analytical control and modern technical methods in one of America's most advanced specialty foundries, assure castings of superior quality in every respect. Customers of the Fort Pitt foundry have the advantage of the combined experience of Fort Pitt metallurgists and Porter process equipment engineers in the solution of their corrosion problems. Send us your blueprints. We will gladly supply an estimate and recommend the proper alloy.

FORT PITT STEEL CASTING CO.

Division of H. K. PORTER COMPANY, Inc.

PITTSBURGH 22, PENNSYLVANIA

FACTORIES: McKEESPORT, PA. • PITTSBURGH, PA. • BLAIRSVILLE, PA.
NEWARK, N. J. • NEW BRUNSWICK, N. J. • MT. VERNON, ILL.



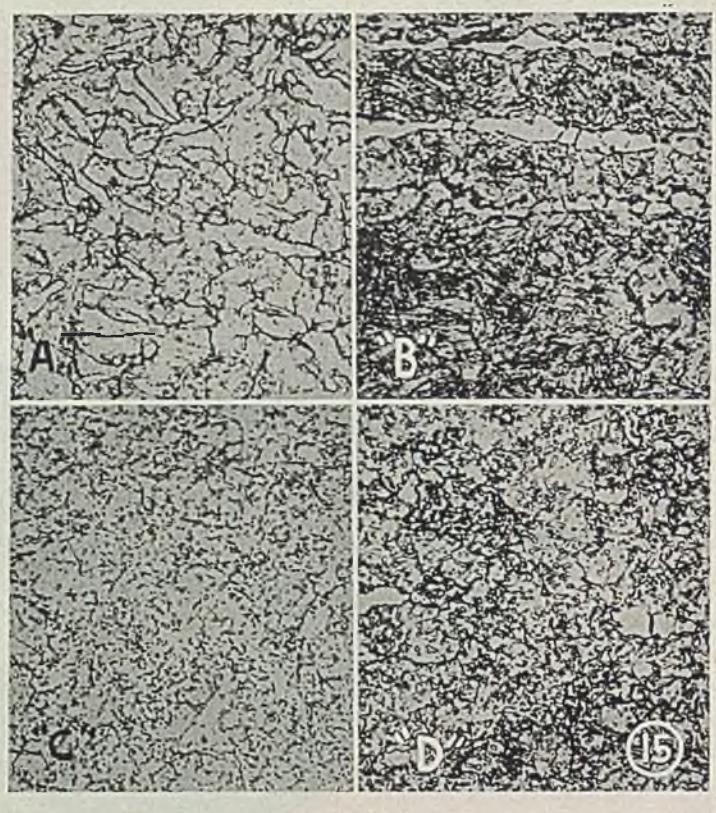


Fig. 14—Relation of tensile properties to hardness Types 410 and 403

Fig. 15—Structures of typical Group I annealed stainless steels (A) Type 410, (B) Type 431, (C) Type 420 and (D) Type 440C. Magnification X500

cracking will occur which may not show up until after pickling or surface finishing.

Stress-relieving will result in a slight reduction of the "as quenched" hardness and in improved ductility, toughness, and elastic properties. Recommended ranges for stress-relieving each grade are given in Table IV.

The low side of the range is best where maximum hardness is desired, the middle of the range where maximum toughness is required, and the high side where maximum elastic properties are wanted.

Figs. 8, 9 and 10 illustrate the effect of various stress-relieving temperatures on the hardness and toughness of the high carbon grades.

Fig. 11 shows the effect on Type 440C of time at stress-relieving temperatures. Other hardenable straight chromium grades respond similarly. Stress-relieving for one to three hours is generally recommended and this may be followed by air-cooling or quenching in oil or water.

All grades display their maximum corrosion resistance in the hardened and stress-relieved condition. Types 410, 403, 416, 414 and 431, however, may also be tempered to lower hardnesses and retain excellent corrosion properties. The high carbon grades, 420, 440A, 440B and 440C, are at their best when hardened and stress relieved and are not generally placed in service in the annealed or tempered conditions. Average results of stress-relieving are tabulated in Table V.

Tempering: A wide range of tensile properties and hardness can be secured by tempering hardened Types 410, 403, 416, 414 and 431. The best tempering temperature depends primarily on the properties desired. Like most alloy steels, the hardenable stainless steels develop lower impact strength when tempered in the range from about 750 to 950 degrees Fahr. Further, in the upper part of this range maximum corrosion resistance is not obtained. Tempering is, therefore, generally confined to the range indicated in Table VI.

In tempering operations, as the temperature is increased or the time is prolonged, tensile strength, yield strength, and hardness decrease; and impact strength and reduction in area increase. To secure the most uniform hardness results, close control of temperature, especially when tempering at lower temperatures, is desirable.

Time at tempering temperature is generally one to four hours; the longer periods are employed at the lower temperatures. The influence of time on the hardness of hardened material is shown in Fig. 12. This chart was prepared to indicate a trend and should not be used in selecting exact tempering temperatures. Average results of tempering fully hardened material are listed in Table VI.

In many cases where lots are to be tempered to narrow ranges of hardness, preliminary pilot tests or trials with small samples or individual parts are sometimes advisable to find the exact temperature necessary.

The cooling rate from tempering temperatures has no marked effect on tensile properties or hardness. Parts are usually air-cooled, but may be oil or water-quenced to facilitate handling.

As an aid in the selection of the proper stress-relieving or tempering temperatures, Fig. 13 indicates the relation between the drawing temperature and resulting hardness of Types 410, 403 and 416. It should be noted that this chart is based on material having an as-quenched hardness of 380 to 400 brinell.

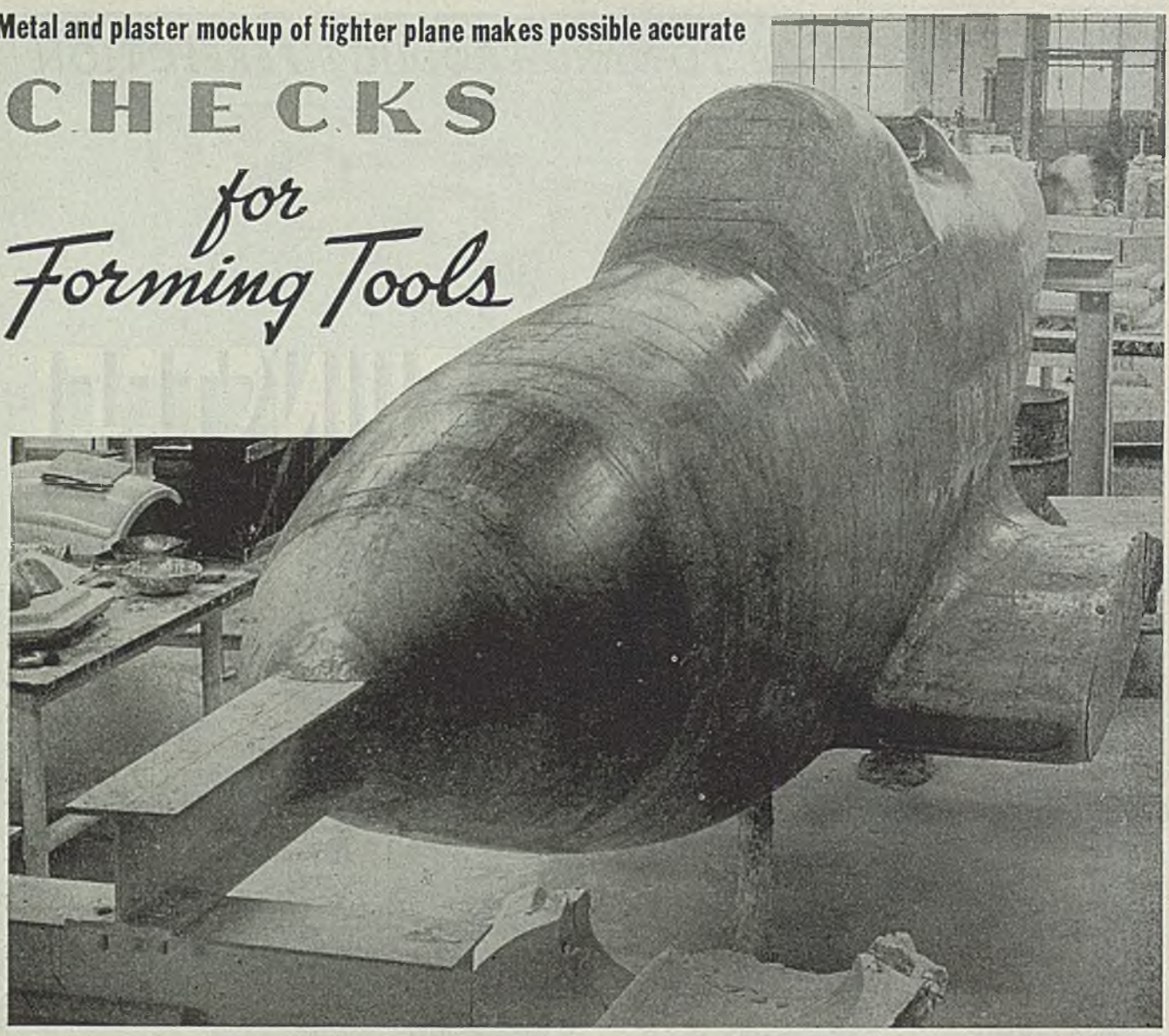
It is often necessary to estimate the mechanical properties of heat treated material from hardness values when actual tensile tests cannot be conducted. Fig. 14 shows the relation between tensile properties and hardness of Types 410 and 403. It is also applicable to Type 416 excepting that values for reduction of area will be approximately 12 per cent lower and those for elongation approximately 4 per cent lower than shown in the chart.

Annealing: Full softening of the hardenable grades is obtained by heating above the lower critical temperature followed by slow cooling. The best range of temperatures for each grade is listed in Table VII. Time at temperature depends on the size of the load and should

(*Please turn to Page* 160)

Metal and plaster mockup of fighter plane makes possible accurate

CHECKS for Forming Tools



Tooling for mass production takes less time and expense is reduced by use of full-scale model with framework of wood, steel and dural template stock. Better patterns for cast tools provided by permanent, dimensionally stable model

Fig. 1 (above)—Several tons of plaster were required to form this model of a P-63 fighter plane used for quick and accurate checks of tools used for forming the various fuselage components

FULL-SIZED plaster model of Bell Aircraft's P-63 Kingcobra fighter plane has proved its practicability many times over in shortening time and reducing expense of tooling for mass production. Constructed by Bell Aircraft's plaster pattern department at Buffalo, the full-scale model has a framework of wood, steel and dural template stock over which two coatings of plaster of Paris were applied. The complete mockup represents the exact outside left contours of the fuselage and wing fillets plus allowances for shrinkage of the finished kirksite dies to be cast from its patterns. It has the theoretically perfect lines of the completed airplane.

Fabricating equipment at Bell plants includes drop hammer dies, sketch press forms, crank press dies and hydropress blocks. It was for patterns for these cast tools that the model was constructed. Prior to the creation of this master form, it was necessary to prepare a separate mockup for each part. As plaster is a fragile material, it was difficult to keep these smaller mockups intact to a degree where they could be used for future reference. With the complete model, it is possible not only to have better tools, because the larger model produces better lines, but also a permanent fixture which has been modified to all latest engineering changes.

Because plaster is one of the most inert molding materials, its dimensional stability is invaluable to tooling. Although it absorbs moisture and later dries out, the P-63 mockup has been checked continually during the past 2 years and no noticeable change has been found.

First step in construction was to machine one of the parallel surfaces of a 6 x 6-inch by 30-foot H-beam to form the base working surface. Two stands were constructed to support the beam at either end. These were made from H-beams and were about 5 feet high. After leveling the beam with a transit, a straight line was placed down the entire length. This provided two working lines, the top surface of the beam representing the center line of thrust plane, and the line on the beam which signifies the center line of the ship. These are extremely accurate.

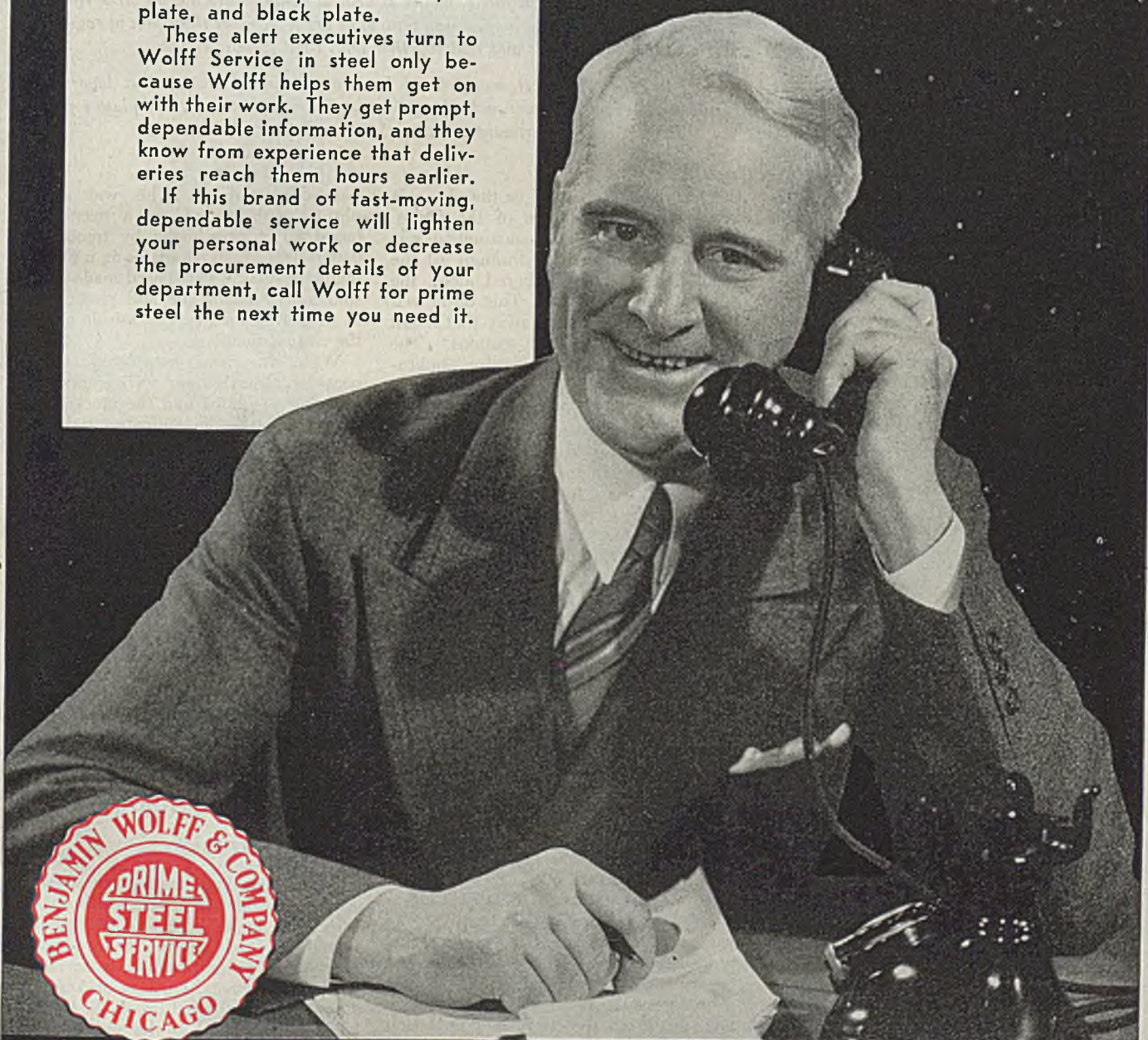
The 150-odd templates comprising the model were laid out from standard loft templates with the required allowance for shrinkage added. All templates symmetrical about the center line of the ship were made in two halves which then were riveted together to insure symmetry. The reference lines were transferred to the edge of the template by

Save Man Hours } your own your department's with Wolff Steel Service

Check the names of purchasing agents who buy steel **regularly** from warehouses, and you'll find one practice common to many of them — calling Wolff first for sheets, bars, expanded metal, tin plate, and black plate.

These alert executives turn to Wolff Service in steel only because Wolff helps them get on with their work. They get prompt, dependable information, and they know from experience that deliveries reach them hours earlier.

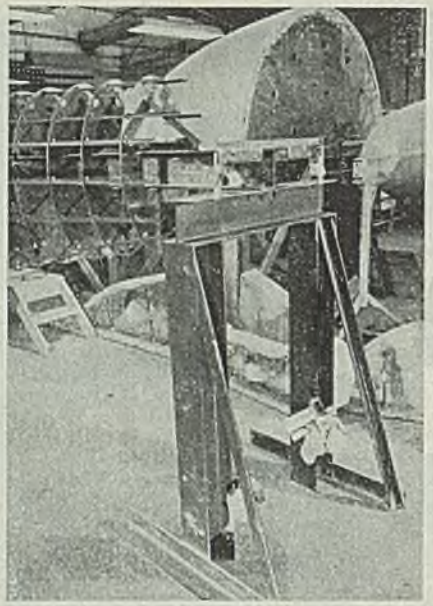
If this brand of fast-moving, dependable service will lighten your personal work or decrease the procurement details of your department, call Wolff for prime steel the next time you need it.



BENJAMIN WOLFF AND COMPANY

General Office and Warehouse — 58th St. at Seeley Ave., Chicago 36, Ill.

Wisconsin Office — 176 W. Wisconsin Ave., Milwaukee 3, Wis.



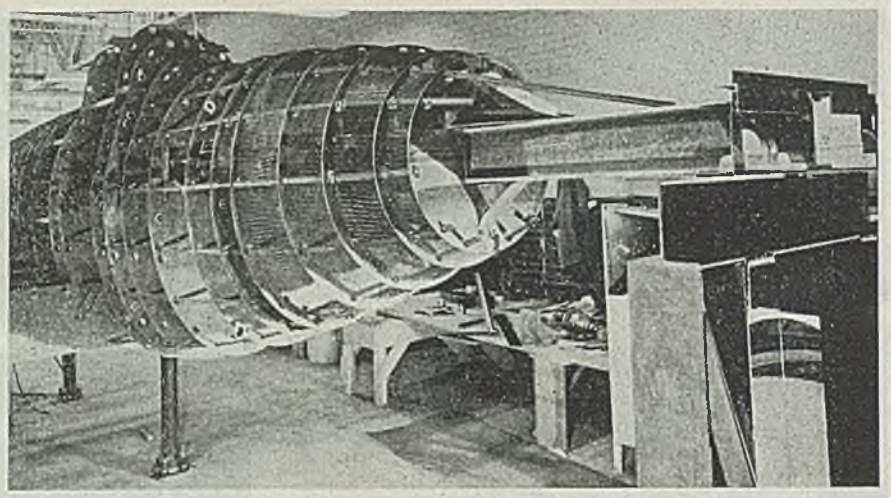


Fig. 2 (left)—Framework of model is central H-beam resting on steel frame at either end as shown here. Dural templates are fitted over the beam at regular intervals and tied together with light steel channels

Fig. 3 (above)—Steel mesh, fitted between templates before first layer of plaster is applied, serves as backing for two layers of plaster. The plaster pattern department required 1600 man-hours for this job

means of a small nick with a cold chisel.

Templates then were ready to mount on a piece of ¾-inch resin-bonded plywood. This wood was kept back about 2 inches from the edge of the template so that only the metal appeared on the outside contour. They were fastened to the wood with wood screws and a hole was cut through the template and plywood to allow it to be slipped over the H-beam. The top of this hole was accurately filled to the thrust plane.

At plotted intervals around the outside of the template and about 1½ inches from the edge, holes 1½ inches in diameter were drilled. Holes 3/32-inch in diameter were punched around the entire edge of the template, 1 inch from the rim and 1 inch apart.

The next step was to lay out on the center line of the ship the various stations to correspond with the templates made. The largest template, going through the top of the cabin and all the way down to include a portion of the subwing and fillets, was placed over the H-beam to its proper location on the beam. After the thrust plane on the template was checked with a transit, the template was fastened to the beam by bolting 2-inch angle irons to both. The template was squared to the thrust plane surface of the beam and braced firmly forward and aft with extreme accuracy to form the third working surface. Remaining station templates were set in a similar manner, each being checked with the transit after it was bolted in place. Short pieces of 1-inch angle iron were used as spreaders toward the outer edges of the template to insure parallel planes between each.

After they were all in place and checked again, long lengths of 1-inch steel channels were inserted through previously plotted holes. Channels then rested directly against the edge of the plywood backing and they were attached by wood screws. These channels were placed about every 3 inches around the fuselage. Ordinary wire lath was cut into convenient pieces to fit between the templates and wired to the channels below the contour edge of the plates. The last step in metal construction was to string soft iron wire through all the small holes previously bored along the edge of the templates. This tie-in was to prevent any cracking away that might tend to occur between sections. The framework was then ready for application of plaster.

Two layers of plaster were applied, the first being partially forced through the wire lathing to form a bond with the metal and eliminate the springy effect of the lathing. Since plaster expands slightly on setting, it was necessary to allow the first and largest mass to harden and take up the larger, initial expansion. The surface of this layer, which was left rough to act as a gripping surface for the finish coat, then was shellacked to prevent too rapid absorption of the water from the finish plaster.

The second or finish coat was applied and, with the aid of flexible steel splines, the contours between the templates were "faired in." Although this operation sounds simple, it is in reality a complicated procedure.

The process of splining-in the mockup required more than 1½ tons of plaster and produced an average wall thickness of 1½ to 2 inches. It also was necessary to insert additional templates either on buttocks lines or water lines to fashion the actual shapes at various points more accurately. This was the case at the opening on the leading edge of the subwing as it fairs into the fuselage and again at the trailing edge wing fillets. Extra templates also were used in the carburetor intake fairing and in critical areas of the cabin structure.

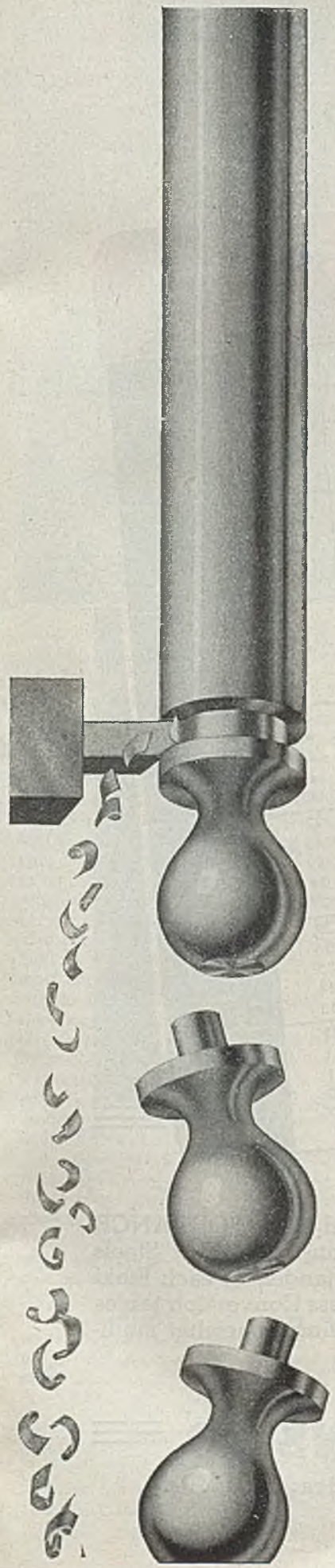
When the surface was completely splined in and satisfactorily aligned to specifications, layout work was started on every piece of skin, cowling, fillets, doublers, stringers and door opening on the entire surface. This was accomplished with the aid of a master loft board which was made by tracing the department's own templates on a piece of template stock. This board made it possible to lay out a line and project it to its proper location on the outside edge of the various templates.

With the form completed, several coats of clear lacquer were sprayed on the plaster surface and the mockup was ready for use—the entire operation requiring only 1600 man-hours.

From the model, "shell" casts are taken and then built up into patterns for various tools. In cases of doublers and stringers, where secondary additional contours are added, the mockup again serves to determine the exact shape where the part will touch the outside contour of the ship. It also has proved its value in checking metal parts after they are formed and in helping to determine proper springback allowance for tools. This type of model in aircraft tooling is said to have such a wide range that its possibilities are not yet entirely investigated.

Construction Materials Resist Corrosion

Inert, noncontaminating construction materials, called Karbates, which operate effectively under both acid and alkaline conditions and where strong organic solvents are present have been developed by Calco Chemical Division of American Cyanamid Co., Bound Brook, N. J. These materials are said to be versatile and suitable for a variety of chemical applications. This product, with a graphite base, possesses a high coefficient of heat transfer. Karbate materials are chemically inert and highly resistant to corrosion, are unaffected by severe thermal shock, and are impregnated to make them impervious to liquids.



J&L STEEL

COLD FINISHED BESSEMER SCREW STOCK

Uniform Bessemer Flame Control free cutting steel for superior parts.

Our metallurgical engineers will be glad to discuss your production problems with you.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

⇨ *did* **YOU** *get yours?*

(Front)

(Effective April 1, 1945)

*STANDARD TEMPER NUMBERS for

Finkl Tempered Die Blocks and Hot Work Steels

*As determined by Brinell Ball Diameter using Tungsten Carbide Ball.

▪ FX CU-PRO-DIE ▪

SHELL-DIE DUR-O-DI

TEMPER	Brinell Diameter	Brinell Number	✓Scl. Range (Approx.)	Rockwell "C"
•H	2.80-2.90	477-444	66-61	49-46
•1	2.95-3.10	429-388	60-55	45-41
2	3.15-3.30	375-341	55-50	40-36
3	3.35-3.50	331-302	50-45	35-32
4	3.55-3.70	293-269	45-40	31-28

✓Scleroscope Hardness Ranges are APPROXIMATE only.

•Die Blocks furnished to Temper H or Temper 1 have soft shanks.

In ordering Tempered Die Blocks or Inserts be sure to specify:

(1) Hardness desired according to the standard Temper letter or number indicated above.

(2) Specify sizes in the following order: HEIGHT x WIDTH x LENGTH. For example: 10" (High) x 14" (Wide) x 16" (Long)

A. FINKL & SONS CO.
CHICAGO

(Back)

HARDNESS CONVERSION

A. S. M. STANDARDS				FINKL
Brinell Diameter	Brinell Number	Rockwell "C" Scale	Scleroscope Number	Finkl Steels Scleroscope
2.55	578	57	78	78
2.60	555	55	75	75
2.65	534	53	72	72
2.70	514	52	70	70
2.75	495	50	67	68
.80	477	49	65	66
85	461	47	63	64
90	444	46	61	62
95	429	45	59	60
0	415	44	57	58
	401	42	55	57
	388	41	54	55
	375	40	52	54
	363	38	51	53
	352	37	49	51
	341	36	48	50
	331	35	46	49
	321	34	45	48
	311	33	44	46
	302	32	43	45
	293	31	42	44
	285	30	40	43
	277	29	39	42
	269	28	38	40
	262	26	37	39
55		25	37	38
48		24	36	37
41		23	35	36
5		22	34	35
2		21	33	34
		20	32	33
		18	31	32
		17	31	31
		16	30	31
		15	30	30

Actual Size of Card
Printed in Red and Black on Celluloid

⇨ ***if not:*** Send for this handy card **NOW**. It's a card of **IMPORTANCE** to every user of heat-treated Die Blocks and Hot Work Steels in that it shows the **NEW STANDARD** Brinell Hardness Ranges for each Finkl Temper Number in effect since **April 1.** The general Hardness Conversion tables on the reverse side also show further standardization . . . being somewhat modified from previous published tables.

Since 1879

Address your request to

A. FINKL & SONS CO.

2011 Southport Ave. • Chicago 14, Ill.

MACHINING Heavy Duty GEARS

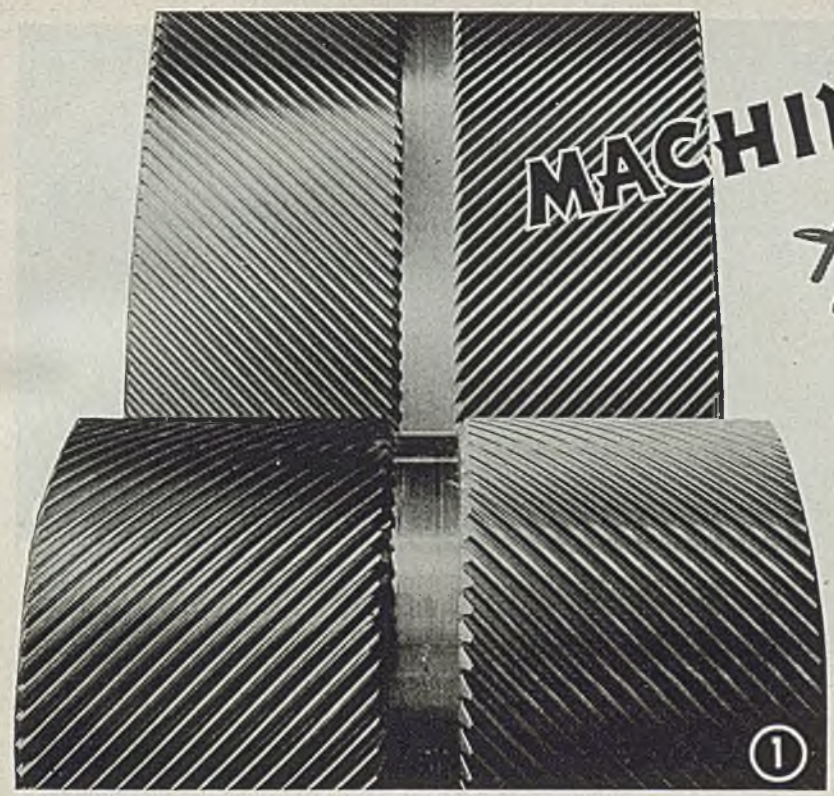


Fig. 1—Large marine gear and pinion after shaving. This is a set for a low speed destroyer transmission

War requires making special gears on mass production basis. Here are described some of the special machining and production methods successfully developed to meet this objective

By W. P. SCHMITTER
The Falk Corp.
Milwaukee

IMPACT of the war on production of heavy gears is reflected in the complexion of designs as well as in the enormity of the production problems to be surmounted. Entirely new transmissions such as those involved in the large landing ships have had to be developed and put into quantity production without so much as a prototype available. Main propulsion drives for destroyers, cruisers, plane carriers, cargo vessels and a host of new combat and service vessels are being built in numbers which have defied the most optimistic estimates.

Gear Design Requirements: Gear design may be divided into two broad classes, namely, custom made and standardized. However, the war has led to a demand for certain single purpose gears in such quantities that the methods used in producing standardized types are being followed.

An example of custom built gearing requiring rigorous design treatment is the modern high-speed reducing gear, transmitting large powers from turbines to propellers of naval or mercantile vessels. Such gears are of rather impressive proportions, the escort carrier drive illustrated in Fig. 3 being 18 x 16 x 10 feet. Thousands of horsepower must be carried with a very minimum of weight and yet the supporting structure must be adequate to maintain precise gear alignment. The design has met the requirements here in rather ingenious fashion by the employment of skeletonized welded construction.

Pitch line velocities frequently attain values in excess of 3 miles per minute, necessitating the most rigid adherence to precision standards in order that noise, vibration, and dynamic tooth loading be maintained at a minimum. Because of this and the absence of major extraneous shock, the emphasis is on surface durability of the tooth profiles and accordingly such gears are usually designed with fine pitches with many teeth in contact in the zone of action as is apparent from Fig. 4.

Gear Materials Depend on Size: Gear hardness, heat treatment and manufacturing technique differ radically, depending upon the field to which the product is to be applied and the quantities in which the gears are produced. In the automotive industry, repetitive manufacture has been developed to the point where thousands of identical gears are turned out and, consequently, very elaborate tooling is justified. Morever, ample resources of statistical data permit forecasting, with sufficient accuracy, the degree and manner in which a gear will distort under heating treatment, the allowance which must be made for deflections under load, and reliable estimates of the actual loads imposed under various

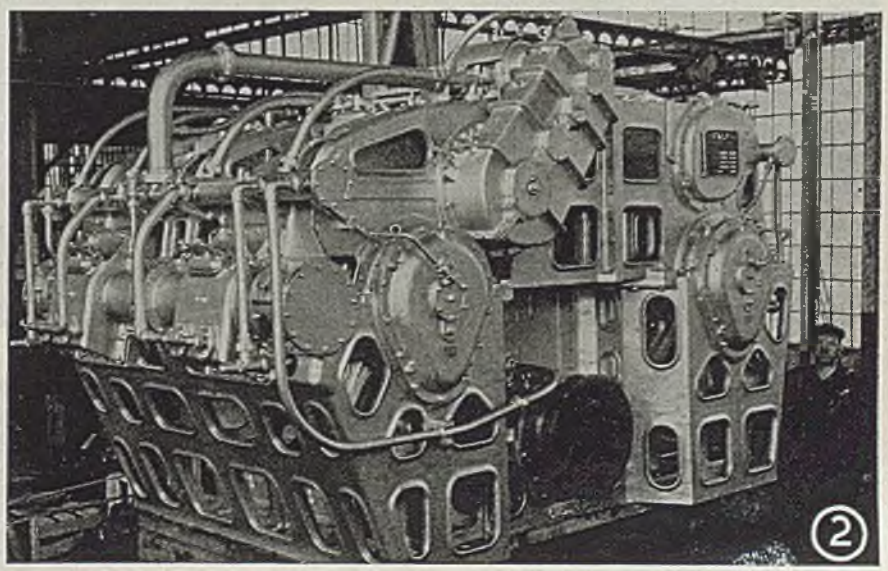
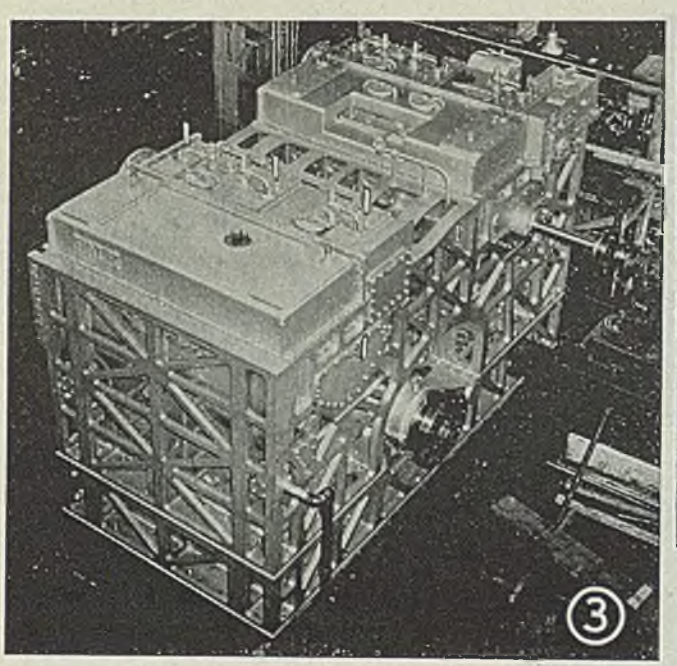


Fig. 2 — This 30,000-horsepower double-reduction herringbone gear drive for a destroyer transmission is no simple product. Many problems are involved in its making



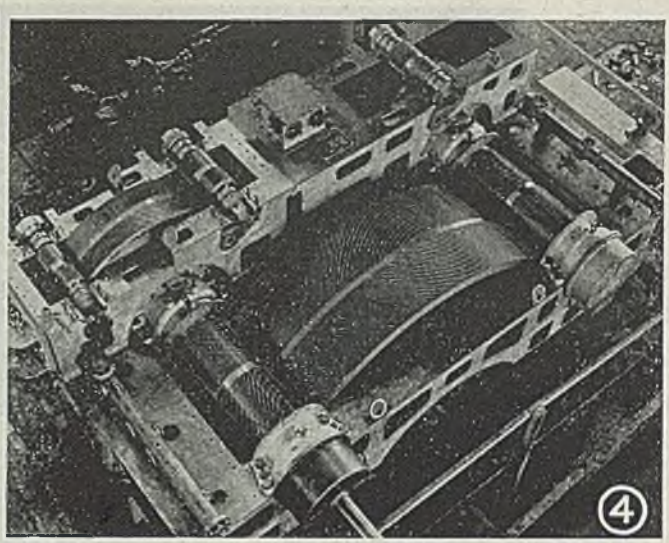


Fig. 3—Note skeleton frame of this double-reduction drive from turbines to propeller of an escort carrier vessel

Fig. 4—Turbine reduction drive for single-screw tanker. Propeller is driven at 96 r.p.m. by three turbines delivering power through the three small gears at left. Covers removed here to show all elements. High pressure turbine delivers 2424 b.h.p. at 8012 r.p.m.; intermediate pressure turbine, 2658 b.h.p. at 5033 r.p.m.; low pressure turbine 3122 b.h.p. at 4022 r.p.m. Low speed gear data: Diametral pitch 4, 75 and 616 teeth; pitch line velocity 3880 feet per minute

conditions. This is not so in the case where industrial gears are manufactured in relatively small quantities.

Because of the rigid requirements for the maximum in accuracy, heavy duty industrial gears are usually heat treated before cutting, although applications exist where, because of design or service conditions, it is necessary to use carburized or fully hardened gears beyond the machinable range. This discussion will deal mainly with gears in which the final cutting and refining of the tooth profiles is not subjected to distortion by subsequent heat treatment.

With regard to the choice of alloys, it has been found that any analysis capable of being heat treated to the required minimum physicals will conform satisfactorily. It is for this reason that the NE and other lean alloy steels have been successfully used for gearing. In the selection of alloys, grades high in carbide forming elements have been favored in order to secure the maximum resistance to abrasive types of profile wear.

For large sections, the alloy content must naturally be increased to obtain the proper response to heat treatment. For sections which cannot be liquid quenched because of the large size or demand for minimum residual stresses to prevent warping after cutting, the physicals must be obtained by normalizing and tempering. For these applications high alloy contents are an absolute necessity. The selection of alloy content also is dependent upon the machinability rating of the material at the given production hardness because of the critical nature of the gear cutting processes. The use of medium sulphurized steels (0.07 - 0.10 sulphur) has materially aided the gear cutting problem.

Industrial gears of small size are heat treated to maximum hardnesses of approximately 360 brinell by means of a liquid quench. Medium sized gears and pinions are quenched and tempered to a range of 235-270 brinell which gives the best results in production. A range of 260-295 brinell is satisfactorily used when the proper alloy is selected.

For heavily loaded large pinions rang-

(*Please turn to Page* 164)

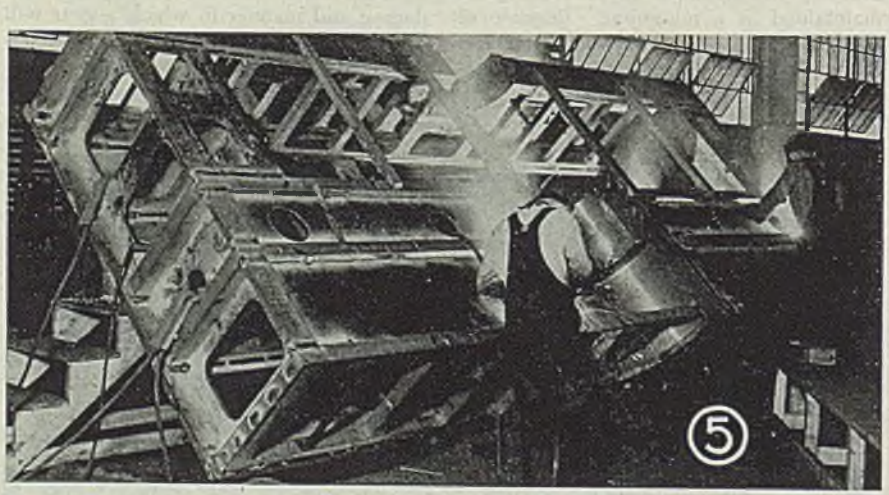
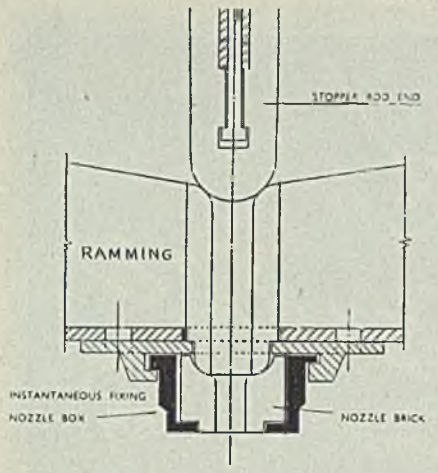


Fig. 5—Fabricating framework for a marine gear housing. Unit is tilted for best welding position in making the many fillet welds with the electric arc

Fig. 6—Contact impression on gear after shaving

New Type Ladle Nozzle

AFFORDS UNIFORM POURING SPEED



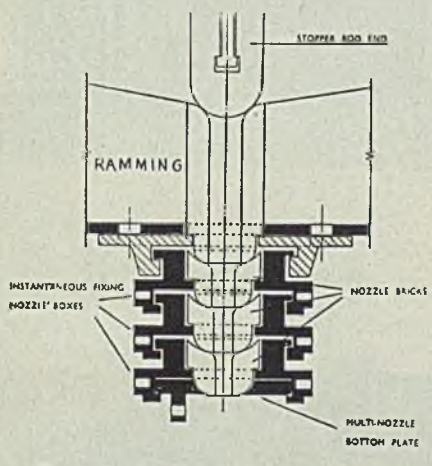


Fig. 1 (top)—Arrangement of single nozzle box

Fig. 2 (bottom)—Arrangement of multinozzle box

MAINTENANCE of a uniform teeming speed for each ingot, particularly those of special alloy steels, has an important bearing upon the quality of the resulting ingots. As the head of steel in the ladle diminishes and the steel itself cools, there is considerable variation in the teeming time between the first and last ingots, using the ordinary nozzle of fixed diameter.

To overcome this problem, various suggestions from time to time have been made to provide the ladle with a number of nozzles which may be changed as teeming proceeds, with the object of preserving a reasonably uniform teeming speed from first to last. Such changeable nozzles hitherto have not been entirely successful.

After lengthy trials in actual working in the melting shops of Samuel Fox & Co., Ltd., Stocksbridge, England, and other plants of the United Steel Companies, Ltd., a type of changeable nozzle, known as the Bagnall-Bethel nozzle, has been adopted which achieves reasonable constancy of teeming speed and at the same time is simple and practical.

In its simplest form, the single secondary nozzle, the device comprises a primary refractory nozzle of the ordinary kind, mounted in the ladle bottom in the usual way. (Fig. 1) The lower end of the primary nozzle however, is given a rounded or convex shape. Against this rounded end abuts a second, shorter nozzle, having an orifice of smaller diameter than the primary nozzle, and with a convex recess at its upper end.

The secondary nozzle is carried in a separate box, fastened to the ladle by a quick-acting bayonet joint or interrupted screw fastening, with wedge-shaped locking elements or lugs. The secondary nozzle box is secured by a partial turn and the wedge-shaped lugs bring the convex recess against the convex end of the primary nozzle, making a tight joint, the two orifices being in alignment and forming a continuous passage.

In practice, the first ingots are poured with the secondary nozzle in position. After a suitable number of ingots have been teemed, the secondary nozzle is removed. This removal can be done in a matter of seconds—by giving the secondary nozzle-box a part turn with a special spanner or tommy bar. It then falls away, exposing the primary nozzle, and teeming can then be continued with this nozzle or any other size of nozzle which may be desired.

Where numerous ingots have to be teemed and a graded succession of nozzles is required, an alternative arrangement is the Bagnall-Bethel multinozzle. (Fig. 2) The principle is the same as that in the single changeable nozzle, but it is utilized to provide a series of graded nozzles attached one beneath the other, and detached as teeming proceeds.

In the multinozzle, the primary nozzle is of the conventional type fitted into the bottom of the ladle, but provided with a lower end of convex shape. The primary nozzle may be, for instance, of 1¼-inch diameter orifice.

To the ladle is affixed a nozzle-carrier with bayonet-joint attachment, carrying a secondary nozzle of, say, 1⅛ inches diameter orifice. The upper surface of the refractory nozzle is concave, so that it mates tightly with the lower portion of the primary nozzle by the wedging action of the lugs on the bayonet-joint. This nozzle-carrier can be detached quickly by a partial rotation with a tommy bar.

The lower end of the secondary nozzle is convex in form, and the carrier-box is so shaped that it forms the upper part of a second bayonet-joint device. To this is attached a second carrier-box, with a refractory nozzle of, say, 1 inch diameter orifice, the upper surface of the nozzle again being concave to make a tight joint against the lower end of the nozzle above. In a similar way a further nozzle may be attached, having an orifice of, say, ⅞-inch diameter.

For teeming a succession of ingots, the operation commences using the smallest (⅞-inch) nozzle, and when the required number of ingots is teemed, this is released in a few seconds by means of a tommy bar. This exposes the next larger size nozzle, with which a further series of ingots is teemed. This is then detached in turn, and so on until teeming is completed by using the largest orifice, that in the primary nozzle.

In this way a graded series of nozzles may be used for teeming, each exactly suited to the stage of teeming which has been reached.

The Bagnall-Bethel patent nozzle, both in the form of the single secondary nozzle, and as the multinozzle, has been thoroughly tested for various types of steel from electrically melted to open-hearth, in several different melting shops, with uniformly good results.

—From *British Steelmaker*, Jan. 1945.

Folder Discusses Welding Maintenance Problems

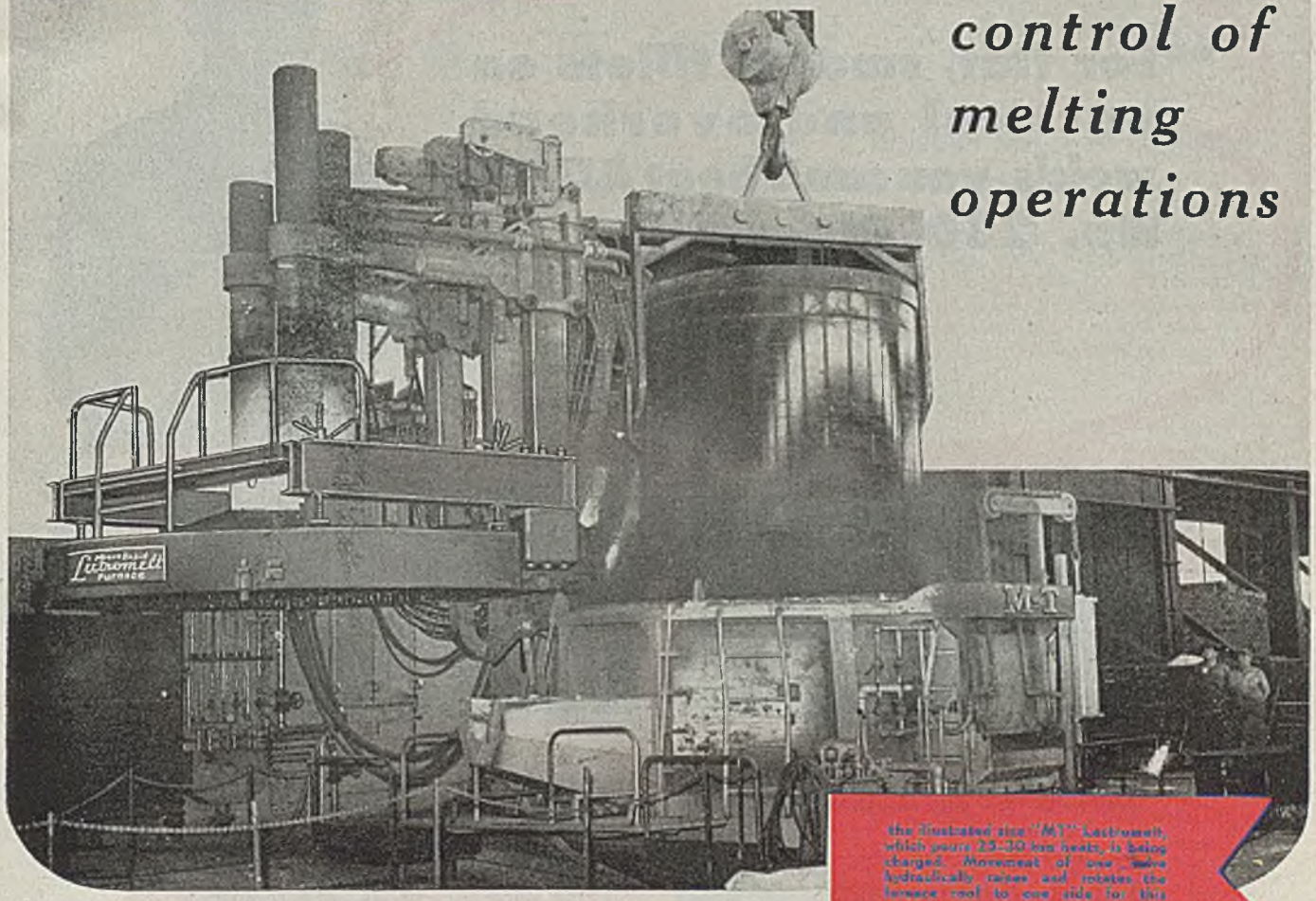
A six-page folder on low temperature welding rods, concentrating on problems concerning maintenance, is available from Eutectic Welding Alloys Co., 40 Worth, New York 13. This welding is said to be better suited for solving maintenance welding problems than others because of low temperatures and fewer risks involved. No new equipment is required for these rods. All that is necessary are EutecRods, which can be used with any oxyacetylene torch or arc equipment.

Folder describes the company's procedures. Rods, applied at low temperatures to cast iron, steel, aluminum, bronze, etc. are said to produce clean, strong bonds, leaving the welded parts easily machinable. Strength of the machined part is unimpaired and no distortion occurs, according to the company. Folder also includes suggestions for salvaging parts thought ready for scrapping, and for putting them to work again.

MOORE-RAPID

Lectromelt FURNACES

. . . permit closer control of melting operations



the illustrated size "M-1" Lectromelt, which pours 25-30 ton heats, is being charged. Movement of one lever hydraulically raises and rotates the furnace roof to one side for this operation.

The precise control possible with the Moore Rapid Lectromelt Furnace in the melting of quality steels and irons offers many advantages to the user. It assures high quality metals and facilitates the ready duplication of desired compositions and properties in the metal. Large or small heats may be made or part of the heat tapped and the analysis of the remainder altered as desired.

With Lectromelt's top-charge feature, the roof is quickly raised and swung aside so the furnace can be charged by drop-bottom bucket. As a result, the charge is uniformly and properly deposited on the furnace hearth.

Our engineering department will welcome the opportunity of discussing your melting requirements with you. Write for details.

LECTROMELT TOP-CHARGE FURNACES
. . . FROM 100 TONS DOWN TO 250 POUNDS

Pittsburgh Lectromelt Furnace Corp.

PITTSBURGH 30, PENNA.

SAYS THE MAN IN THE HELMET—

"For flat, smooth fillets on vertical and overhead welds, you can't beat AIRCO No. 230 Electrode . . . .

AWS Classification E 6011

". . . It's tops in the field for all-position AC welding.

"I like the neat, smooth fillets it gives on vertical and overhead welding. They're unusually strong, deep welds, too — good enough to meet the strictest code requirements.

"The metal sets up rapidly, which is one of the reasons why this Airco No. 230 is an especially fine electrode for making vertical and overhead welds.

"Slag doesn't interfere and the fine spraying action and lack of arc-blow help out greatly, too.

"I use it on AC or DC. It's mainly a grand all-position AC electrode, but it works fine with DC reverse polarity, too. It's easy to identify by this A.W.S. color marking — white end and blue band. Conforms to A.W.S. Classification E6011."

Airco electrodes are made in a complete range of types and sizes for every welding job. The new catalog describes Airco's complete line.

For a free copy of Airco's News Electrode Catalogue No. 120 write to the local Airco office or to Dept. S. Address Air Reduction, General Offices: 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, General Offices: Houston 1, Texas.

Weld with **AIR REDUCTION**
Offices in All Principal Cities

AIRCO ELECTRODES FOR BETTER WELDS AND EASIER WELDING

Engineering NOTES

Patents Make Jobs

Creative thinking must be encouraged in every way possible if the United States is to enjoy full employment after the war, according to the Bodine *Motorgram*. Even small plants are said to have a golden opportunity for finding one or more employes who are inventively inclined. Incentives for the inventor—tools and a chance to put his ideas to work—may be potent sales and job builders tomorrow.

A serious drop in creative thinking, probably due to a lack of time under the stress of all-out war production, is shown in statistics issued by the Patent Office. Since the war started, the number of patents granted has shown a rapid decline. This contrasts unfavorably with the past, when the country was enjoying the fruits of the work of men such as Whitney, Morse, Bell and Edison, to mention only a few of many. More recent years have seen the development of automobiles, airplanes, radio, television. These have led to a host of subsidiary industries giving employment to millions of workers.

Stagnation of research and invention today thus points toward an aggravated unemployment situation and retarded progress after the war. Stimulation of creative thinking is an important wartime project for industry. Patents make jobs.

° ° °

Engine Runs Without Oil

Lamson & Sessions reports it is making aircraft nuts for a new 18-cylinder, 2200 horsepower motor "whose cylinders and other vital parts are made of a new alloy metal and run dry—without oil. Nuts and other parts used in the inner construction of this intricate engine must be as smooth as glass and absolutely free from burrs."

° ° °

Postwar Vaporizer

A vaporizer designed by the Spartan Co., Minneapolis, for medical use in the relief of bronchial ailments or in offices or sleeping rooms where the humidity is too low weighs only 2 pounds when empty and is completely self-contained. The unit, for postwar marketing is 5 inches high, 5½ inches wide, and 7¾ inches long. Its main body, handle and several parts are molded from plastic. The cover is satin-finish aluminum. An automatic electrical unit provides dry steam vapor in less than 1 minute after connections have been made. A ½-gallon water tank assures vapor for several hours. A handle across the top offers easy portability.

° ° °

Brazing Aluminum

Sheet aluminum now may be obtained pre-prepared for brazing. Basic material is coated on one or both sides with a brazing alloy that melts and flows when the sheet, or parts made from it, are heated in the presence of a flux. Temperature must be regulated to be above the fusing point of the coating and still below that of the aluminum. The bond between the metals is said to permit bending, drawing and hammering without damage to the coating. A number of alloys and coatings are available to meet various strength and temperature requirements.

° ° °

New Stainless Steels

Several new types of stainless steels have been developed and carried through the laboratory stages and now are being produced on an experimental commercial basis by the Rustless Iron & Steel Corp. One of these is a precipitation-hardening steel of the chromium-nickel variety which, like duralumin, can be formed and fabricated in the soft or ductile condition and then hardened. Work also is being continued on stainless alloys for high temperature applications, such as in gas turbines, superchargers and jet-propulsion engines.

° ° °

Columbium—Unusual Metal

Columbium, sometimes called the sister metal to tantalum, possesses unusual metallurgical properties. Although its properties also are available in other elements, it combines several properties in ways that are different and unique. It resists tearing and splitting more than most other metals when subjected to deep drawing operations. Special treatment consisting of controlled chemical composition and cold working produces a springiness and resistance to deformation which otherwise is offered only by some special alloy steels. The metal is soft in annealed state, but by special processes, hardness over a wide range can be obtained. It welds to itself and a number of other metals by electric spot, seam, butt and roller processes, and may be machined with ordinary machine tools. Corrosion resistance is outstanding. Like tantalum, it is reduced from a pure salt. Columbium was first manufactured in the form of workable metal by Fansteel Metallurgical Corp. in 1929.

° ° °

Oxygen For Blast Furnaces

Feeding almost pure oxygen into the lower part of the stack may reduce blast furnace operating costs in the near future. This prediction was made by Martin J. Conway, manager petroleum division, Lukens Steel Co., Coatesville, Pa., at a metropolitan section meeting of the American Society of Mechanical Engineers, New York. He also believes that catalytic production methods may be applied in other departments of the steel industry to lower fuel costs and improve methods of production. He pointed out that the cost of fuel in the steel industry per ton of basic product has decreased at the rate of about 1 per cent annually over the past two decades—all because of improved production methods.

° ° °

Fire Gaskets

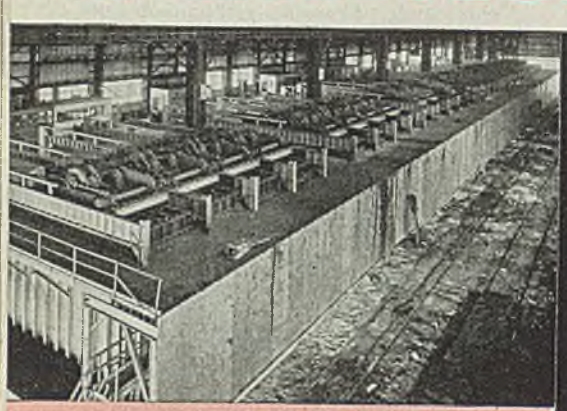
To seal connections in exhaust systems of supercharged aircraft engines, Inconel —an alloy of nickel, chromium and iron —in wire form has been developed by Johns-Manville. The wire is knitted into a narrow mesh and braided, sometimes with asbestos fibers, into tape or thick strips that can be cut to make ring-type gaskets for high-temperature service up to 2000 degrees Fahr. The alloy is especially well-suited to this service, as it is highly resistant to corrosion, resilient, nonscaling and nonmagnetic.

° ° °

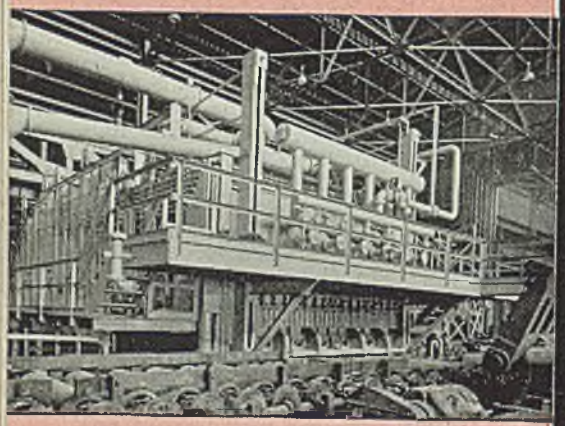
Models Teach Safety

A number of steel companies are using working models of cranes and steel mill equipment to teach employes the fundamentals of safety. A model crane developed by one company is equipped with every type of safety feature, including fire extinguishers, warning signs and safety guards. Parts are movable and it has a real magnet which will pick up weights up to 500 pounds, regulation controls and a limit stop. Performance equals that of a real crane. Psychological basis for this method of instruction is the fun most fathers get out of playing with the youngster's electric trains. Women, too, have been found to enjoy playing with the models as they learn. Operators learn how to handle loads with the fewest number of movements and the techniques of avoiding accidents and injuries to other employes.

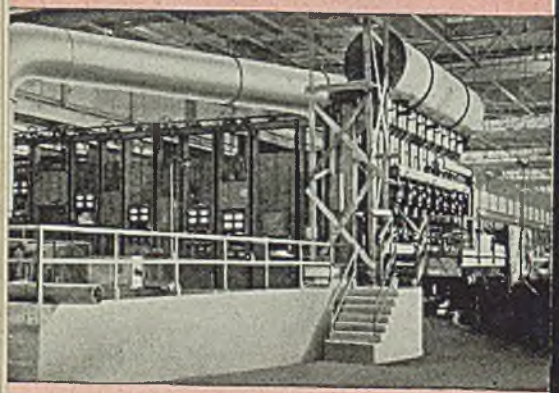
'SURFACE' SERVES WITH HEAT



"Surface" one-way fired soaking pits



"Surface" slab heating furnace



"Surface" billet reheating furnace

...ace" continuous heat treating furnaces for plate

FROM INGOT TO FINISHED PRODUCT

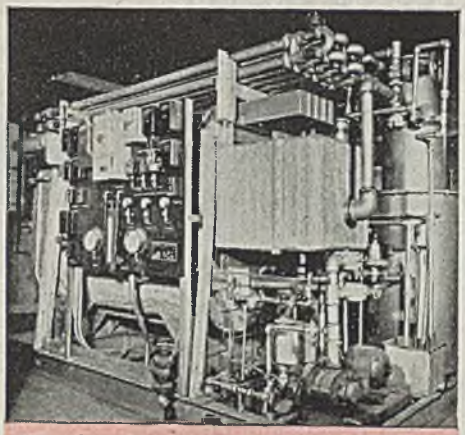
Hundreds of installations, including the modern One-Way Fired Soaking Pits... Slab, Billet and Round Heaters ...Continuous and Batch Normalizers and Annealers — Muffle-type and Radiant Tube Fired, Controlled Atmosphere Furnaces... give outstanding proof of "Surface" acceptance wherever heat is used in the Steel Industry.

"Surface" collaboration with metallurgists and engineers in the metal producing and working industries, plus the years of constant laboratory research in the scientific application of gases, heat and mechanisms to the many heating problems, have resulted in continuous improvement in equipment to give the desired result. Only a few such installations are shown herewith, representative of "Surface" developments in the industry.

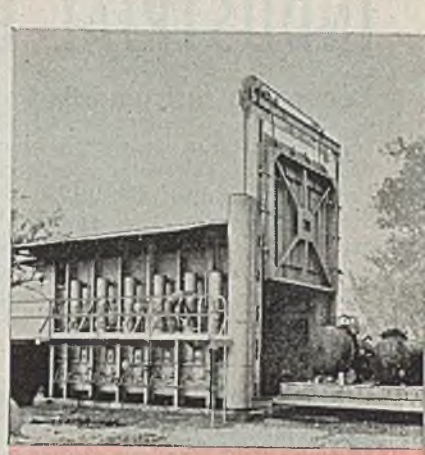
Now, when quality tonnage is paramount, "Surface" is ready with modern processes and methods to meet the world's demands.

'Surface'

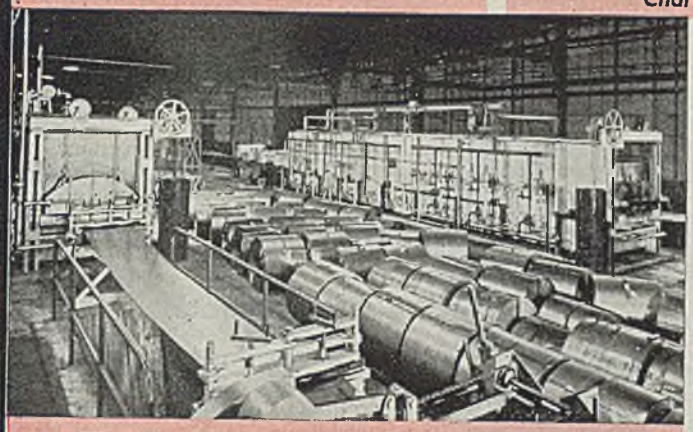
"Surface" rod annealing in pit type convection furnaces



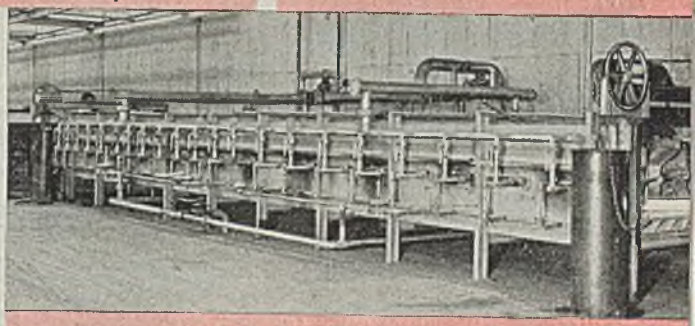
"Surface" prepared gas generating equipment (NX, RX, DX and Char-Mo Gases).



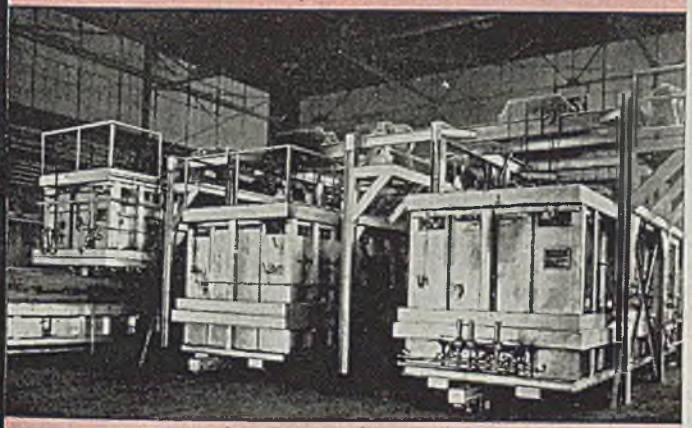
"Surface" stress relief furnace



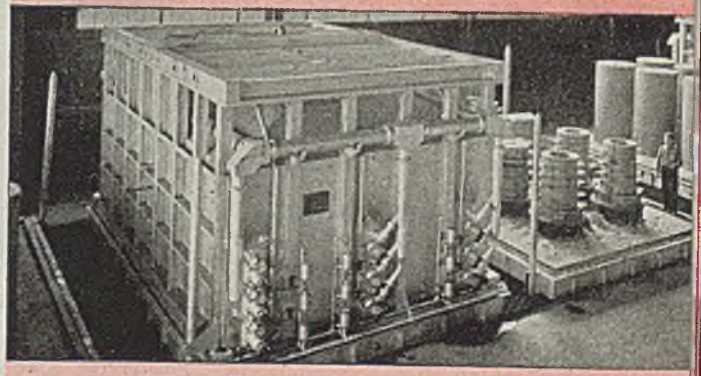
"Surface" continuous controlled atmosphere strip annealing and normalizing furnaces



"Surface" wire patenting furnace

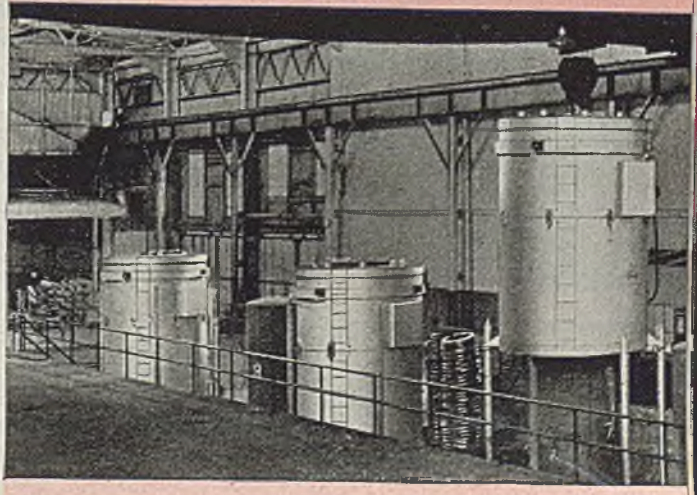


"Surface" high alloy rod and bar atmosphere annealing lift-cover with car-bottom furnace



"Surface" controlled atmosphere coil and sheet annealing cov

"Surface" bright annealing and normalizing furnace for tubing

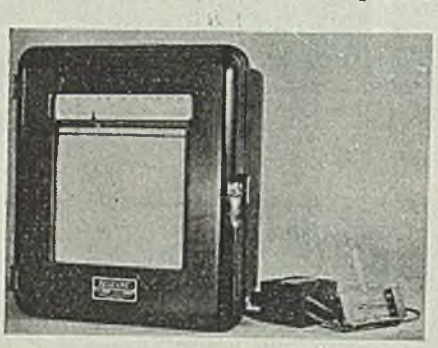


"Surface" controlled atmosphere wire and rod annealing furna

INDUSTRIAL EQUIPMENT

Recording Instruments

A new group of recording instruments designated as Televac is announced by Precision Scientific Co., 1750 North Springfield avenue, Chicago 47. Type MR (shown here) with a range of 0-500 microns utilizes the new Televac No. 500 thermal gage with specially treated elements. Its features include coated filaments to prevent "off calibration" periods

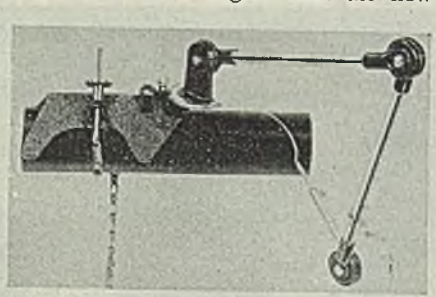


due to water, oil vapor or other contaminating vapors; increased sensitivity gained through use of two filaments in both standard and variable tubes of the vacuum gage; all gages are interchangeable without recalibration, and the user is assured of duplicate readings in terms of absolute pressure in microns. The gage is supplied with a special Leeds and Northrup micromax strip chart recorder calibrated directly in microns.

The type S recorder for ultra vacuum contains two ranges 0-500 microns for pressures above 1 micron and utilizing the No. 500 thermal gage in this range and an industrial type ionization gage for the range 0 to 0.4 microns. This instrument also features a safety circuit which makes it impossible to turn on the ionization gage until a vacuum of 1 micron has been reached.

Marking Device

Pipe, structural shapes and flat sheets are accurately scribed for cutting on any angle to ½ of a degree with the new



protractor offered by Tru-Line Corp., 759 Venice boulevard, Los Angeles 15. They are made in two stock models, three sizes. The model illustrated scribes the circumference of pipe 3 to 18 inches in diameter. It is made of precision-machined cast bronze alloy and steel tubing. The joints are large in diameter and contain special fibre bearings which hold the correct tension and maintain positive alignment. The marking arm is absolutely rigid throughout its travel. Another size of this model marks pipe 12 to 36 inches in diameter. Another model marks pipe or rod ½ to 3 inches in diameter.

For use on flat surfaces, channel iron, T or I structural shapes, the protractor is set up as on pipe, or held square to any edge or corner. Plumb bob indicator and spirit level show any degree of angle from a horizontal plane.

Electronic Heater

Development of a new electronic induction heater for brazing, soldering, annealing, hardening and preforge heating applications is announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis. With a low-loss coupling arrangement, the electronic generator can be adapted to a wide variety of metalworking applications without the use of radio-frequency trans-

formers. Predetermined automatic timing controls each unit operation. The operator pushes the start button and when the operation is completed, the unit automatically shuts off.

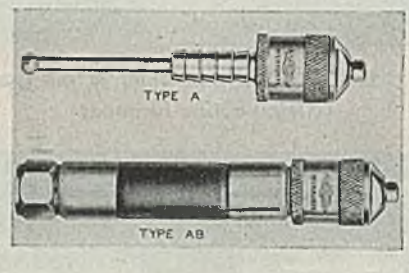
Other features of the electronic heater include a current limiting circuit for protecting the oscillator filament and prolonging tube life; a three-phase rectifier on larger size units to obtain maximum power and prevent unbalance of the power line; safety devices for full protection of operator and unit. All models having a capacity of 10 or more kilowatts operate from either 220 or 440 volts, three phase supply.

Air Guns

A new line of leakproof air guns for blowing chips, dust, dirt, kicking out finished parts and operating air-driven tools such as air vises, clamps, chucks, presses, etc. is introduced by Trico Fuse Mfg. Co., 2948 North Fifth street, Milwaukee 12, Wis.

A slight "finger-tip" flex of the hose discharges a small puff or full blast of air as desired. Operation is instant and positive. Levers, buttons, gaskets or glands are eliminated by streamline design. The patented ball and socket valve joint has two moving parts. Air pressure helps close valve tightly when fingertip pressure is released.

Type A is for permanent applications; type AB is recommended for remote control applications. It is attached directly



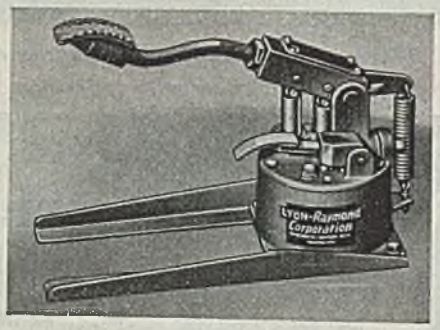
to the air pipe line and operated by hand, knee or foot control, treadle, pulleys, cams, plungers, etc. The guns are available in three styles and for complete range of hose diameters.

Welding Electrodes

Welding Equipment & Supply Co., Detroit 7, announces the addition of two new electrodes to their regular line. One is a molybdenum high speed steel electrode producing typical molybdenum high speed steel weld deposits at 60 to 64 rockwell C hardness. The other is a superior hot work tool steel electrode producing carbon-molybdenum-chromium deposits having extreme hardness and abrasion resistance at high heat with rockwell C hardness of 58 to 62. Both of these new electrodes produce "hard-as-welded" deposits which can be heat treated.

Hydraulic Foot Pump

Lyon-Raymond Corp., 2058 Madison Street, Greene, N. Y., announces a two speed foot pump for pressures up to 10,-



000 p.s.i. It has two pistons—one a high speed, low pressure piston, the other a small, slow speed, high pressure piston. Up to 1000 pounds pressure both pistons pump oil, but at 1000 pounds the high speed, low pressure one

(All claims are those of the manufacturer of the equipment being described.)

BONDED

with Chicago FV

the Pedigreed Bond

It's the new bond that gives the ultra smooth finishes you get with Chicago Grinding Wheels—

Precision finishes undreamed of before—

Finishes so accurate that you can measure them in micro inches with a Surface Analyzer.

PERFECT FINISH INSURANCE

Whatever you have to finish—metals, alloys, plastics, wood, laminates or composition materials—you can do it better with Chicago Wheels.

Chicago Wheels have kept pace with the precision requirements of our war industries, and you can use them with confidence to finish civilian goods better in double quick time.

CHICAGO GRINDING WHEELS

A wide range of grains and grades and—for the duration—sizes up to 3" in diameter.

CHICAGO MOUNTED WHEELS

The first made and the finest today. In a selection of bonds, abrasives and shapes to handle each job more efficiently.

TEST WHEEL

We'll gladly send a Mounted Wheel or an FV Bond Grinding Wheel for you to try. Tell us size you'd like.

Write for Catalog listing all Chicago products and showing comparative photographs of finishes with different kinds of Wheels.

CHICAGO WHEEL & MFG. CO.

Headquarters for Mounted Wheels and Small Grinding Wheels

1101 W. Monroe St., Dept. ST, Chicago 7, Illinois

* Half a Century of Specialization has established our Reputation as the Small Wheel People of the Abrasive Industry.

Send Catalog. Interested in

☐ Mounted Wheels. ☐ Grinding Wheels.

☐ Send Test Wheel. Size.....

Name..... .....

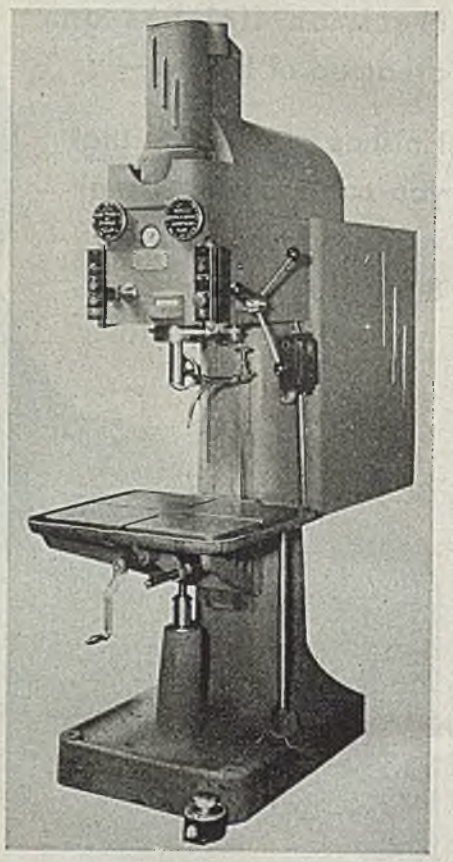
Address.....

automatically cuts out and higher pressures (up to 10,000 pounds) are developed by the small high pressure piston.

The pump is self-contained and designed for continuous, heavy duty performance. It can be furnished with a base suitable for mounting or with an auxiliary base allowing it to be used on the floor without fastening.

Tapping Machine

A tapping and threading machine is offered by Cleveland Tapping Machine Co., 1725 Superior avenue, Cleveland 14. The machine is lead screw controlled at all times, yet has rapid approach and retraction of the spindle. It is constructed so that the lead screw assembly is never disengaged from the spindle. The entire lead screw assembly slides in scraped ways; has a specially designed locking device that is so accurate that it can release and then



again re-engage the lead screw assembly many times and the top passed through the same hole again and again yet the work piece will retain the same class fit of thread as when the tap was passed through the work piece originally.

The approach and retraction of the spindle is controlled by two air cylinders which exert no air pressure on the spindle when tapping. The rapid approach can be set to stop within 0.010-inch of the hole to be tapped. The retraction becomes effective the instant the tap leaves the work. The tap is removed at twice the tapping speed.

The reversing mechanism is mounted on the drive shaft and not on the tapping

...Many Hardened in 1/3 Former Time

THE above report on the TOCCO hardening of 79 parts for Cooper-Bessemer engines and compressors appeared in July, 1943. Since then, the production of 63 more parts has been assigned to this versatile "one-man heat-treating department."

These 142 parts range in size from ½ oz. set screws to 186-lb. cross-head pins. Materials include SAE 52100, SAE 1050 modified, NE 8620, Meehanite, as well as carburized low-carbon, carbon and alloy steels. All are hardened on the same TOCCO machine.

TOCCO cuts the hardening time of many of these parts 75%; eliminates straightening; reduces machining and grinding; provides better working conditions.

Find out how versatile, speedy TOCCO Induction Heating can improve *your* products, step up *your* output and cut *your* costs. The 32-page book, "Results with TOCCO," free on request.

THE OHIO CRANKSHAFT COMPANY · Cleveland 1, Ohio

TOCCO

INDUCTION

HARDENING, BRAZING

ANNEALING, HEATING

spindle. It is actuated by two oppositely opposed bimetallic clutches, one operating the forward or tapping cycle, the other operates the reversing cycle. Infinite speed is possible within the range from 40 to 400 revolutions per minute, but higher ranges can be supplied. The motor revolves in one direction and does not reverse for the tapping cycle. The machine has a tapping capacity from ⅜ to 3 inches in steel and will tap class 3 fit on a production basis, either right or left hand thread.

A dial wheel on the left side of the face of the machine controls the rapid traverse of spindle. The right dial wheel controls the depth stop. Both wheels are graduated in thousands. The approach can be set in thousands up to 5 inches of rapid approach. The depth control can be set from 1 to 6 inches. A pilot light indicates when motor is running. The gage on the face of the machine regulates exactly the right pressure on the clutch for whatever size of tap or die being used.

The bimetallic clutch is sensitive so that it will slip when any additional torque is applied thereby saving tap and work piece. A speed indicator is visible on the face of the machine so the operator always knows the actual spindle speed. An emergency stop button is right in front of the operator's hand. All controls have been placed so that the operator has them at his finger tips at all times.

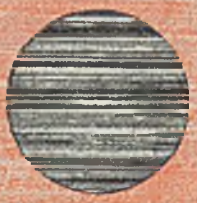
Mercury-Vapor Detector

A new electronic detector for instantaneously detecting the presence of mercury-vapor concentrations in the atmosphere is announced by Special Products Division, General Electric Co., Schenectady, N. Y. The detector is designed particularly for use in the glass, chemical,

smelting, metal-mining and electric apparatus manufacturing fields where mercury-vapor concentrations must be kept below the toxic limit—1.2 parts mercury vapor in 100,000,000 parts of air by volume, for continual breathing—to safeguard the health of employes. It will measure directly mercury-vapor concentrations as high as one part in three million parts of air by volume and as low as one part in two hundred million parts, with an accuracy of approximately 5 per cent. Set at its highest point of sensitivity, the detector is also capable of measuring with reasonable accuracy concentrations as low as one part in a

CUPRODINE

FACILITATES DRAWING



A polished steel surface when magnified appears rough — covered with pin points and file-like ridges.

A cross section of these ridges more highly magnified might be illustrated as above.

When Cuprodized, the sharp ridges are dissolved and surface coated with copper insuring longer die life and improved products.

Assures longer die life—less scoring and breaking

CUPRODINE (copper) coatings are unique in that the Cuprodine bath reacts chemically with the steel, dissolving the microscopic surface ridges and points which protrude through most drawing compounds, scratching and ruining the dies.

A chemical reaction causes copper to plate out of the solution (without current), producing a thin tight copper coating that provides an ideal prelubricating surface insuring longer die life-improved drawing.

CUPRODINE is well known and has been generally adopted in wire mills and in the production of small arms steel shell cases. There is a large field in other industries where the economy and efficiency of this new method can be applied. Further information regarding the adaptability of Cuprodine to your particular needs will be furnished by our Technical Laboratories. Write dept. F-4.

MANUFACTURERS OF INHIBITORS AND METAL WORKING CHEMICALS

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.

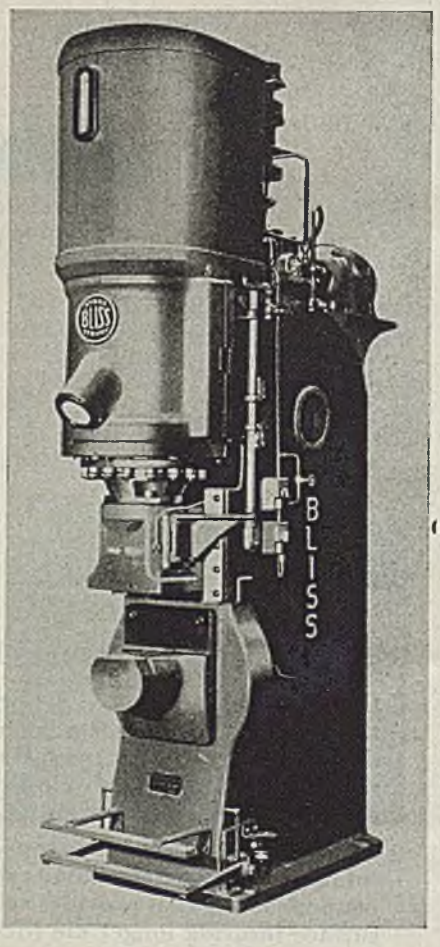
Note—West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California.

billion. In addition, it will detect mercury if it is carried by a gaseous medium whose spectral absorption band does not overlie the 2537 Angstrom wave length.

Operating on 115 volt, 60 cycle power supply the detector draws air from the atmosphere at the rate of ¼ to ½-cubic foot per minute through a cylindrical absorption chamber within the instrument. This chamber contains an ultraviolet lamp and a phototube. Normally the lighted ultraviolet lamp permits normal current to flow through the phototube, but the presence of mercury-vapor in the air drawn into the absorption chamber intercepts and scatters the ultraviolet light, thus reducing the phototube current. By means of a bridge circuit, this drop in the phototube current is translated into an upscale reading on the indicating instrument of the detector.

Horn Press

E. W. Bliss Co., Fifty-third street and Second avenue, Brooklyn 32, N. Y., has built a new design of horn press which is used in the manufacture of automobile truck rims. The press frame is a steel casting in which the horn and the 300-ton hydraulic cylinder are mounted. The slide of the press is guided on the frame and can be provided with a shouldered slide cap if necessary. A 20 horsepower pump was installed, but larger pumps can be incorporated on the same press to provide faster speed.



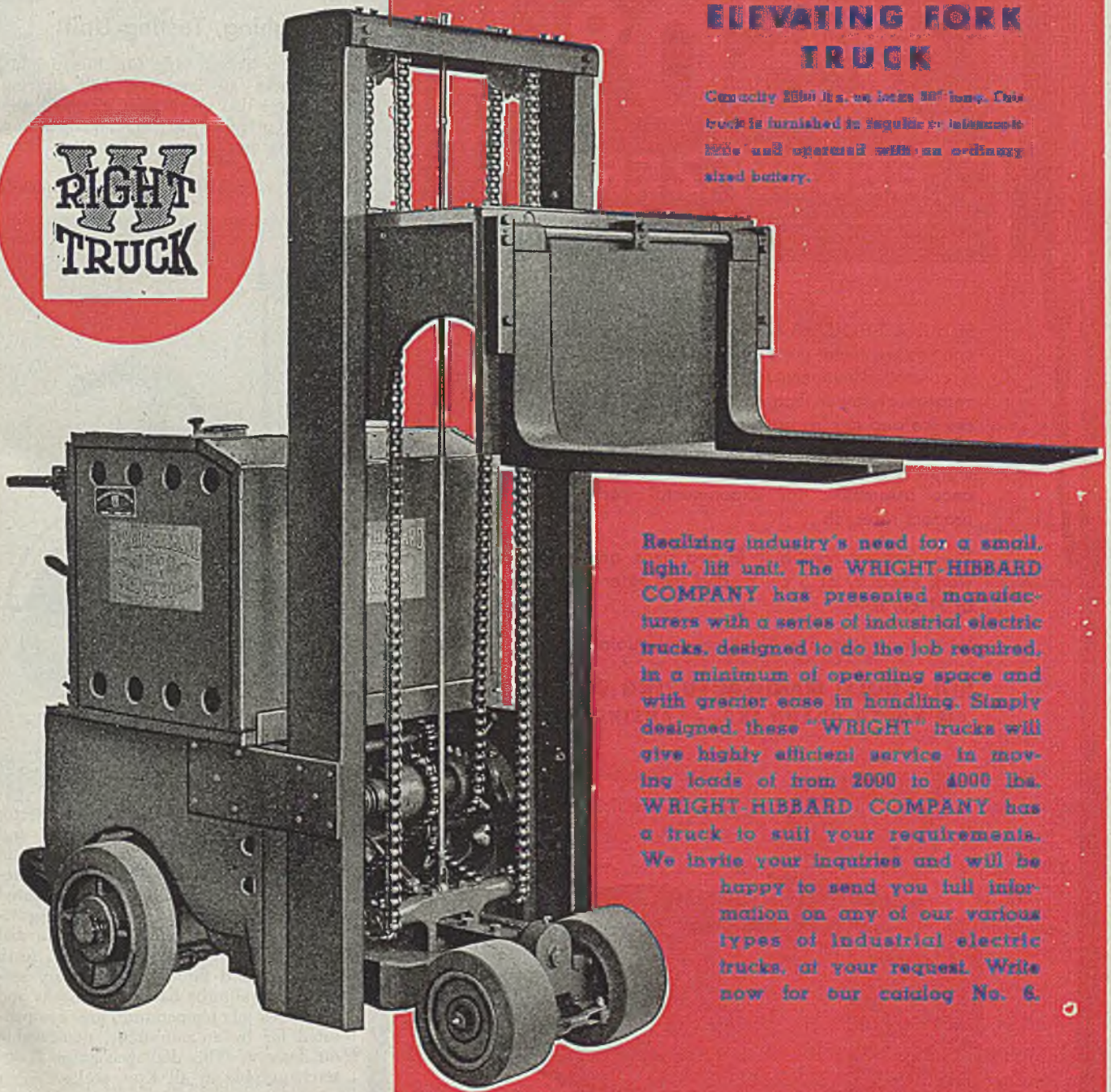
Electric control by both hand and foot button is provided with either automatic

The "WRIGHT" truck for the job!

WRIGHT TRUCK

ELEVATING FORK TRUCK

Capacity 2000 lbs. on base 36" long. This truck is furnished to handle or interchange bins and operated with an ordinary sized battery.



Realizing industry's need for a small, light, lift unit, The WRIGHT-HIBBARD COMPANY has presented manufacturers with a series of industrial electric trucks, designed to do the job required, in a minimum of operating space and with greater ease in handling. Simply designed, these "WRIGHT" trucks will give highly efficient service in moving loads of from 2000 to 4000 lbs. WRIGHT-HIBBARD COMPANY has a truck to suit your requirements. We invite your inquiries and will be happy to send you full information on any of our various types of industrial electric trucks, at your request. Write now for our catalog No. 6.

WRIGHT-HIBBARD

INDUSTRIAL ELECTRIC TRUCK CO.

INCORPORATED

PHELPS, NEW YORK

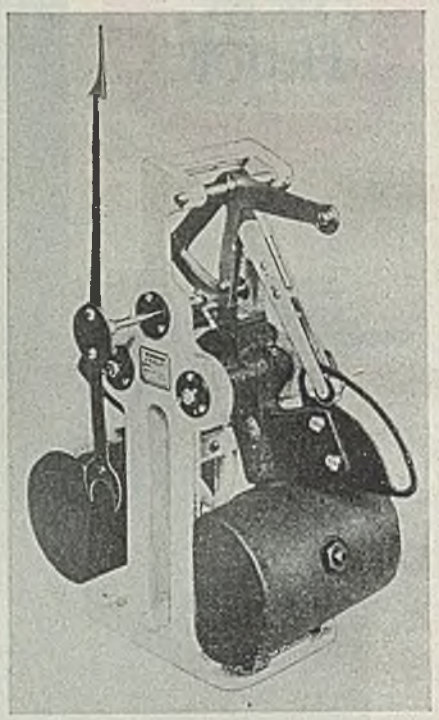
reverse or reverse by the release of the foot treadle. The nonrepeat device is incorporated in the automatic reverse.

This press is one of a line of gap type presses ranging in capacity from 50 to 500 tons. Presses are available in the horn type as illustrated, table type for general shop work and extended table type for straightening work. Hydraulic cushions in the bed are available.

Weighing, Testing Unit

Yale & Towne Mfg. Co., Philadelphia, announces an improved ball bearing, springless dial mechanism of the double pendulum type for weighing, counting, batching, measuring and testing operations.

Featuring ball bearings to eliminate

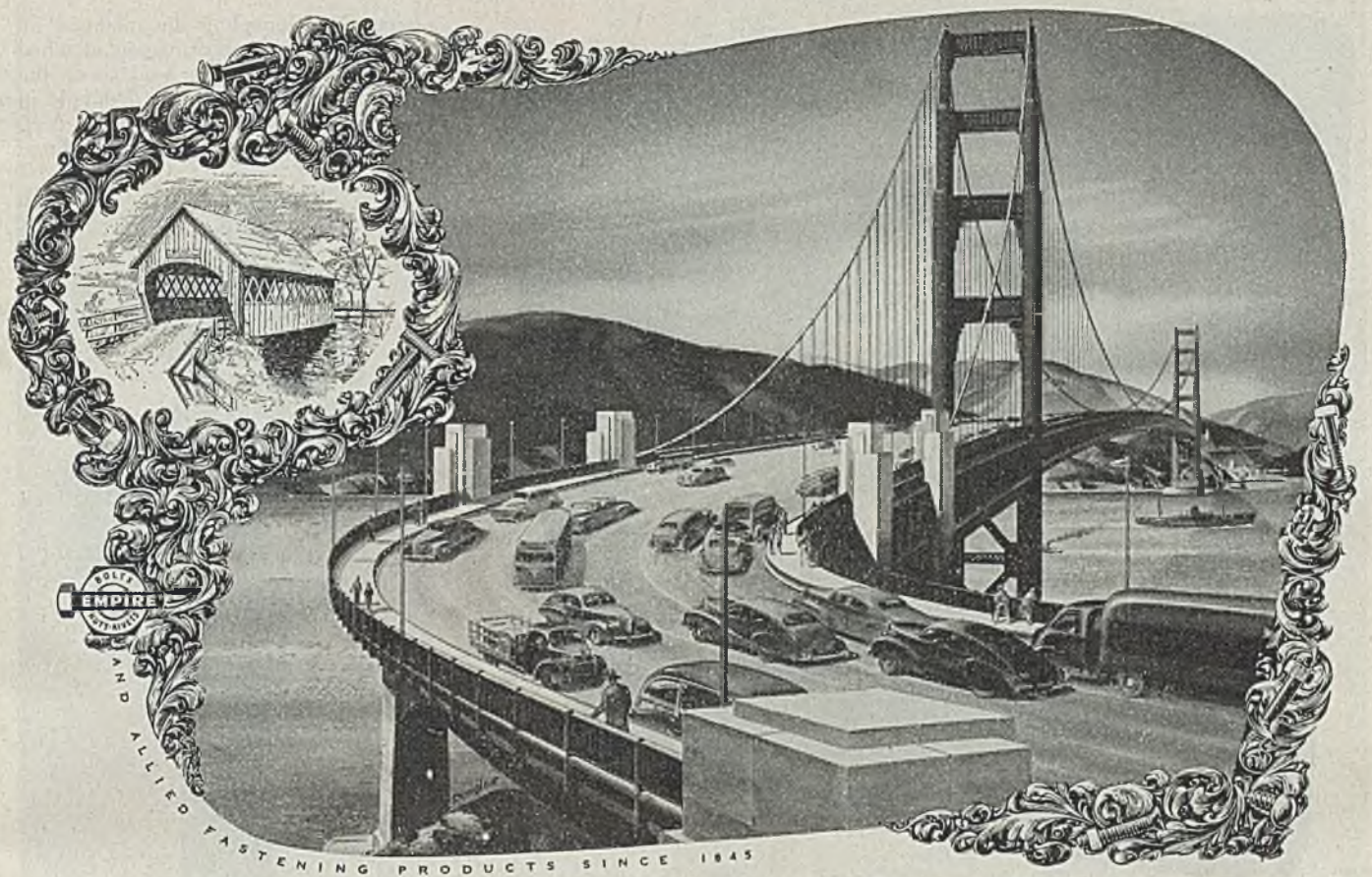


wear at bearing points, the gear sector and shafts carrying the indicator and pendulum arm weights are mounted in fixed centers, assuring alignment and preventing these parts from being unseated when subjected to shocks or jarring vibrations. Friction and wear of the dial indicator shaft and sector gear teeth are minimized through an auxiliary sector which absorbs backlash. Shocks and variations of temperature are compensated for by an adjustable, nonleakable oil dashpot. This dial mechanism is interchangeable in all Kron scales.

Riveting Machine

Three operations are performed in one stroke of the ram with the electrically-powered Rivitor announced by Tomkins-Johnson Co., Jackson, Mich. It is particularly adapted to piercing, dimpling, and riveting bail ears on pails, using 1¾ pound tinners rivets. Rivets are underfed by the machine. The unpierced pail and ear are placed over the rivet and properly located by gages.

When the ram descends, a combination



These are the things that make America strong... the industries that RB&W has served during its 100 years of developing better fasteners for better products.

NO. 4 *Construction*

Stepping Over MOUNTAIN STREAMS... HOPPING OVER BAYS

Bridges . . . important symbols of the construction industry . . . from the picturesque covered bridges of old New England—to the giant steel structures such as the Golden Gate Bridge that spans San Francisco Bay . . . have been steadfastly held together with the aid of Russell, Burdsall & Ward Bolts and Nuts . . . In fact, since 1845, when RB&W's history began, *every* division of the construction industry has relied on RB&W fasteners. With the help of these products, one-story buildings grew to touch the sky . . . and in these same years RB&W also grew from a handful of craftsmen, developing much of their own new equipment and processes, to an organization of *thousands* of employees—scientists, research workers, engineers, trained craftsmen—still pioneering and improving RB&W processes and products . . . RB&W's proved ability to put the ideal combination of strength, accuracy and finish into fasteners . . . is the reason why today, as throughout the past 100 years, RB&W products continue to be *stand-bys,* not only in the construction industry, but in the farm implement, automotive, railroad, power, aircraft, and general manufacturing industries as well.

Specify the RB&W EMPIRE brand for *your* product.

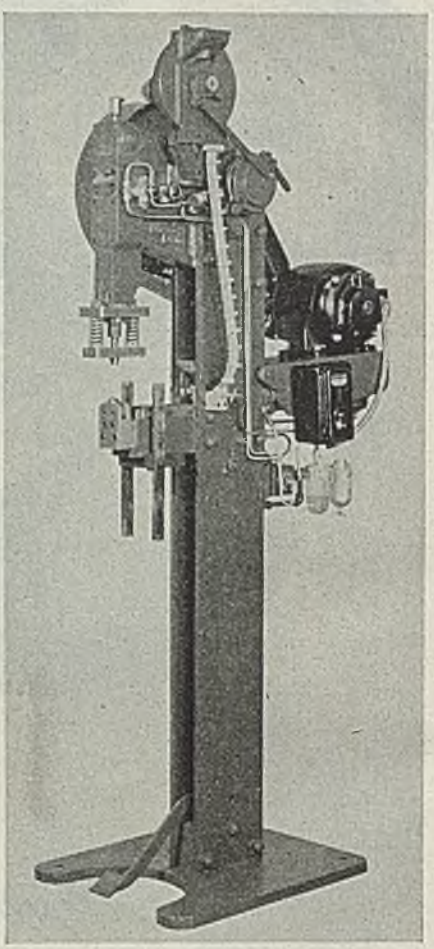
100 Years.. MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

RB&W

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Factories at: Port Chester, N.Y., Coraopolis, Pa., Rock Falls, Ill. *Sales offices at:* Philadelphia, Detroit, Chicago, Chattanooga, Los Angeles, Portland, Seattle. *Distributors* from coast to coast. The industry's most complete, easiest-to-use catalog.

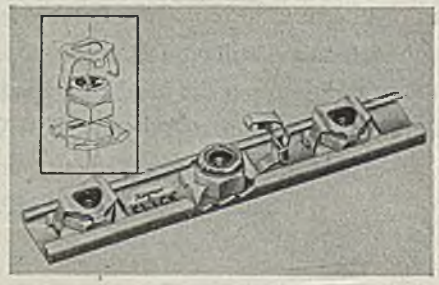
piercing and dimpling die mounted on a spring-actuated pressure pad attached to the ram forces the work over the rivet, piercing and forming a dimple in the pail and ear. The dimple is deep enough to prevent the manufactured



head of the rivet from projecting inside the pail. At the end of the down stroke of the machine, the rivet set forms a slightly rounded head on the rivet.

Nut and Bolt Retainer

A new design of Click gang channel nut and bolt retainer is announced by Kaynar Mfg. Co., Los Angeles. The units consist of a retainer plate held by



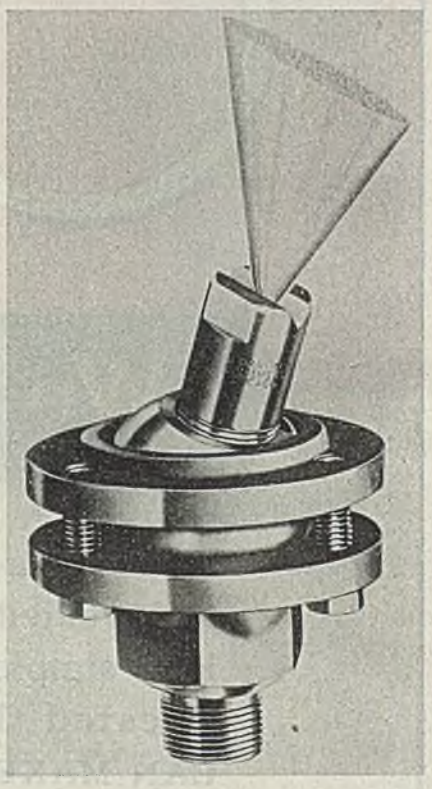
the flanges of the channel in which a standard nut or bolt fits. A steel spring clip fits over the nut or bolt head and grips into position. Disassembly to permit fast change of damaged nuts or bolts is accomplished by opening the spring clip with a screw driver.

These gang channels are fabricated from 24ST Alclad aluminum and may be

riveted or spot welded to other assembly components. The nut or bolt can "float" assuring self-alignment of nuts with the bolt axis and preventing cross-threading in the event bolts enter the nut channel at a slight angle. Irregular spacing of holes to users' templates may be furnished.

Spraying System Joint

A new spraying system adjustable joint with a ball and socket design, provides a full 50 degree nozzle adjustment range in any plane at right angle to the face of the joint. The thick socket plates permit a strong friction grip. Three machine screws can be turned to adjust the joint as required. The adjustable joint is made in brass or steel as standard, but



may be had in a variety of special steel alloys as required. Various sizes of joints with standard pipe thread can be furnished, such as ⅛, ¼, ⅜, ½, ¾ and 1 inch. Typical applications are found in equipment for washing, rinsing and paint flow coating. This joint is offered by Spraying Systems Co., 4021-R West Lake street, Chicago 24.

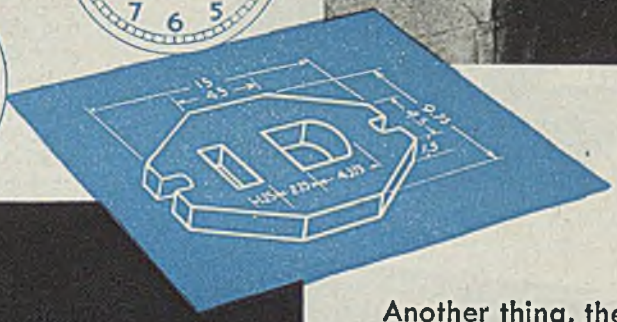
Shell End Mills

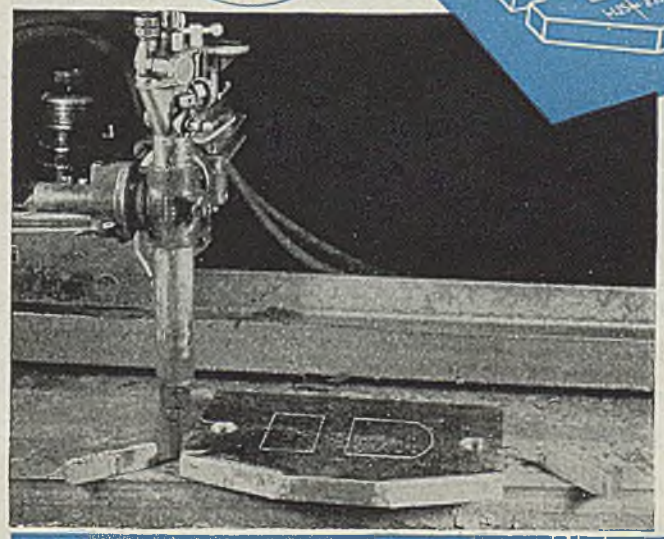
Small standard shell end mills with brazed-in blades made of stellite cobalt-chromium-tungsten alloy are available from Haynes Stellite Co., Kokomo, Ind. These cutters are furnished with blades of either stellite 98M2 or Star J-Metal brazed into a steel body. Diameters range from 1¼ to 6 inches, with face thicknesses from 1 to 2¼ inches. These cutters are supplied ready for use. They are used for milling aluminum, bronze, cast iron, brass, alloys and some steels.

DoALL MAKES SHOE IN 1/3 TORCH AND SHAPER TIME

Forty-five minutes to cut this shoe from boiler plate—one easy operation and a square, clean finish.

An acetylene oxygen gas torch cut the shoe in less time, but the burnt edges then had to be machined—the two operations requiring three times as long.





For rough shapes from mild steel, the torch offers a fast cutting method, but for machine finish precision work, use the DoALL.

Another thing, the torch will not cut non-ferrous metals, aluminum, brass, cast iron, bakelite, fibre products—the DoALL will. The torch is impracticable for tool steel shapes, which the DoALL handles easily.

Yes, DoALL cuts them all—today's most modern and rapid machining method. Does both internal and external cutting, following straight or contour lines accurately and without metal waste.

DoALL Advantages over 10 Basic Cutting Methods are shown in pictures in a new booklet. Write for copy today.

DoALL

INDUSTRY'S NEW SET OF TOOLS

CONTINENTAL MACHINES, INC.

1324 S. Washington Ave. • Minneapolis 4, Minn.

Sales & Service Offices: Baltimore, Birmingham, Boston, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, El Paso, Erie, Grand Rapids, Hartford, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Providence, Reading, Rochester, Rockford, St. Louis, San Francisco, Seattle, Statesville, Syracuse, Toledo, Tulsa.

Powder Metal Parts

(*Continued from Page* 109)

part is to manufacture for it means that more leeway is available in the characteristics required in the metal powder, lower compacting pressures, and lower coining pressures to size the sintered part.

For Medium-Strength Parts, 5-10 Per Cent: Where strength of the powder-metal part is a factor, the porosity may run from 5 to 10 per cent. Such parts require more care in manufacture and selection of the metal powder, in compacting and sintering. Yet the result is a part that can be made with ample strength at comparatively low cost.

For High Strength Parts, Under 1 Per Cent: Powder-metal parts with tensile strengths up to 166,000 p.s.i. have been produced. Porosity of such parts is under 1 per cent, less than that of cast iron or steel if slag impurities, phosphites, sulphites, etc. be considered as voids (logical from a strength standpoint). While still in the laboratory and experimental production stage, this class of powder-metal parts promises to increase in importance. However, production demands extremely pure materials, great care in manufacture.

Powdered Metal Myths Exploded: For many years, the best powdered iron was that from European sources. Today, however, American made powdered iron is far superior to anything ever produced on the continent.

"Let's credit American engineers," says Mr. Langhammer, "for it has been American vision, courage, ingenuity, and free enterprise that has made possible important improvements in the present product from the standpoints of greater purity, more uniform hardness, better size control . . . and we can see additional advances coming. Chrysler credits this great progress to the open-minded attitude of powdered metal producers, particularly their efforts to determine the manufacturer's needs, to solicit his counsel and to co-ordinate his work with their own.

"To afford some idea of the present situation, iron powder of 90 per cent purity can be obtained from American sources in large quantities at very low cost; while iron powder of 96 per cent purity can be had at a moderate price. And if price is no object, a purity of 99.9 per cent can be obtained.

"Particle *hardness,*" continues Mr. Langhammer, "used to vary 20-30 points (on an arbitrary scale). American engineers have reduced this variation to 5-10 points, an important increase in uniformity. Another vital factor is control of particle size. At least 50 per cent improvement has likewise been obtained in control of variations in particle size."

High Tensile Strengths: Result of these advances in producing powdered metal is a significant increase in physical properties obtainable in powder-

PERFORMANCE CONTROLS THE SKYWAYS

Pan American DC-7 Clipper by Douglas

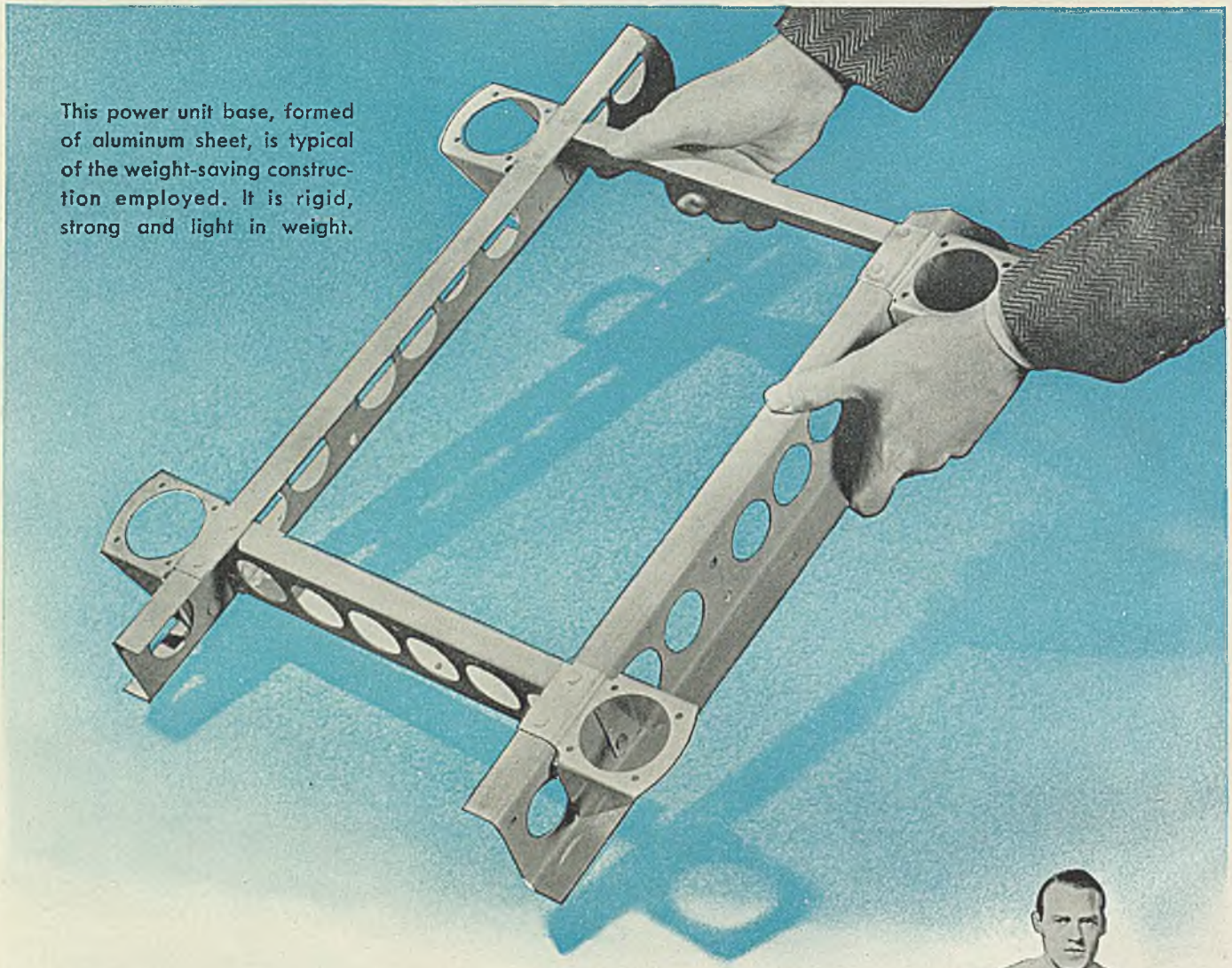
HERE'S A PICTURE OF TOMORROW . . . of a giant Pan American DC-7 Clipper over Rio de Janeiro, just 19 hours out of New York. Aboard are 108 passengers and a crew of 14. Spacious pressurized cabins have carried them comfortably at an altitude of 20,000 feet, at speeds of more than 300 miles per hour. It has been a thrilling experience, made possible for many by the amazingly low fares.

It's an experience that none today could look forward to without the many remarkable developments in equipment and apparatus inspired and accelerated by wartime aviation needs. Scores of these developments will find application far afield of aviation, making possible processes and products of entirely new efficiency and performance.

PESCO precision hydraulic and liquid pumps and controls are an outstanding example. Developed originally for modern aviation, they now open the way to all industry for expanded and more efficient uses of Pressurized Power and liquid flow. For descriptive literature, write PESCO Products Company, 11610 Euclid Avenue, Cleveland 6, Ohio.

In Precision Hydraulics, Fuel Pumps,
Air Pumps, Related Accessories . .

PERFORMANCE POINTS TO *Pesco* FIRST



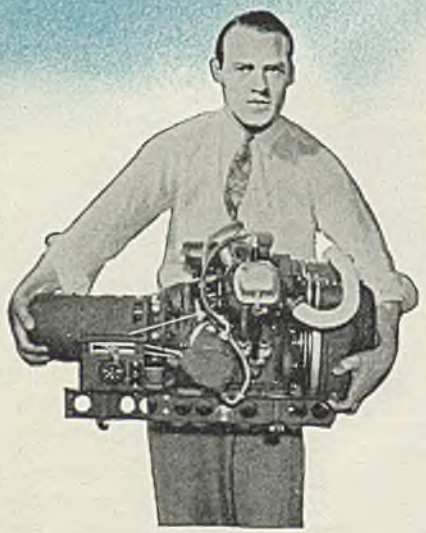
This power unit base, formed of aluminum sheet, is typical of the weight-saving construction employed. It is rigid, strong and light in weight.

Hitchhiker with a mission . . .

This little engine-generator set often goes along just for the ride. But let a plane crew need any auxiliary power, and it goes to work. Made largely of Alcoa Aluminum, it packs a lot of power per pound of weight.

Already we're seeing these lightweight engines aiding the civilian war effort. Chugging away faithfully alongside open manholes, they supply fresh air to the men below, pump out water, and floodlight the work. Alcoa predicts a widespread use of such equipment, made portable with weight-saving aluminum.

Thinking of using aluminum sheet on parts like that base? Our engineers will gladly assist in selecting materials and working out forming and assembly operations. ALUMINUM COMPANY OF AMERICA, 2112 Gulf Bldg., Pittsburgh 19, Pa.



This Andover Auxiliary Power Unit weighs only 116 pounds.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

metal parts. A myth still widely accepted is that such parts are unsuitable wherever strength is a factor. This is no longer true, points out Mr. Langhammer, for already parts have been made showing up to 166,000 p.s.i. in tensile tests. A tensile strength of 150,000 p.s.i. is now readily obtainable in laboratory work and in experimental production. Somewhat lower values are easily had in regular production work.

It is believed that eventually powder-metal parts can be made to have physical properties higher than steel, because such parts will use metals in pure form. Chemical methods of producing metal powders afford extreme cleanliness of the product. And fabrication into the finished part avoids any contamination from elements picked up from the atmosphere, furnace, ladle or mold as occurs during conventional melting and pouring operations. Too, exact percentages of elements can be put into the part because unpredictable melting losses are not involved. This permits precise control of analysis.

Eventually higher physicals than steels are believed possible because of the greater homogeneity and density that will be obtainable in powder-metal parts. In this connection, it is of interest to note that while theoretical strength of steel is near 500,000 p.s.i., slag and impurities make it impossible to approach this figure in actual practice.

Large Size Parts: Another myth that is being exploded is the idea that only parts of small or medium size are practical. This is not correct, reports Mr. Langhammer, for Chrysler is prepared to make Oilite plates up to 36 inches in diameter and 1 inch thick from present equipment. Thick thrust bearing plates, for instance, can be made 36 inches wide and 6 feet long, or longer if desired. And new methods of producing powder-metal parts will make possible still larger sizes. Mechanical parts weighing up to 90 pounds are already in production and still larger units are under development. Bearings 18 inches in diameter have been made.

An important recent development at Amplex is the production of solid bar stock, cored bars and large plates of Oilite bronze. The significance of these items is that a plant can stock a variety of unfinished pieces and machine them down to size of any bearing in the plant to fill an emergency when the exact bearing replacement may not be obtainable on short notice. A few of these pieces can thus furnish "backstop" emergency protection for hundreds of bearings in a plant.

There is almost no limit to size of powder-metal disks, sheets or plates for bearings and filters.

Mr. Langhammer points out that today the only question size involves is whether or not the economics are favorable. If it is better to make an item some other way than from powdered metals, Chrysler engineers will so recommend, because

they prefer to make powder-metal parts that provide substantial contributions in performance, quality, life and over-all economy.

Production Sequence: Speed and precision characterize Amplex production methods. First step is selection, weighing and blending of the powders. Blending or mixing is done on special mixing machines. From there the powdered metals flow across oscillating screens which remove any off-size grains. Particle size is measured by running through screens, 100 to 325 mesh. Average particle size corresponds to about 250 mesh. Of course, material for a powder-metal part is not made from just one size particles, but a certain per cent will be in one size range, another percentage in another size range, and so on.

Particle size is also checked by direct magnification as in Fig. 4, or by projection on a screen, and individual particles (one layer in a unit area) counted.

Powdered metal is produced by a number of methods. Atomization is applied primarily to low melting point metals such as magnesium, lead, aluminum, zinc and occasionally copper, bronzes and brasses. Higher melting points of refractory metals such as tungsten, molybdenum and tantalum require treatment of ore by chemical methods to produce the oxide which then is hydrogen reduced to make the metal powder. Electrodeposition is used frequently to produce a hard brittle deposit or a sludge-like deposit in production of powdered iron and copper.

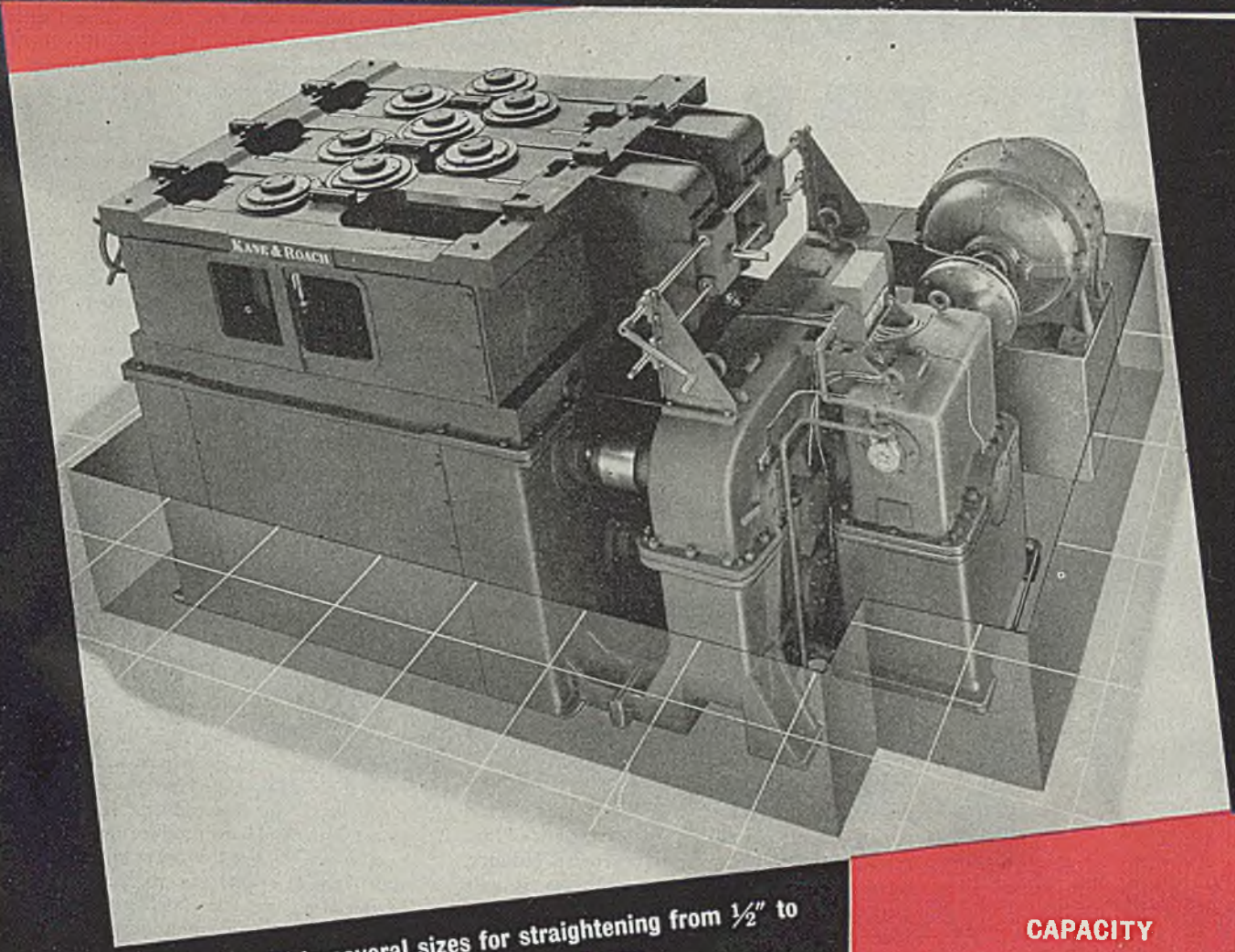
One source of powdered iron, however, is from steel mill scale, material otherwise thrown out as scrap. This material is pulverized and reduced at 700-1000 degrees Cent. Iron powder 99 per cent pure can be obtained from Armco iron by leaching with sulphuric acid, then reducing the iron sulphate so produced.

Briquetting: After screening the mix at Amplex, the powder is fed into briquetting presses where dies compact the loose powder. Compacting or pressing ratios of from 2:1 to 3:1 are involved; that is, the volume of loose powder required is roughly two to three times the volume of the finished part. Die design must provide the same desired compacting ratio in all portions of the part regardless of thickness differences. This means that if one section is twice the thickness of another, dies must provide twice the volume of powder for that portion.

Differential motion or multiple acting dies are often employed. Different thicknesses in the same part may be produced by closing the dies in the thin section first, then in the thicker section—to get the desired uniform 3:1 compacting ratio in both portions of the part. Since the powder flows only a limited amount, it is easy to see that correct die design is a skillful accomplishment.

Another factor of importance is provision for filling the dies with exactly

K&R 9VS VERTICAL SHAFT TWO PASS STRAIGHTENING MACHINE



This machine is built in several sizes for straightening from ½" to 4" heat treated square bars and proportionate shapes.

CAPACITY

Heat Treated Steel 130,000 lbs. Tensile Strength

12 x 2 Flat on Flat

8 x 1 Flat on Edge

4 x 4 Square

These machines are employed for straightening tool steel and alloy bar stock where the production does not justify the use of a Combination Vertical and Horizontal Straightener, and they are also used for large bar and billet sections to substantially reduce the cost of straightening, as compared to bulldozer or gag press operations.

Manufacturers of:

Cold Roll Forming Machines, Straightening Rolls, Bending Rolls, Gang Slitters, Edging Machines, Crimping Machines, etc

KANE & ROACH

INCORPORATED

Syracuse, New York

the right amount of powder, because it is evident that the amount of powder affects the density and physical characteristics produced by a set of dies. This is often handled by varying the depth of the dies over the different portions, thereby allowing the dies to be filled automatically with the exact amount of powder by a loading arm which fills the die level and wipes excess material away from top of die as shown in Fig. 5. Or a measured amount of mix may be placed in the die cavity and allowed to flow up around the dies during compacting. Low production items may employ handfilled dies, as in Fig. 6.

Life of dies varies, but 50,000 pieces per die is a good figure. Amplex has already developed production dies for some 13,000 bearing sizes and more than 6000 mechanical parts.

Presses of various types are employed at Amplex—mechanical units for small and medium size parts. hydraulic units for large parts. A mechanical press is shown in Fig. 7, with a new large heavy tonnage hydraulic unit in Fig. 8.

Speed of die closure is a factor. Briquetting, however, is always a fast operation, averaging only 10 seconds per part.

Maximum pressure in the briquetting cycle ranges from 15,000 to 100,000 pounds per square inch of cross sectional area. Thus in press work, press capacities go up roughly as the area of the parts produced.

Sintering: After briquetting, "green" parts are fragile. But now they go into the sintering furnace where a temperature high enough to melt one of the elements in the mix causes this element to act as a binder to produce an integral part when it sets. Proper selection of the element which is to act as the binder is an important metallurgical factor. Under certain conditions, it is possible to make the grains of all metals in the mix grow into one another to produce the extremely dense and strong powder-metal parts previously mentioned.

Binders can be used that will electrically insulate the individual pure iron particles in compacts that are to be used as cores for radio frequency transformers. The result is that greatly improved radio frequency apparatus has been made possible — equipment that exhibits higher "Q" or efficiency values than any other —by this use of pure metal powders.

Furnace atmospheres are controlled to prevent undesired chemical reactions with the powder-metal parts. For small and medium size parts, continuous chain belt conveyor type furnaces are employed as shown in Fig. 9. A large volume of such parts can be processed on such a unit.

Sizing: Any slight distortion that may occur from sintering is corrected and a bright smooth surface produced by a subsequent press sizing or coining operation. Also the finishing dies can help in controlling dimensions of the finished part to within extremely close tolerances, thus reducing or eliminating the neces-

Independent Survey Reveals Production Increases

By the Use of

VASCOLOY-RAMET

Tantalum-Tungsten

CARBIDE TOOLS

These figures represent the findings of production engineers in one of America's leading plants. On a total of 62 different operations, 951 more parts were produced per hour. Production was recorded under everyday shop conditions.

Startling as these figures may seem to many, they are not new to us or to other users of Vascoloy-Ramet Tantalum-Tungsten Carbide Tools who have checked their production before and after their changeover.

If your shop is not using Vascoloy-Ramet Carbide Tools, it may interest you to compare your present production with "before and after" production figures of another plant. It will not obligate you to receive these figures made on a fairly extensive variety of parts. Simply write us for "Before and After Figures".

VASCOLOY Ramet RAMET CORPORATION

NORTH CHICAGO, ILLINOIS

SALES AND SERVICE IN PRINCIPAL CITIES

WORLD'S FINEST CARBIDE

sity for many machining operations. Dimensional accuracy of plus or minus 5/10,000-inch can be had if required.

At the same time, calibration scales on instruments, identification or other markings can be made by including the design wanted in the coining dies. A typical sizing press at Amplex is shown in Fig. 11.

Oil Impregnation: Those parts where the self-lubricating property is to be used are next impregnated with oil by dipping in a hot oil bath as shown in Fig. 10. Capillary action causes oil to be drawn into all portions of the part, providing a reservoir of oil that assures sufficient lubrication to make the part often outlast the machine in which it is used, it is reported.

Differential Hardness: Powder-metal parts can be made to have properties obtainable in no other manner. For instance, by proper die design, it is possible to produce nonferrous parts with different hardness values over the surface.

Also, desired structural shapes can be had with built-in lubrication that eliminates the need for a bronze bushing, or the like.

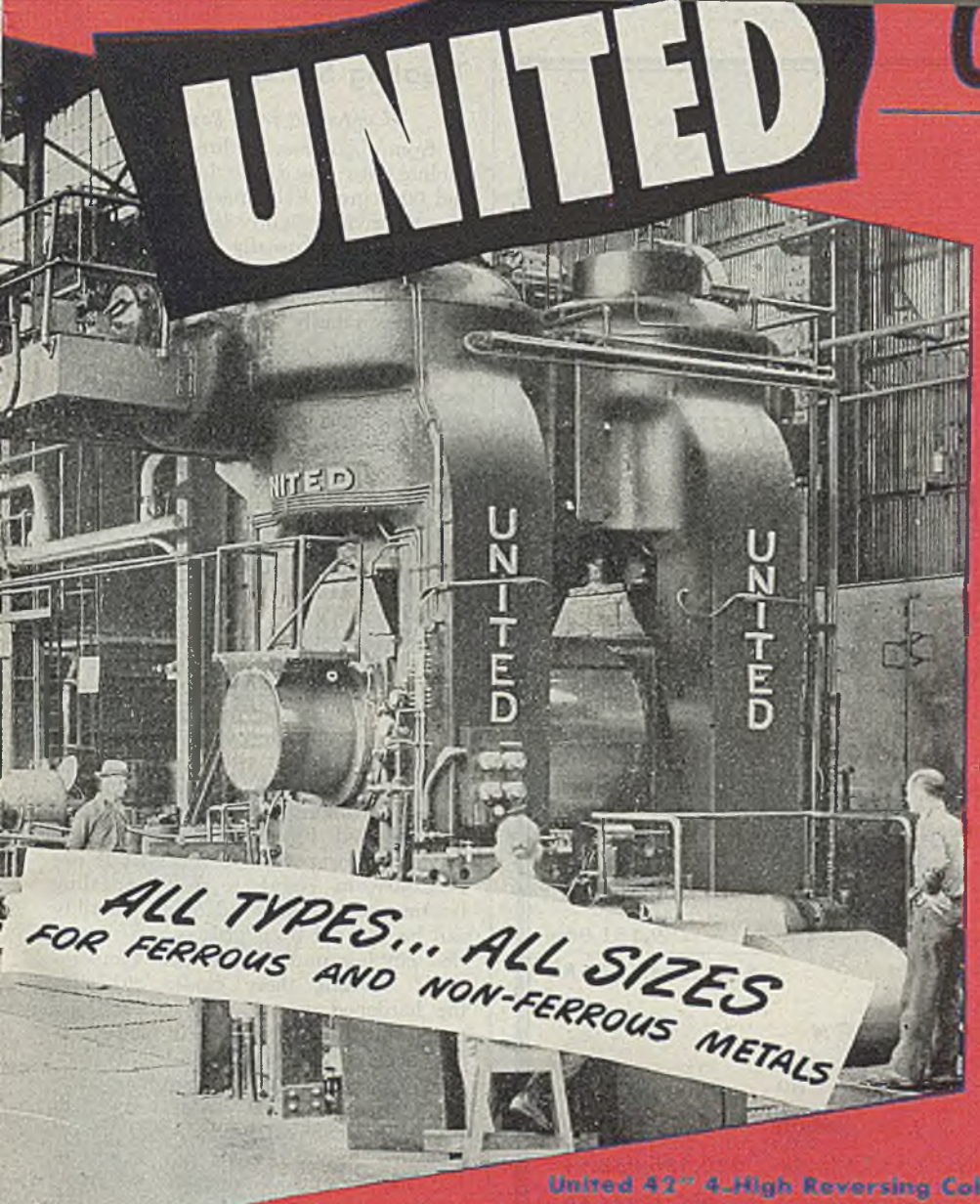
Too, the ability to make powder-metal parts from almost any conceivable combination of materials permits production of alloys not obtainable by usual methods because of different melting points and specific gravity of the elements used. Certain elements that may be desired may segregate and vaporize out of the melt entirely when trying to incorporate them in melted metal, or may have an extremely large and unpredictable melting loss that makes them impractical to use. Powder-metal production methods involve no such difficulties as no loss of elements occurs . . . . . everything put into the original mix appears in the finished part.

These inherent advantages of the process, coupled with increased knowledge and control of production of powdered metals themselves, are expected to result in an important expansion of use of powder-metal parts in the near future.

Molded Plastic Cases Made for Tachometers

Cases molded by Barber-Colman Co. from high-impact phenolic molding material manufactured by Bakelite Corp., 30 East 42nd, New York 17, house speed measuring devices such as clocks and tachometers made by Elgin National Watch Co. for fire control, navigation, and combat purposes in tanks and aircraft. Specifications require cases to withstand rough usage and diverse environmental conditions. For example, they must perform satisfactorily in fighter planes that take off in the heat of an African desert and, in a few minutes, are flying at temperatures as low as minus 70 degrees Fahr. Plastic cases are said to be shock-resistant and impervious to attacks of oils and greases.

UNITED Cold Strip Mills

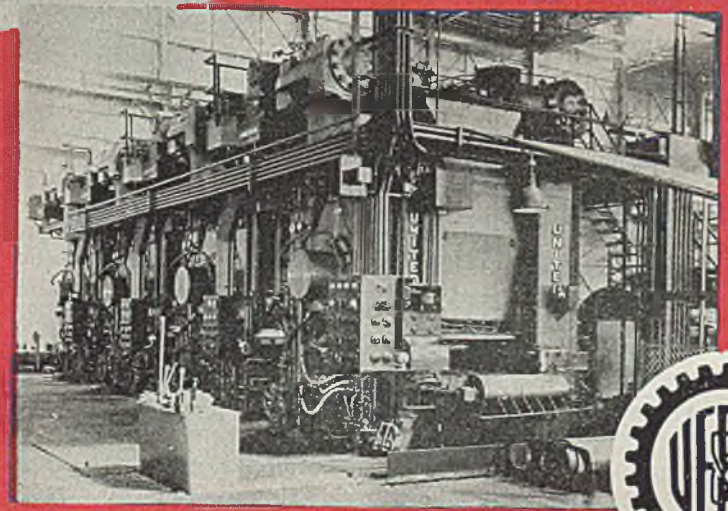


To meet war requirements we greatly increased our Rolling Mill production facilities. Now, as we expect to be able to offer attractive deliveries on units duplicating existing designs of all types and all sizes of COLD STRIP MILLS or modifications of them adapted to meet your specific requirements.

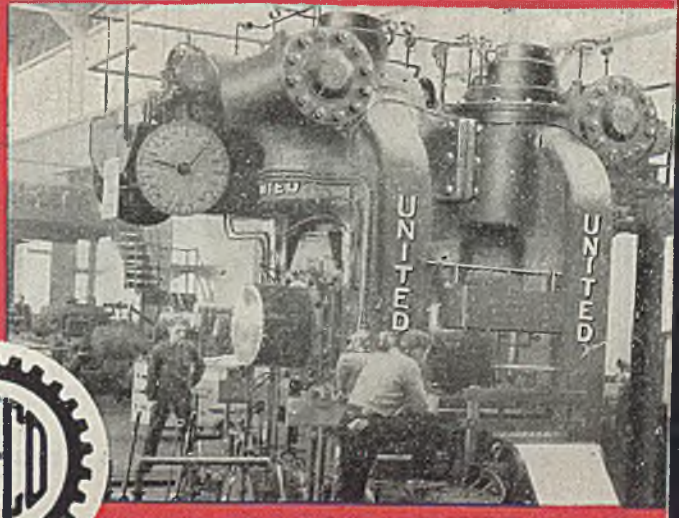
Recognized pre-eminence in technical research, and more than 40 years experience in the design, construction and installation of Rolling Mills and their auxiliary equipment for leading steel manufacturers throughout the world, is evidence of UNITED'S ability to serve you.

In planning for present or post-war expansions, you should consult with our engineering staff.

United 42" 4-High Reversing Cold Mill



United 54" 4-High, 2-Stand Tandem Cold Mill



United 28" 4-High Reversing Cold Mill

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at PITTSBURGH, VANDERGRIFT, NEW CASTLE, YOUNGSTOWN, CANTON

DAVY AND UNITED ENGINEERING COMPANY, LTD., SHEFFIELD, ENGLAND

DOMINION ENGINEERING WORKS, LTD., MONTREAL, P. Q., CANADA

Adamson United Company, Akron, Ohio

* The world's largest Designers and Builders of Cold Rolling Mills and Equipment

Treating Stainless Steels

(*Continued from Page* 120)

be from about one to three hours. The cooling rate may be varied between 25 and 50 degrees Fahr. per hour, the slower rates giving slightly lower hardnesses. Slow cooling is usually stopped at 1100 to 1200 degrees Fahr., and the material withdrawn from the furnace and cooled as rapidly as desired.

From some processing operations involving severe cold deformation, such as cold heading, a special softening treatment may be applied to Type 440A, 440B and 440C. This treatment consists of heating to 1625 to 1675 degrees Fahr. for two to three hours, furnace cooling to 1400 to 1450 degrees Fahr., holding four to six hours, and slow furnace cooling (25 to 50 degrees Fahr. per hour) to 1000 to 1100 degrees Fahr., followed by air cooling.

The 431 grade does not respond to full slow-cool annealing treatment. It can best be softened by a process anneal at 1150 to 1225 degrees Fahr. for four to eight hours followed by air cooling or quenching.

For any of the hardenable grades, unless maximum softness and ductility are required for severe cold forming or other processing operations, it is not necessary to resort to full annealing treatments. Usually adequate ductility can be secured by a process anneal carried out just under the critical temperature. Heating these grades either in the hardened or cold worked condition to the temperatures given in Table VII and holding for periods of one to four hours followed by air cooling or quenching will result in low hardness and high ductility. Photomicrographs of typical annealed stainless steels are shown in Fig. 15. Results of annealing the hardenable grades are given in Table VIII.

Special Procedures for Forgings: Because of the unusual air hardening capacity of the hardenable stainless steels, certain precautions are sometimes necessary with forgings. In other cases this characteristic is advantageous.

Forgings of the high carbon grades are not generally allowed to air-cool to room temperature, otherwise strain cracks may develop. The best practice is to place the forging, as it comes from the hammer, directly into a furnace operating at 1300 to 1350 degrees Fahr. and allow it to soak for three to six hours, followed by air-cooling to room temperature. This procedure will eliminate any possibility of cracking.

A similar practice may also be desirable with Types 414 and 431 forgings of large or complicated sections. With these grades, however, care should be taken to be sure that the forgings have cooled to allow enough temperature (below about 550 degrees Fahr.) to become magnetic, before they are charged in the annealing furnace. The annealing temperature should be from 1150 to 1300 degrees Fahr. for Type 414 and 1150 to 1225 degrees Fahr. for 431.

In the case of Types 410, 403 and 416,

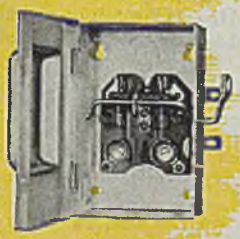
Square D's Complete Line of Safety Switches means the right switch for the job... every time!

Type A Switches with concealed blades. Quick make, quick break and interlocked cover. Design permits smaller boxes with plenty of wiring space. Up to 200 amperes, 600 volts. H.P. rated. Made in 2 and 3 pole, 3 and 4-wire solid neutral.

Blue Label Line—Type D Switches are compact, employing a rotary type of blade construction. Made for 2 pole and 2-wire and 3-wire, 230 volt A.C.-250 volt D.C. systems. Available for 30 to 60 ampere fusings. Front operated.

Type A Switches with visible blades. Quick make, quick break and interlocked cover; rated from 30 to 2400 amperes, up to 600 volts. Horsepower rated. Fusible and not fusible. 2, 3 and 4 poles and 3, 4 and 5-wire, solid neutral.

Manual Motor Starters are available up to 60 amperes, 575 volts A.C. horsepower rated. Auxiliary blades shunt running fuses when operating handle is moved to starting position. Releasing handle automatically moves blades to running position with fuses in circuit.



General Purpose Switches (Type D) are quick break only in capacities from 60 to 600 amperes inclusive. Thirty-ampere (and rain-tight) switches are not quick break. Made with 2, 3 and 4 pole and 2, 3, 4 and 5-wire s/n systems. 230 volt A.C. and 250 volt D.C.

Double Throw Switches. Made in sheet steel or explosion-resisting enclosures, approved for Class 1, Group D hazardous locations. Interlocked covers and quick make and quick break mechanism in sheet steel enclosures.

Type C Industrial Safety Switches are quick make and quick break. Made up to and including 600 amperes, 600 volt. Fusible and not fusible. Horsepower rated. 2, 3 and 4 poles, and 3, 4 and 5-wire solid neutral. Also available in rain-tight enclosures.

Weatherproof, dust-tight and explosion-resisting enclosures are available with ratings up to 200 amperes. Dust-tight switches approved for Class 11, Group G hazardous locations. Explosion-resisting enclosures approved for Class 1, Group D hazardous locations.

● Square D's unusually complete line of safety switches covers five divisions: *1.* Heavy Duty Industrial Type A. *2.* Intermediate Industrial Duty Type C. *3.* General Purpose Type D. *4.* Double Throw Switches. *5.* Manual Motor Starters.

See our catalog in SWEET'S or write for Safety Switch Bulletin. Address Square D Company, 6060 Rivard St., Detroit 11, Mich.

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

forgings are sometimes deliberately allowed to become fully hard by air-cooling off the hammer and are thereafter tempered without resorting to additional hardening treatments. Where this procedure is employed, care should be taken to air-cool the parts in a rapid and uniform manner. Parts should be spread out, and not placed in piles.

Forgings of these grades which are later to be machined should be tempered to a hardness range of about brinell 180 to 240 to obtain best machinability.

(*To be concluded next week*)

STAINLESS STEEL DESIGNATIONS

The Rustless Iron and Steel Corp. has established designations for the various grades of stainless steels which are closely descriptive of their principal chemical contents. These are presented below along with their equivalent American Iron and Steel Institute type numbers:

Group I—Straight chromium, hardenable grades (Martensitic):

AISI Type	Rustless Grades
410	12
403	12T
416	12FM
414	12-2
431	16-2
420	13-C-35
440A	17-C-60
440B	17-C-80
440C	17-C-100

Group II—Straight chromium, nonhardenable grades (Ferritic).

AISI Type	Rustless Grades
430	17
430F	17FM
442	21
446	27

Group III — Chromium-nickel, nonhardenable grades (Austenitic).

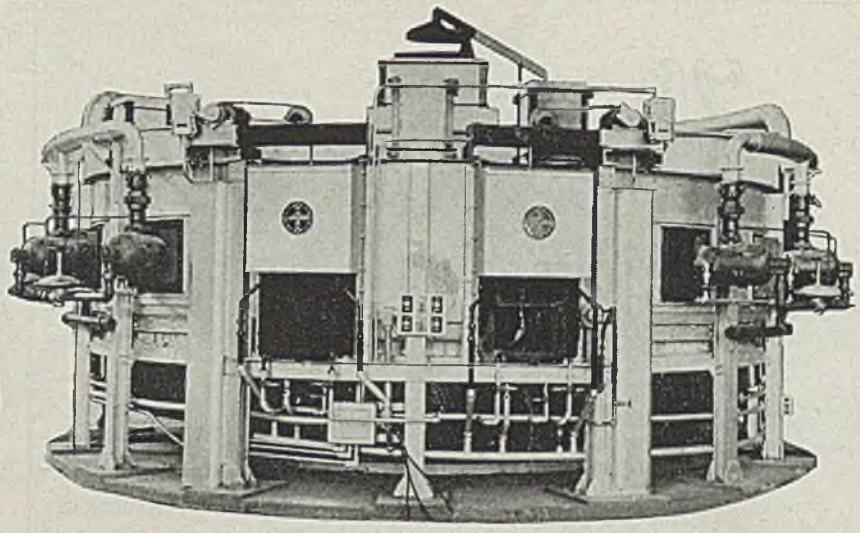
AISI Type	Rustless Grades
301	17-7
302	18-8
304	18-8
303	18-8FM
308	20-10
309	25-12
310	25-20
316	18-12-3 Mo
321	18-10 Ti
347	18-10 CB

—o—

A new insulating material, Santocel, derived from silica, may make possible lightweight blankets and sleeping bags warmer than the heaviest furs and woolens, according to Monsanto Chemical Co., 1700 South Second, St. Louis. The company also predicts its use will make possible thin-walled refrigerators with 40 per cent more storage space than present models of the same size.

HAGAN ROTARIES

. . . used exclusively in W. P. B. MODEL SHELL PLANT



HAGAN ROTARY HEARTH FORGING FURNACES

IN 1944
Five (5) ROTARY FORGING FURNACES HEATED
8,587,605 Shell Forgings

In January 1945,—
607,615 Shell Forgings (105 mm. size) heated . . . average time per completed forging was 2.6 man minutes.
Lowest man minute labor cost in the industry

At a recent meeting of the War Production Board in Washington, D.C. the forging plant and equipment of the Ambridge plant of Spang-Chalfant, division of The National Supply Company—was chosen as the *best* and *most successful* in the country and is to be used as a model for all new shell plants.

Five Hagan Rotaries built and installed since 1941 have helped earn this nation-wide recognition for outstanding, economical War production. Five more Hagan Rotaries are now under construction for two other units of this organization.

GEORGE J. HAGAN COMPANY
PITTSBURGH, PENNA.
Detroit · Los Angeles · Chicago · San Francisco

Machining Gears

(*Continued from Page* 128)

ing from 15 to 40 inches in diameter which are normalized and tempered, a hardness of 200 to 250 brinell is usually used. The physicals in this range will be 100,000 to 125,000 pounds per square inch tensile strength with a minimum yield point of about 80,000 pounds per square inch.

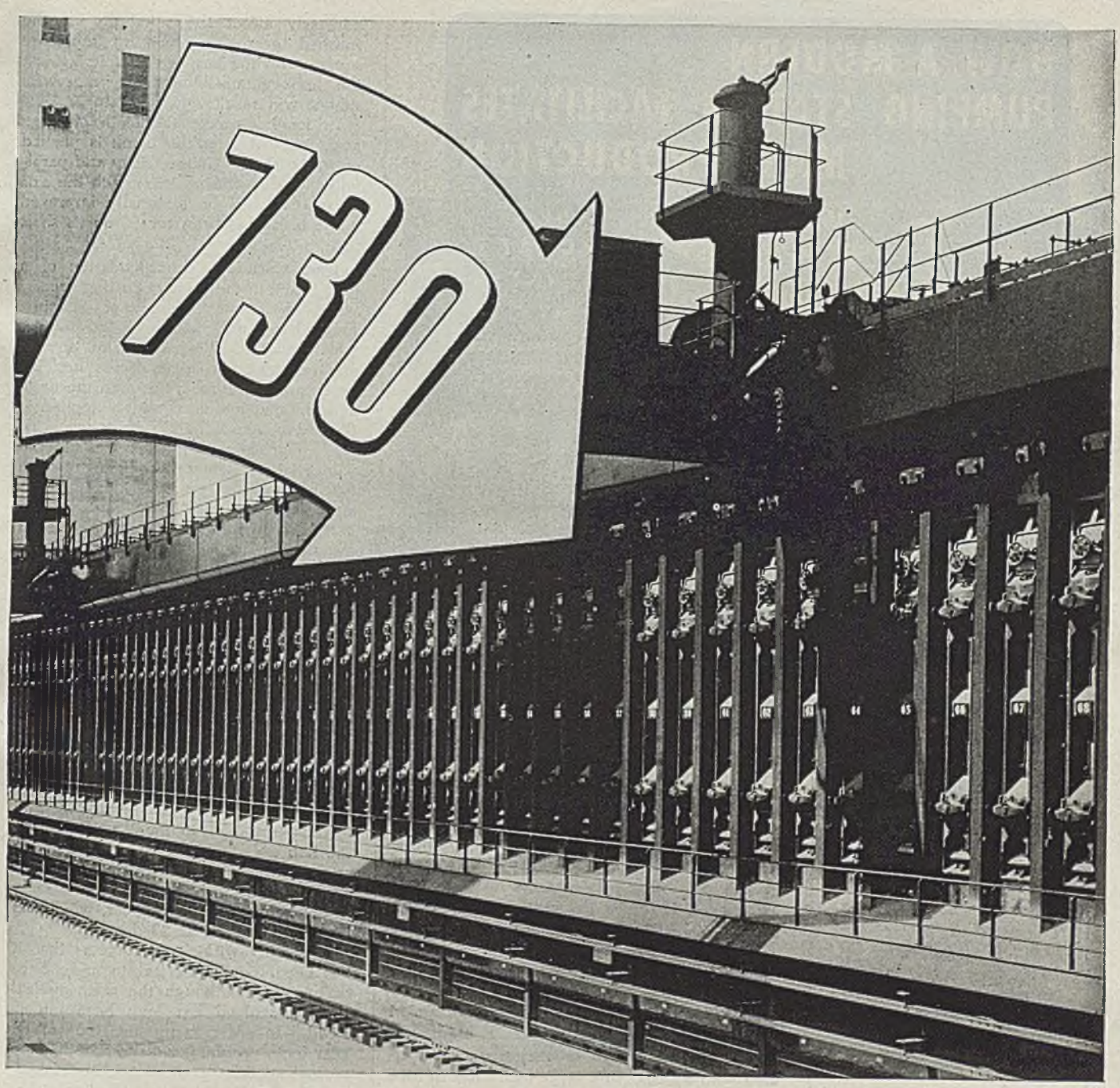
Industrial gearing can be made from rolled bars, forgings or castings. For very large gears, castings will be found superior because of the absence of extreme directional properties usually associated with drastically rolled forgings or plate. Obviously, the founding of such gears must make full use of amply sized well placed risers. A widely used analysis for large cast alloy steel gears is a manganese-molybdenum composition. The steel is either annealed or double normalized and tempered to approximately an 80,000 pounds per square inch tensile strength and a 45,000 pounds per square inch yield point.

Housing Cast or Welded: Accurate and adequate support of the gear members is of prime importance since relatively small deflections will prevent realization of the theoretically computed load carrying estimates. Frames may be of cast iron, cast steel or welded steel. Each has its particular advantages.

Cast iron has its principal use in standardized drives and large volume special drives where weight is not a determining factor and extreme shock loads are not likely to be encountered. For large rolling mill drives, heavy steel frames are used—they may be either cast or welded with the choice determined by the cost. For the very high ratio of strength to weight required in marine drives, a skeletonized steel framework similar to Fig. 5 is used. This may be either welded or cast depending largely upon the facilities for producing them. For certain types of custom built drives in the low production class, a combination cast and welded construction may hold some advantages. In this type of construction, however, the cost per pound varies considerably with the percentage of steel castings.

Manufacturing Accuracy Vital to Gear Performance: The horsepower rating of a gear computed by theoretical formulas is an estimate predicated on the expectation that certain assumptions relating to accuracy of manufacture, mounting, and operation will be realized. The gear blanks must be accurately turned and bored, and the teeth cut to very close tolerances. Likewise the supporting housings and bearings must be bored straight and true. Of no less importance is the mounting of the gear case on an adequate foundation and using the proper amount, type and viscosity of lubricant for the gears and bearings.

Turning and Boring Blanks: Turning, boring, and facing of gear blanks are preliminary operations which must be carried out with care in order not to



New WILPUTTE UNDERJET COKE OVENS

Have been built during the war—or are building—with a carbonizing capacity of

6½ MILLION TONS OF COAL ANNUALLY

WILPUTTE COKE OVEN CORPORATION

A SUBSIDIARY OF SEMET-SOLVAY COMPANY

40 RECTOR STREET NEW YORK 6, N.Y.

adversely affect the suitability of the finished gear. The boring must be square with the face which bolts against the hobbing machine table, otherwise runout will result.

In some instances the teeth of large gears are cut after the blank is pressed on to the shaft. Concentricity and parallelism of the pitch cylinder with the axis of rotation will be materially improved if the blank has been turned on its shaft in a pit lathe.

Gear Cutting: The foundation of a gear is laid in the primary cutting process which is either hobbing or shaping. Each has some particular advantages which make it best suited to one or another field. In general, the hobbing process is considered the more accurate and, for that reason, is widely applied in the production of large high speed gearing. The shaping process has the advantage that it requires no gap width for herringbone gears. Both methods are used at the Falk Corp.

A large hobbing machine consists essentially of a table on which the gear blank is mounted, a compensated differential driving mechanism, uprights carrying the hob saddles, and means for driving the hobs in timed relation with the table and transverse feeding mechanism. The machines are extremely rigid and much effort has been expended in the attainment of the highest degree of precision possible.

Two hobs of opposite hand are used, one starting at the upper part of the gear and feeding down toward the center, and the other starting from the bottom and feeding upward. In the Wuest process, the hob axes are horizontal and at right angles to the axis of the gear. The thread angle of the hob is, therefore, the same as the helix angle of the gear, which has been standardized at 23 degrees.

It is only within recent years that it has been found practical to make hobs of this type, although the mathematical theory involved has long been understood. In order to produce the correct gear tooth profile, it is necessary that the normal section of the tooth be a compound of the helicoid and involute rather than straight sided, such as is the case with single thread hobs of the inclined type. Wuest type gears are used successfully at pitchline velocities of 10,000 feet per minute. The process makes available gears having the inherent advantages of hobbing without the disadvantage of a wide gap.

Hob errors such as directly influence the accuracy of the gear are at a minimum with single thread. Single thread hobbing requires a rather wide gap which is objectionable in some circumstances. For high speed work it is seldom a factor.

The hob rotates continually, working around the circumference, and simultaneously feeding across the face at a very slow rate, describing a helix. Since the cutting edges are quite close to each other, cutting reactions are very uniform and the wind-up and elastic distortions in the machine are maintained at constant values. The relative speed of the hob and blank will not remain constant; however, if

alternate hard and soft regions are encountered this will be reflected in the accuracy of the tooth spacing. The uniformity of cast gears in this respect is undoubtedly one of the chief reasons for its success in the high speed field.

The number of cuts taken in hobbing may be one or several. High speed and large rolling mill gears are never finished in a single pass. A very light feed is taken in the final cut to obtain maximum accuracy. The machine is not permitted to stop during the final cut.

Hobs are profile ground to a "class A" tolerance. However, the correct gear tooth profile will not be obtained unless the hob sharpening is accurate. In the single thread hob the flutes or gashes are parrellel with the axis and nearly normal to the hob thread. In the multiple thread hob the flutes are diagonal, which calls for accurate sharpening on machines equipped with a mechanical means for dressing the wheel to the peculiar shape arising from the fact that the hob must oscillate as the wheel traverses its axis. The matter is considered of such importance that all hobs are checked after sharpening on special testing machines. If correct, the inspector etches his O.K. on the cutting face.

Herringbone gears on the continuous tooth design can be produced on either rack or pinion cutter machines. In the rack type shaper the cutting begins with one portion of the rack where the roughing is done. The cutter moves upward with reference to the blank in the process of cutting and only the lower teeth are used for finishing. Gears of this type that are to be shaved after cutting are made with a narrow gap between the two helices to provide clearance for the shaving cutter.

Gear Lapping An Art: The lapping process is the most common method of profile refinement after cutting the teeth. It consists of running the gears in mesh with a fine abrasive mixed with a suitable carrier.

Before the development of special machines, the pinion and gear were usually lapped by running them in their respective cases or in special bearings set up on parallel bars. Such methods were slow and did not provide for proper control of backlash and tooth contact.

Principle of Gear Shaving: The basic principle of the shaving process involves the meshing of gashed or serrated gear teeth in the form of a rack or rotary cutter at crossed-axis with the gear to be finished. The work is rotated at relatively high speed and the cutter fed back and forth across the face width of the gear a sufficient number of times to produce the desired finish. The shaving cutters are made of hardened high-speed steel with tooth profiles ground to master gear tolerances.

While the rack cutter type machine and early rotary cutter machines were designed primarily for automotive gear finishing, great progress has been made on the latter type machines so that they can be applied to speed reducer, commercial and marine gear shaving. Standard rotary cutter machines are now in use which

HELPFUL LITERATURE

1. Plate Planers

Baldwin Locomotive Works—8-page illustrated pamphlet presents information on medium and heavy duty plate planers. Features include protection of carriage screw from dirt and chips, anti-friction thrust bearings to absorb cutting tool thrust lead, operating controls at carriage and force feed systems for continuous lubrication of vital parts.

2. Centrifugal Pumps

Bell & Gossett Co.—42-page illustrated catalog CP 843 describes Type W enclosed and semi-open impeller pumps. It includes detailed instructions and drawings to aid in installation and operation, selection tables and engineering data.

3. Beryllium-Copper Castings

Beryllium Corp. of Pa.—16-page illustrated booklet discusses beryllium-copper castings and lists following advantages: good casting characteristics, ease of machining, impact strength, corrosion resistance and high electrical and thermal conductivity.

4. Gearing

Atlantic Gear Works, Inc.—111-page illustrated catalog lists specifications and prices of complete line of gears, sprockets, chains, reducers, bearings and couplings for industrial uses. Technical data are included to aid in mechanical power transmission applications. Stock and special gears are covered.

5. Refractory

Chas. Taylor Sons Co.—6-page illustrated bulletin No. 200 describes use of Zircon refractory brick and cement in aluminum open hearth furnaces and gives properties and chemical analysis. Typical applications are pictured and described.

6. Thread & Form Grinder

Sheffield Corp.—24-page illustrated bulletin No. M-100-145 describes Multi-Form wheel method of grinding. Applications and advantages are discussed. Operation of principal elements of machine is covered. Table of specifications is included.

7. Gas Analysis Apparatus

Burrell Technical Supply Co.—6-page illustrated folder deals with apparatus for gas analysis employing catalytic method. This is rapid method because of simple technique, safe since hazard of accidental explosions is eliminated, and accurate.

8. Snubbers

Burgess-Manning Co.—18-page illustrated catalog No. 454 discusses snubbers for preventing exhaust and intake noise of industrial and marine engines without interfering with efficient engine operation.

9. Grinding Machines

Blanchard Machine Co.—80-page illustrated manual entitled "Work Done on the Blanchard" presents example of machining and finishing of flat surfaces. Materials ground include aluminum, magnesium, copper, brass, bronze, glass, carbon, plastics and minerals.

10. Chain

Cleveland Chain & Mfg. Co. — 160-page illustrated book deals with welded and weldless chains. Types discussed include conveyor, fence, coil, halter, harness, plumbers, tow, sling, sash and stud link anchor chains.

11. Snagging Wheels

Bay State Abrasive Products Co.—4-page illustrated folder describes Resinoid B Bond high speed, and Vitrified 6 Bond and Vitrified H9 Bond low speed snagging wheels. Recommendations for proper wheel selection are given.

12. Colors in Industry

Arco Co.—Four illustrated bulletins deal with Optonic Color System which outlines simple basic rules for selection of color scheme in industry to promote safety, sanitation, employee efficiency and stimulate morale. Color chips are included in 12-page bulletin entitled "A Practical Guide to the Use of the Optonic Color System." Other bulletins are entitled, "Color Power for Industry", "Standard Code for Identification of Piping Systems", and "Safety Color for Industrial Plants."

13. Couplings

Buffalo Machinery Co.—8-page illustrated bulletin No. 1005, describes machine tool, transmission and special torque control couplings. New machine tool type available with graduations in inch or foot pounds, which can be easily adjusted without removal from machine, is described.

14. Insulating Fire Brick

Armstrong Cork Co.—8-page illustrated bulletin No. I-196 describes five types of fire brick for temperatures up to 2600 degrees Fahr. Featured are new data on suspended arches and walls, as well as tailor-made arches and domes. Diatomaceous earth, insulating concrete and ingot mold insulation are covered.

15. Conveyors & Feeders

Chain Belt Co.—6-page illustrated bulletin No. 462, describes Rex apron and pan feeders and conveyors. Contains design details, cross sections, capacity tables and specifications.

16. Castings, Patterns & Dies

Acme Aluminum Alloys, Inc.—48-page illustrated booklet entitled "Acme for Action" shows personnel and equipment of various divisions and contains photographs of work in process.

17. Steel Castings

Birdsboro Steel Foundry & Machine Co.—12-page illustrated description "New Steel Foundry Makes Navy Castings" in which plant layout and methods of producing steel castings from 1 to 70 tons are covered.

18. Hardened Steel Drills

Black Drill Co.—28-page illustrated manual contains data and directions for use of Hardsteel drills to drill, counterbore, countersink or ream hardened steel without annealing.

19. Machine Tool Bases

Central Boiler & Mfg. Co.—4-page illustrated folder setting forth advantages claimed for steel plate fabricated bases, columns and frames for machine tool. A number of typical examples is pictured.

20. Mobile Canteens

S. Blickman, Inc.—12-page illustrated catalog describes eight basic models of canteens for in-plant feeding of up to 450 people at a time. Basic models afford choice of containers and capacities.

21. Boiler Tubes

Bissett Steel Co.—4-page illustrated folder deals with pressure tubes for stationary, marine and locomotive boilers. It contains specifications, prices and directions for ordering.

22. Valves

A. W. Cash Valve Mfg. Corp.—8-page illustrated price data sheet D-11 gives specifications and prices of pressure reducing and regulating valves, diaphragm type and pot type pressure relief valves, automatic pressure controls and strainers for steam, water, air, gas and oil lines.

FIRST CLASS
PERMIT No. 36
(Sec. 510 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

STEEL
Penton Building
CLEVELAND 13, OHIO

Readers' Service Dept.

STEEL
1213 West Third St., Cleveland 13, Ohio

4-16-

1	11	21	31	41
2	12	22	32	42
3	13	23	33	43
4	14	24	34	44
5	15	25	35	45
6	16	26	36	46
7	17	27	37	47
8	18	28	38	48
9	19	29	39	49
10	20	30	40	50

Please have literature circled at left sent to me.

NAME TITLE

COMPANY

PRODUCTS MANUFACTURED

ADDRESS

CITY AND STATE

This card MUST be completely filled out. Please TYPE or PRINT

23. Furnace Control

Askania Regulator Co.—12-page illustrated bulletin No. 122 deals with applications and operating principles of Askania heating furnace control. Jet principle is incorporated in all units which are applied to equipment for heating of metals and other uses.

24. Pumps

Aurora Pump Co.—12-page illustrated bulletin entitled "Aurora Turbine-Type and Centrifugal Pumps" covers construction specifications and condensed selection information on pumps to handle up to 5000 gallons of fluid per minute against heads of up to 400 feet.

25. Construction

American Road Builders' Association—20-page illustrated bulletin "The Road Ahead" explains how construction creates jobs. Highway construction projects, effects on other related jobs and plans for the future are discussed. Present and postwar highway plans are covered.

26. Coolant Separators

Barnes Drill Co.—4-page illustrated bulletin No. 151 deals with magnetic-automatic coolant separators for honing and grinding machines. Advantages of use and specifications are covered.

27. Wire Cloth

Buffalo Wire Works Co.—56-page illustrated catalog No. 12 is for users of industrial wire cloth. Explanation of mesh, gage, percentage of open area, proper screen, types of weaves, selection of metal and finishing services are covered. Tables and formulas for specification are included.

28. Air Handling Equipment

B. F. Sturtevant Co.—198-page illustrated pocket-size catalog and engineering data-book No. 500 is entitled "What We Make". Entire line of air handling and allied equipment is briefly covered. Engineering data includes psychrometric chart and other useful information.

29. Hydraulic Circuits

John S. Barnes Corp.—4-page illustrated bulletin No. 301U, describes unit type hydraulic circuits specially designed to suit requirements. Self-contained units range in size from 1½ to 10 horsepower. Hydraulic panels for mounting on machine bases are also described.

30. Phenolic Resin Glue

Bakelite Corp.—8-page technical data booklet No. J-487 explains formulations, mixing procedure, working life, spreading, assembly, curing, cleaning and storage of Bakelite cold-setting phenolic resin glue XC-17613. Illustrated with graphs.

31. Finish Testing Instrument

Brush Development Co.—10-page illustrated bulletin describes Model SA-2 Surface Analyzer which measures surface irregularities of one-millionth inch and more. It consists of drive head, crystal pickup, calibrating amplifier and direct inking oscillograph.

32. Spotting & Centering Drills

Chicago-Latrobe Twist Drill Wks.—4-page illustrated bulletin No. 40M844 describes high speed spotting and centering drills and lists sizes and prices of standard drills.

33. Swivel Joints

Barco Manufacturing Co.—4-page illustrated catalog No. 259, shows swivel joints and parts for use on piping handling air, oil, gas, steam, water and other liquids. They provide 360 degree swivel movement and side flex to take care of piping misalignment. Tables of standard dimensions are given.

34. Milling Machine Vise

Bellows Co.—4-page circular presents information on CVH-60 automatic milling machine vise which, by eliminating hand clamping and by automatically synchronizing opening and closing of vise jaws with movement of machine bed, cuts loading and unloading time.

35. Acid-Proof Brick Floors

Belden Brick Co.—16-page illustrated brochure shows many typical industrial applications of acid-proof brick flooring, which is resistant to cutting action of steel wheeled trucks, oil, water and acids and has crushing strength of 18,500 pounds per square inch. Technical analyses are also included.

36. Stainless Steel

Central Steel & Wire Co.—154-page pocket-size, plastic bound, reference and data book. Gives specifications of various forms and types of stainless steel and covers methods of fabrication. Conveniently thumb-indexed for ready reference.

37. Air Diffusers

W. B. Connor Engineering Corp.—Loose-leaf collection of bulletins and technical data discusses Kno-Draft adjustable air diffusers and contains general and engineering information on selection, application, location, assembly, erection, adjustment and testing of diffusion equipment.

38. Drilling, Boring, Facing Unit

W. F. & John Barnes Co.—4-page illustrated bulletin describes No. 924 vertical drilling, boring and facing machine. This machine can be tooled and adapted to many types of high production jobs requiring up to 60 horsepower and 50,000 pounds thrust. Specifications and overall dimensions are given.

39. Copper-Base Alloys

Bridgeport Brass Co.—80-page Duronze Manual, Revised 1944, presents information on various types of Duronze. Characteristics, specifications, uses and methods of fabrication are included. Engineering data are included in a special section.

40. Black and White Prints

Charles Bruning Co.—28-page illustrated booklet A-1010 in which advantages of black and white prints are set forth. Printing and developing machines for all volume requirements are illustrated and specifications are given.

41. Heat Treating

Carpenter Steel Co.—Pocket-size slide chart gives analyses and heat treating recommendations for various types of tool steels. Multi-color identification of different tool steels makes chart easy and accurate to use.

42. Oil Strainer

George Butler Co.—4-page illustrated bulletin describes Metex coolant and cutting oil strainers for use on grinders, lathes, broaching machines, screw machines, drillers and boring machines. Model G-18-6 strainer has 1944 square inches of strainage area.

43. Electrical Duct

BullDog Electric Products Co.—16-page illustrated bulletin No. 427-1 describes ventilated "LO-X" duct for power and lighting feeder runs, welders and other similar large inductive load applications. Construction details, typical installations and summary of advantages are included.

44. Telephone Booths

Burgess Battery Co.—4-page illustrated bulletin No. 143 deals with model 207 Acousti-Booths. Heavily insulated all wood walls and ceiling absorb industrial noise and reduce reflected noise. Specifications and prices are given.

45. Cowl Fasteners

Camloc Fastener Corp.—8-page illustrated catalog 44A, describes and gives specifications of 4002 series Camloc spring loaded cowl fasteners. Typical applications are shown and advantages of use are set forth.

46. Carbide-Tipped Tools

Bokum Tool Co.—4-page illustrated folder deals with carbide-tipped boring, bottoming, facing, grooving and threading tools. Included are tools tipped with tungsten carbide for all around work on cast iron, non-ferrous metals and steel, and those tipped with tantalum carbide for use on tough nickel and chrome steel.

STEEL
213 West Third St., Cleveland 13, Ohio

4-16-45

1	11	21	31	41
2	12	22	32	42
3	13	23	33	43
4	14	24	34	44
5	15	25	35	45
6	16	26	36	46
7	17	27	37	47
8	18	28	38	48
9	19	29	39	49
10	20	30	40	50

Please have literature circled at left sent to me.

NAME _____ TITLE _____

COMPANY _____

PRODUCTS MANUFACTURED _____

ADDRESS _____

CITY AND STATE _____

This card MUST be completely filled out. Please TYPE or PRINT.

FIRST CLASS
PERMIT No. 36
(Sec. 510 P.L.&R.
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

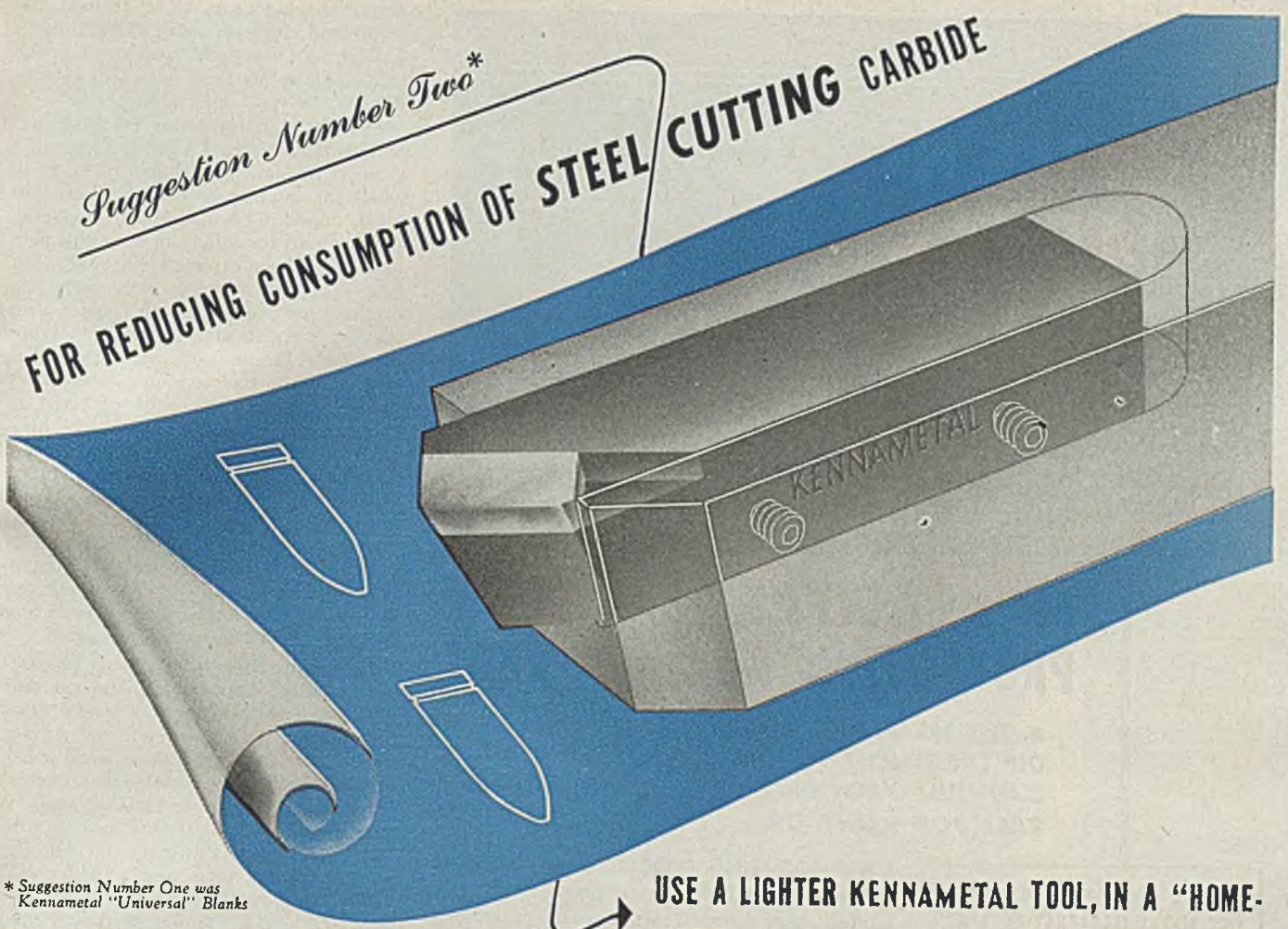
4c POSTAGE WILL BE PAID BY—

STEEL
Penton Building
CLEVELAND 13, OHIO

aders' Service Dept.

*Suggestion Number Two**

FOR REDUCING CONSUMPTION OF STEEL CUTTING CARBIDE



* *Suggestion Number One was Kennametal "Universal" Blanks*

USE A LIGHTER KENNAMETAL TOOL, IN A "HOME-MADE" ADAPTOR, ON FINISH-TORN OPERATIONS

Efficient use of carbide tools—always important—is imperative today, because of the demands of a large shell-making program. Every possible means for promoting economy should be utilized to avoid tool shortages, and consequently delayed production.

On most finish-turn operations carbide can be conserved, and tooling costs can be reduced, by using tools 1" square or smaller, mounted in the tool block by means of a simple adaptor which can readily be made in any shop. For example, in a major shell-plant, the finish-turn operation on a 155mm shell, using a 1½" square-shank Kennametal-tipped tool, required .72 calculated grams of Kennametal, at a tool cost of 8¢ per shell—very economical production. Yet, by using a ¾" square-shank Kennametal-tipped tool in an adaptor, carbide consumption was cut in half (.36 calculated grams), and tool cost was reduced to 3.3¢, per shell finish-turned.

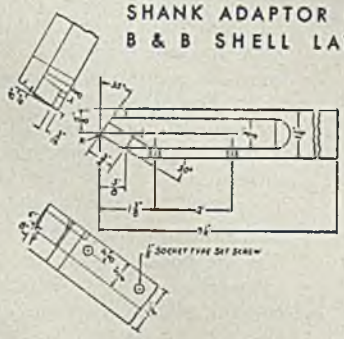
The diagrams at the left show how ¾" square-shank tools can be mounted in adaptors that fit tool holders built to take shanks 1¼" or 1½" wide. Similar adaptors can be devised and made by you for other conditions. On lathes built to take tool shanks 1" x 1½", or 1" x 1¾", it is economical to use a ½" or ¾" shim under a 1" square-shank Kennametal-tipped tool.

By using inherently efficient Kennametal, in conservative size blanks, as suggested above, a two-way saving in carbide consumption can be effected.

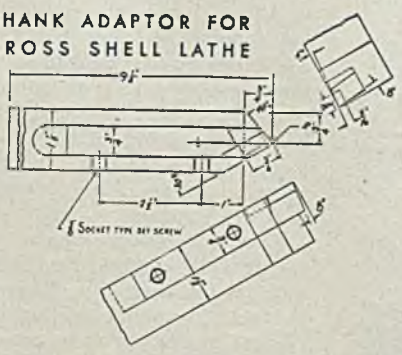
Kennametal engineers, fully experienced in the application of cemented carbides, will be glad to help manufacturers get the best and longest tool service in shell production.

TWO TYPES OF ADAPTORS THAT YOU CAN EASILY MAKE*

SHANK ADAPTOR FOR B & B SHELL LATHE



SHANK ADAPTOR FOR CROSS SHELL LATHE



* Kennametal Inc. does not manufacture or sell adaptors. The sketches above are typical suggestions for making your own adaptors. Blue prints from working drawings will be furnished on request.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL *Inc.*, LATROBE, PA.

permit shaving gears up to 48 inch diameter and 20 inch face width. Tooth contact and backlash, which must be held to close tolerance, are checked after shaving, in special fixtures.

Shaving of Large Gears Practical: Experiments at the Falk Corp. indicate that there is no limit to the size of gears to which shaving may be advantageously applied, unless it be in the coarser pitches such as used for rolling mills as this field has not yet been explored. Fig. 1 shows a large marine gear and its pinion set up in machine for checking tooth contact after shaving. Fig. 6 shows the contact impression. Profile refinement and correction of the tooth spacing is excellent but shaving should not be expected to correct any appreciable errors in the helical trace.

These large gears are lapped for a short period after shaving in order to get 100 per cent bearing and the desired intimate contact between the gear and its pinions. It has been found that dummy lapping can be completely dispensed with and the lapping time can be reduced to a fraction of that ordinarily required.

Burnishing Beneficial: The burnishing operation consists of rolling the gear with hardened and ground master gears under heavy load to smooth out surface irregularities and provide a high polish on tooth profiles. Because of the extremely wide face widths on marine gears, it it necessary to feed the narrow burnishing gear across the entire face of the work while the teeth are in mesh.

This is done by the special burnishing machine. Load is applied to the meshing teeth by weights through a compound system of levers. The work gear is driven and in turn, drives the mating master burnishing gears and the entire mechanism traverses across the face of the work gear.

A high finish is imparted to the profiles. This and the superfical workhardening increases resistances to scuffing and pitting. The process of rolling sets up compression stresses in the surface and, since this is in opposite direction to the tensile surface stresses, the critical stress for a given load is correspondingly reduced.

Machining Housing: It is essential that the boring of the gear frame be extremely accurate in both horizontal and vertical planes since any variation will affect the load carrying ability and adversely influence the noise level.

Either multiple or individual boring bar setups may be used to advantage. In the former, accuracy of centers is insured by the fact that the operator can mike between bars and all holes bored simultaneously. When large quantities are involved, high grade boring jigs with Kelly bars are justified.

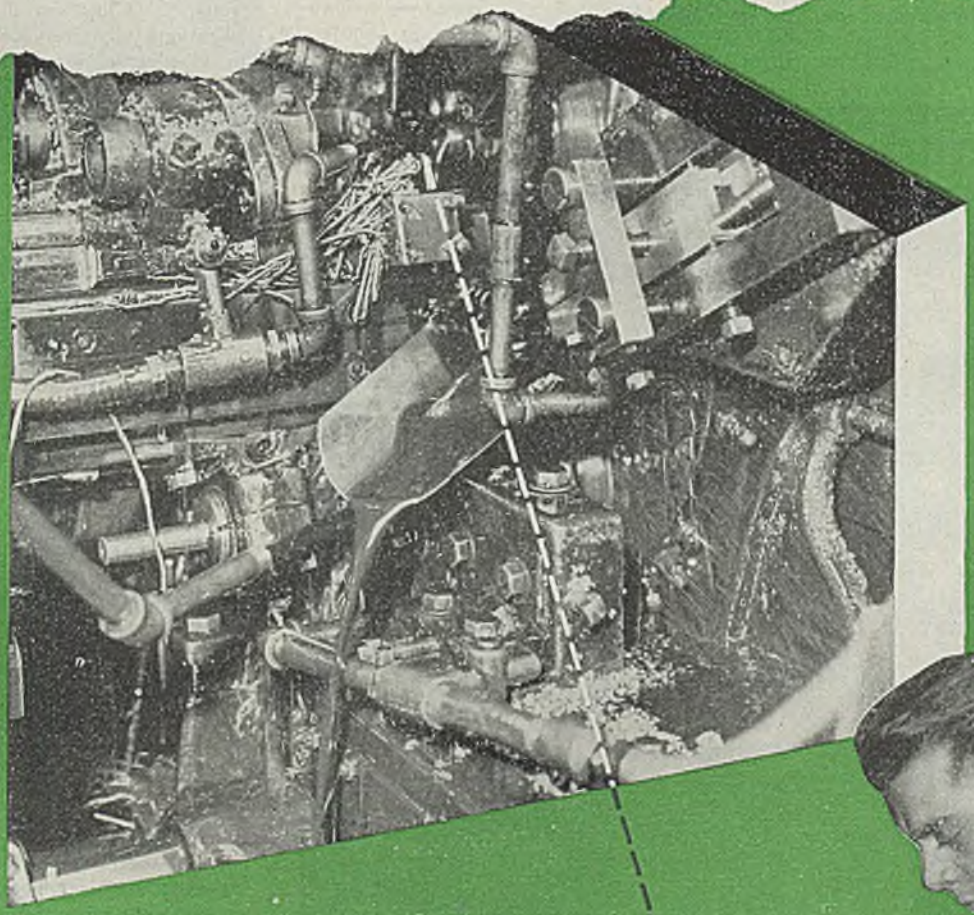
Excellent results can be obtained in boring with a single bar if the machine tool has the necessary inherent accuracy.

Machining of the parting line surfaces of gear castings must be smooth and flat since the joint must be oil tight without the use of gaskets.

Assembling and Testing: Considerable responsibility for insuring proper operation of a large gear drive falls upon

"THE PURPOSE OF ANNEALING MAY BE; (f) TO PRODUCE A DEFINITE MICROSTRUCTURE"

NATIONAL METALS HANDBOOK



The machinist working with annealed steels will omit the word "may" from that statement. The results he can obtain in his machining operations are so greatly dependent on the structure of the steel and its uniformity that he is much concerned with annealing.

Wyckoff's Structure Controlled Annealing reduces variations in machining results by maintaining a uniform satisfactory structure. The elimination of structural variations permits refinement of machining operations to improve efficiency.

ARMY E NAVY

COLD FINISHED STEEL

WYCKOFF

WYCKOFF STEEL COMPANY

First Natl. Bank Bldg., Pgh. 30, Pa. • 3200 S. Kedzie Ave., Chicago 23, Ill.

Works: AMBRIDGE, PENNA.; CHICAGO, ILL.; NEWARK, N. J.; PUTNAM, CONN.

Manufacturers of Carbon and Alloy Steels . . . Turned and Polished Shafting . . . Turned and Ground Shafting . . . Wide Flats up to 12" x 2".

COMPLETE ANNEALING AND HEAT TREATING FACILITIES

the assembly department. Balancing, final scraping, lapping, hand tapping and drilling are usually a part of their duties. Assembly mechanics must be relied upon to uncover any machining errors which may have passed inspection, but this should not be an excuse for inadequate checking in the manufacture of the component parts.

Final testing is also a function of the assembly department. Gears are blued or copperized to determine contact bearings. Revolving elements are checked for runout with indicators. Backlash is determined by running a lead wire through the mesh or by indicating the distance over which the pinion can be rocked when the gear is held stationary.

The importance of the operations alluded to above are apparent from only a superficial examination. The drive cannot deliver its rated horsepower in a satisfactory manner unless all the teeth carry their proper share of load. Undue disturbance and noise will follow if excessive axial or radial runout is present. Bearings will be cramped if checking of bores and necessary scraping are incomplete.

—o—

Plate up to 195 inches wide or 25 inches thick can be rolled on a 206-inch plate mill at Lukens Steel Co., Coatesville, Pa.

Bi-Metal Thermostats Described in Booklet

Seven types of bi-metal thermostats, designed for safe, accurate, automatic control of temperatures up to 650 degrees Fahr., are described in a new 20-page booklet available from Westinghouse Electric & Mfg. Co., P. O. Box 868, Pittsburgh 30. Thermostats described and illustrated are: 1. Built-in Watchman thermostat for aircraft equipment; instrument and bandage sterilizers, motor and wiring protection, vulcanizers, radio equipment, oil purifiers and flatirons; 2. Clostemp thermostat for applications where space is limited such as in platens, irons and vulcanizers; 3. Uni-Therm thermostat, combining close control with small size and simple, compact mounting; 4. Sentinel thermostat for roasters, water heaters, dehydrators and casseroles; 5. Guardsman thermostat, particularly designed for sealing machines, ironing machines and other low-wattage heating applications; 6. Water Heater thermostat for domestic storage type heaters; and 7. Motorguard thermostat for use on fractional and integral horsepower motors.

Characteristics and capacities of each unit are discussed and tabled for easy selection, and cross sections, curves and drawings illustrate operation and proper mounting of units.

Dynamometer Tests Rotating Parts

A new electronically controlled dynamometer for testing parts to be checked under rotating conditions has a direct current motor or generator mounted in bearings and is capable of producing necessary driving power or to absorb developed power of a prime mover.

Its frame is mounted on separate bearings, making dynamometer independent of the motor armature. In operation, frame is connected to the torque arm of a conventional scale so that pounds of pressure can be indicated. In this way, back torque is easily readable. An electronic tachometer records speed of motor rotation. Thus, elements necessary for computing horsepower developed or absorbed are available. According to Electric Products Co., 1725 Clarkstone, Cleveland, electronic units can be set over a speed range from 50 to 5000 revolutions per minute.

Electronically controlled dynamometers are said to be more accurate than manually operated dynamometers, and simpler to operate. With a few hours' training an individual can secure accurate readings. Corrections are made automatically in a fraction of cycle, or less than 1/60-second, reducing time required for checking.

Electronically controlled dynamometer can be set at a predetermined speed and is said to maintain testing conditions within approximately 2 per cent. When acting as an absorbing unit, it will maintain a back torque or load that it is ab-

sorbing with the same accuracy at a chosen level, for most conditions of speed, line voltage and temperature. Circuits necessary for accuracy are adjustable so that electronic tubes, resistors, reactors and condensers may be selected to meet requirements. Operator must be able to load up dynamometer at various speeds and to determine how much power the equipment is developing.

Palladium Catalyst Chamber Recovers Oxygen in Gases

Three palladium catalyst chambers known as Deoxo Gas Purifiers and developed by Baker & Co., 113 Astor, Newark 5, have been used during the past six months by Vacuum Tube Division of Federal Telephone and Radio Corp., Clifton, N. J. Two are being used to remove oxygen from nitrogen and one to remove oxygen from hydrogen.

Installation was part of a test of the new units as a means to reduce costs and to save time in plants requiring pure gases. According to Federal Telephone and Radio Corp., they have completely eliminated all maintenance on the deoxidizing stages of its hydrogen and nitrogen purification trains, with a net rendered impurity of less than one part per hundred thousand, limit of sensitivity of test equipment.

Aerial Tramway Carries Iron Ore

A 60-mile aerial tramway is being built in Sweden from the railroad terminal at Boliden to Yiiterberg to bring down iron ore from the Kristineberg mining district. Spans average 660 feet, according to the *Railway Gazette* of London. Heretofore, large motor trucks mounted on 16 wheels were used, but it has become difficult to replace worn tires.

An extension of the railroad was proposed, but the difficult and mountainous character of the country and the shortage of materials and equipment led to adoption of the cableway as an alternative. Capacity is to be 2 tons per hour. There will be eight driving stations, each operated by a motor of 135 horsepower. A 37-mile branch will serve the copper mines at Adok, and another branch of 25 miles will serve the Lainjour nickel mines.

Wellman Reports Progress

A pictorial record of engineering achievements of the Wellman Engineering Co., Cleveland, in creating and building steel plant equipment and machinery for handling heavy bulk materials is presented in a new 123-page book. Illustrations, 6 x 9 inches, show various types of handling bridges, buckets, steel plant cars, car dumpers, cranes, furnaces, hoists, manipulators, ore handling machinery, charging machines, coke oven machinery, etc. Several full page illustrations appear in color.

THE BUSINESS TREND

War Output Nearing Projected Schedules

MUNITIONS production has leveled off at slightly above a $5 billion monthly rate. This is moderately below the peak level of about $5.7 billion recorded in March last year. However, encouraging progress has been made in bringing lagging war programs up to schedule, and there are indications that the overall output of war goods is approaching the sharply augmented production schedules established earlier this year.

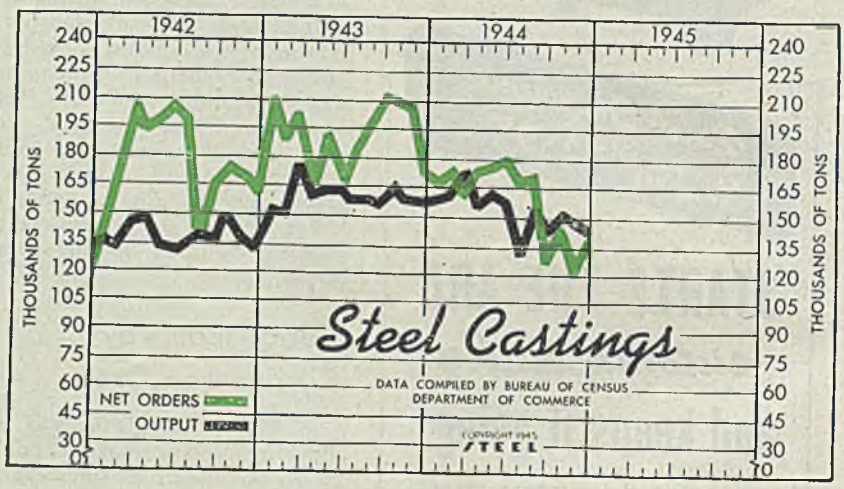
The national steel rate currently is slightly below 95 per cent of capacity, compared with 99 per cent this time a year ago, due primarily to shortage of coking coal resulting from strikes at a number of mines. Electric power consumption is also below that recorded in the like period a year ago. Engineering construction awards are practically unchanged from a year ago, while revenue freight carloadings are moderately above this time last year. Freight traffic throughout the second quarter is expected to exceed the like 1944 period total by a slight margin.

WAR EXPENDITURES—March war expenditures, excluding net Reconstruction Finance Corp.'s loans, registered a substantial increase to a new monthly record of $8,246 million, as preparations for stepping up the Pacific war were combined with accelerated operations in Europe. Last month's war expenditures were 5 per cent above the previous peak reached in May, 1944, and 7 per cent greater than in the like 1944 month. If war costs continue their monthly upward course, they will exceed the $88 billion estimated by the Budget Bureau.

STEEL FORGINGS—January shipments of steel forgings established a new high of 416,585 short tons, a gain of 11 per cent over December's output and 17 per cent above that recorded in the like 1944 month. Shipments of drop and upset forgings amounted to 244,357 tons, or 59 per cent of the total; open hammer and press forgings made up the remainder. Steel consumed in the production of steel forgings during January amounted to 555,992 tons.

Unfilled orders Jan. 31 last amounted to 2,722,619 tons, 13 per cent higher than at the close of the preceding month and 21 per cent above that reported on the same date last year.

EMPLOYMENT—February employment in manufacturing industries totaled 15,537,000, according to a preliminary estimate of the United States Department of Commerce. This represents a decline of about 1.2 million from that reported for the like month last year. The sharp downward trend in employment for this group has leveled off in recent months, reflecting renewed effort to step up production in the lagging war programs.



Commercial Steel Castings

(Net tons in thousands)

	1944 Orders	1943 Orders	1942 Orders	1944 Production	1943 Production	1942 Production
Jan.	167.7	213.1	150.6	159.8	154.7	134.8
Feb.	173.6	191.2	179.9	161.4	151.5	133.7
Mar.	162.6	202.7	211.1	174.6	176.5	146.5
Apr.	175.1	165.8	191.2	155.8	161.4	149.6
May	177.0	192.5	199.6	161.8	163.8	131.5
June	181.5	171.8	208.9	157.4	163.9	132.1
July	169.9	187.3	202.3	131.9	158.8	135.7
Aug.	171.3	200.6	141.2	154.9	158.8	139.2
Sept.	129.8	214.1	177.5	144.5	157.8	139.8
Oct.	146.1	211.3	179.5	150.8	163.9	152.1
Nov.	120.7	209.3	173.3	146.4	158.8	140.4
Dec.	138.7	173.6	172.3	144.2	158.6	143 9
Monthly Average	159.5	194.4	182.3	153.6	160.7	139.9

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	96.5	97.0	95.0	99.5
Electric Power Distributed (million kilowatt hours)	4,322	4,329	4,446	4,361
Bituminous Coal Production (daily av.—1000 tons)	2,017	1,967	1,892	1,954
Petroleum Production (daily av.—1000 bbls.)	4,784	4,783	4,768	4,416
Construction Volume (ENR—unit $1,000,000)	$33.7	$37.3	$41.9	$34.0
Automobile and Truck Output (Ward's—number units)	20,645	20,335	20,235	17,875

*Dates on request.

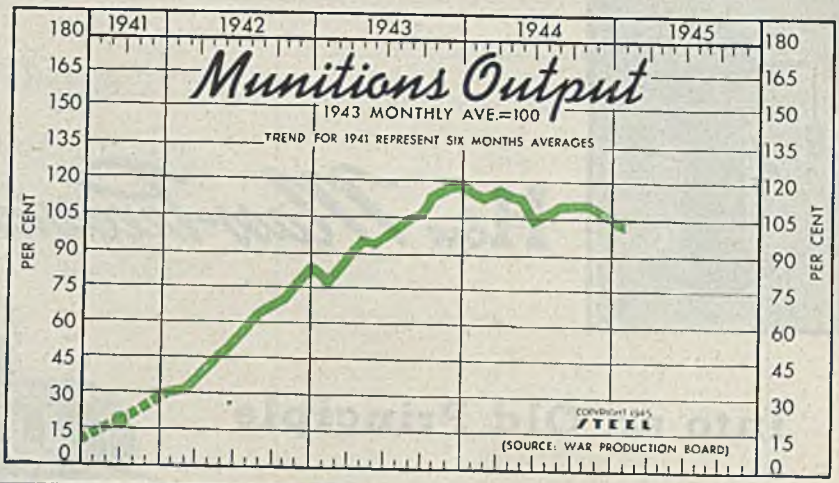
TRADE				
Freight Carloadings (unit—1000 cars)	830†	835	766	789
Business Failures (Dun & Bradstreet, number)	23	28	21	37
Money in Circulation (in millions of dollars)‡	$25,865	$25,834	$25,864	$21,191
Department Store Sales (change from like week a year ago)‡	+24%	+24%	+21%	+17%

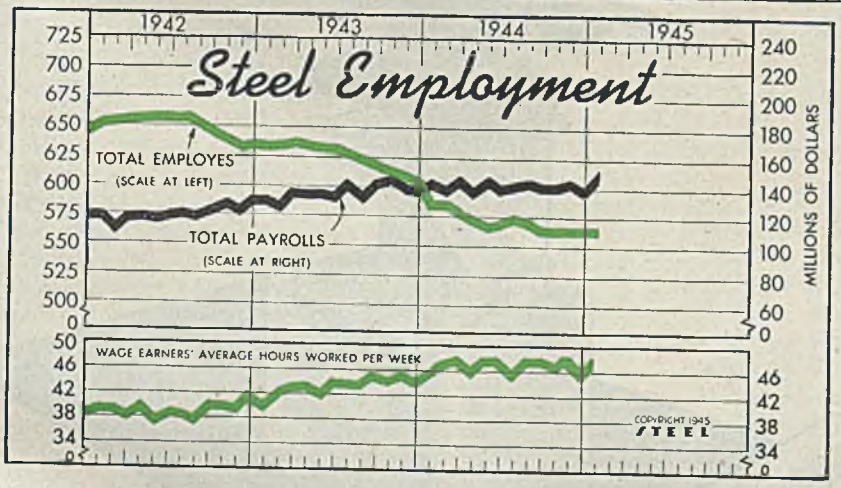
†Preliminary. ‡Federal Reserve Board.

WPB's Munitions Output Index

(Ave. Month, 1943 = 100)

	1940	1941	1942	1943	1944	1945
Jan.			29	79	112	103
Feb.			31	82	111	...
March			36	90	115	...
April		12	43	97	111	...
May			48	95	111	...
June			53	97	104	...
July			59	101	106	...
Aug.			66	105	108	...
Sept.			69	106	108	...
Oct.	6	17	70	114	108	...
Nov.			78	117	106	...
Dec.			85	117	105	...





Steel Employment

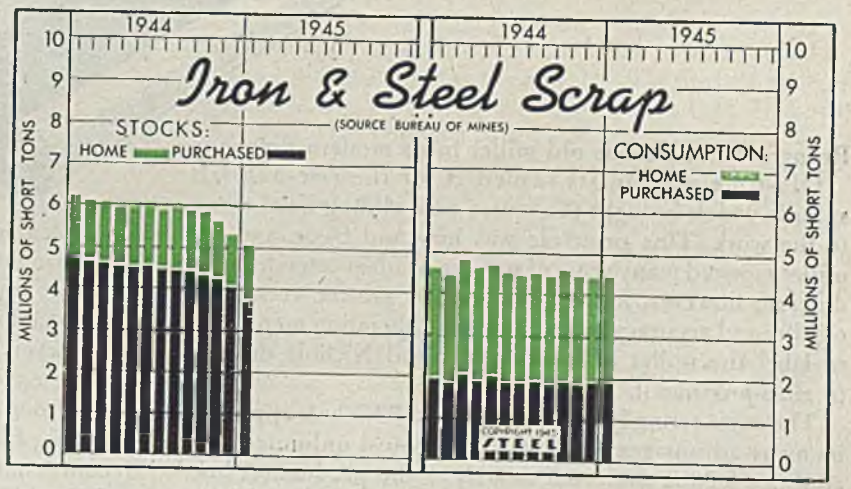
	Employes (000 omitted)			Total Payrolls (Unit—$1,000,000)		
	1945	1944†	1943	1945	1944	1943
Jan	564	583	637	$150.3	$141.8	$129.7
Feb.	...	583	635	....	137.6	122.8
March	...	578	637	....	145.3	136.8
April	...	573	634	....	138.9	133.3
May	...	569	632	....	145.4	137.4
June	...	570	631	....	140.5	136.2
July	...	571	627	....	141.7	142.8
Aug.	...	569	625	....	143.9	139.9
Sept.	...	565	620	....	142.2	143.8
Oct.	...	564	615	....	147.7	144.9
Nov.	...	564	611	....	143.1	141.5
Dec.	...	564	605	....	139.9	140.2

†Monthly average; previous reports showed total number regardless of whether they worked one day or full month.

Iron and Steel Scrap Bureau of Mines

(Gross Tons—000 omitted)

	Stocks Consumers,		Consumption Total	
	1945	1944	1945	1944
Jan.	5,023	6,214	4,507	4,616
Feb.	.....	6,134	.....	4,414
Mar.	.....	6,027	.....	4,827
Apr.	.....	5,932	.....	4,629
May	.....	5,966	.....	4,683
June	.....	5,991	.....	4,460
July	.....	5,909	.....	4,423
Aug.	.....	5,975	.....	4,533
Sept.	.....	5,953	.....	4,471
Oct.	.....	5,832	.....	4,684
Nov.	.....	5,624	.....	4,527
Dec.	.....	5,335	.....	4,487
Mo. Ave.	.....	5,908	.....	4,563



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet)—millions	$10,178	$10,748	$10,929	$9,618
Federal Gross Debt (billions)	$235.0	$234.7	$235.0	$184.5
Bond Volume, NYSE (millions)	$38.5	$30.3	$53.3	$38.4
Stocks Sales, NYSE (thousands)	3,560	4,197	8,966	3,160
Loans and Investments (millions)†	$57,797	$58,071	$58,501	$52,012
United States Gov't. Obligations Held (millions)†	$15,111	$15,016	$43,912	$13,757

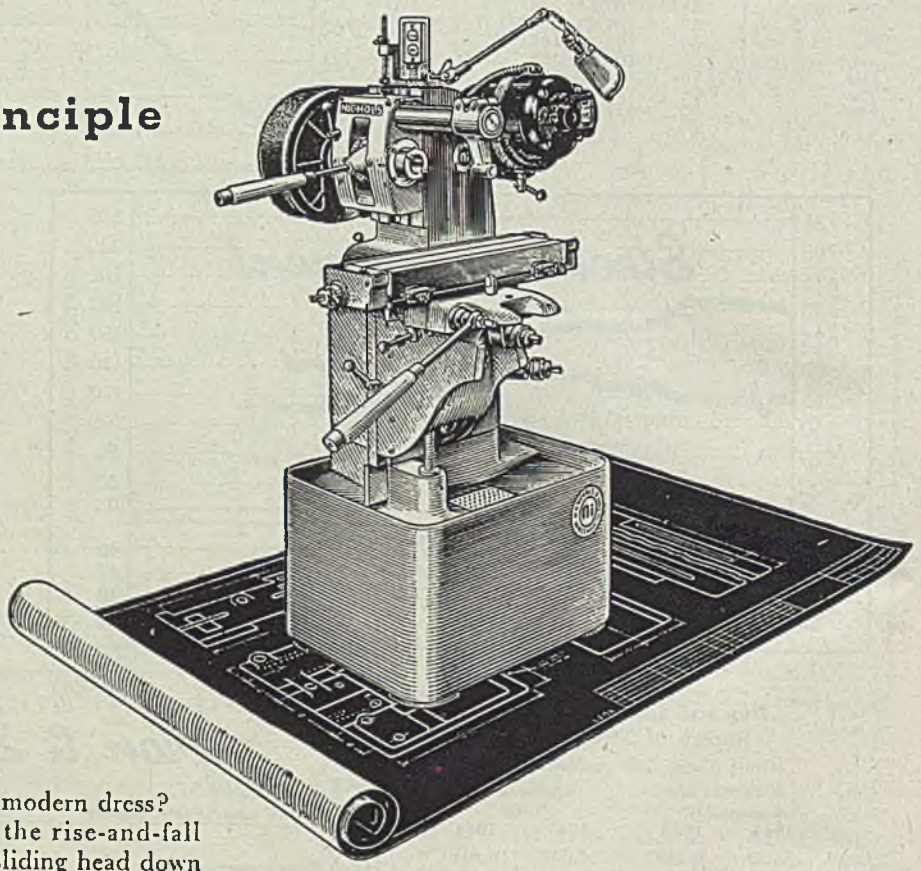
†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$57.55	$56.73
All Commodities†	105.1	105.1	105.0	103.6
Industrial Raw Materials†	116.2	116.0	116.2	113.5
Manufactured Products†	101.9	101.8	101.6	100.7

†Bureau of Labor's Index. 1926 = 100.

How *Mass-Precision* put New Purpose into an Old Principle



Recognize this famous old miller in its modern dress?

Old-time machinists valued it for the rise-and-fall spindle which brought the cutter on a sliding head down to the work. This principle was new and basic, and the miller enjoyed many years of success. With accelerated production, however, industry demanded greater versatility, rigidity and accuracy in its machines. Operating men began to label the miller a "has-been"...until Nichols decided to *mass-precision* it.

The engineering insight of "Accurate" Nichols appraised its many advantages and foresaw its almost unlimited possibilities for the toolroom as well as the production line. Thorough redesign gave it new purpose and precision manufacture gave it the accuracy necessary to keep pace with mass-production "musts."

You'd hardly know the old miller now. The spindle is hardened and is equipped with roller or ball-bearings. Solid gibs, box-type saddle and head, counter-balanced motor drive and rapid-action rack and pinion saddle motion have been added...all merged into a compact, multi-purpose machine tool.

Today you can see it performing dozens of different high-speed machining operations on production lines and toolrooms everywhere...*to tolerances in "tenths."*

Your engineering and production problems may be far afield from machine tools, but Nichols' ability and manufacturing facilities may put *new purpose* into one of your reconversion blueprints.

Nichols-built products draw upon the most advanced manufacturing techniques and facilities, including lapping, grinding, hole locating and sizing, plus precision testing methods to affirm their accuracy.

Put your problem up to "Accurate Nichols."

W. H. NICHOLS & SONS, 48 WOERD AVENUE, WALTHAM 54, MASS.

"Accurate" *Nichols*

PRECISION ENGINEERING AND MANUFACTURING FACILITIES FOR MASS-PRODUCTION

Changing War Steel Needs Promise Sharp Adjustments

Pressure on mills not expected to ease for weeks . . . Prompt delivery still a problem . . . March ingot output near record

SUBSTANTIAL readjustment in steel mill schedules is considered likely before the end of this quarter and further cutbacks in the 1945 munitions program, the latest bearing particularly on shells and combat tanks, are expected to be followed soon by additional curtailments as organized military resistance in Europe continues to crumble.

Readjustments are not expected necessarily to lead to pronounced reduction in steelmaking operations during this quarter, as it is apparent that ample tonnage will be available for as early rolling as possible for at least several weeks.

Actual cancellations in second quarter tonnage as a result of recently announced cutbacks in the shell program are not expected to be heavy. It is pointed out that while the curtailment amounts to about 10 per cent of the overall shell program for this year, it represents approximately a leveling off at current levels. Effects should be more noticeably felt by steel producers later in the year.

During the past week there has been a general overall easing in orders, not a sharp letdown but a noticeable drop. This applied even to sheets, which have been under such heavy demand this year. Much of the general easing may be ascribed to the huge wave of buying early in the year, followed by a second wave last month. Demand continues for tonnage for early delivery, which cannot be translated into orders without directives, which are now issued less often. At the same time there is less interest in forward commitments as events may change the picture before many of these late deliveries can be made.

Curtailment of 10 per cent in the 1945 shell program announced a few days ago resulted in almost immediate cancellations for steel for heavy hydraulic presses and other shellmaking equipment, as shell lines not scheduled for early operation were dropped. A similar reflection was noted in connection with the cancellation of certain tank plants now under construction. Cutbacks in some types of shells now under production, as well as in fuzes and other components for other types of shells have an effect on mill schedules.

Due mainly to effects of the coal strike situation steelmaking last week declined 2 points to 94½ per cent of capacity. Cincinnati was the only district making a gain, recovering 3 points to 89 per cent from the effects of the recent flood. Chicago declined 2½ points to 98½ per cent, Youngstown 2 points to 91, Pittsburgh 3 points to 88½, eastern Pennsylvania 1 point to 94 and Cleveland 5 points to 88½. In other districts production was unchanged as follows: New England 90; St. Louis 80; Buffalo 90½; Wheeling 93½; Detroit 90; Birmingham 95.

Recovering from the handicaps of earlier months but still suffering from lack of workers the steel industry in March produced steel ingots at the third highest rate on record. Output was 7,724,756 net tons, exceeded only by March, 1944, with 7,820,226 tons and October, 1943, with 7,814,117 tons. In spite of this showing first quarter fell more than a million tons short of the initial quarter last year, producing 21,581,859 tons, against 22,595,283 tons shipped in that period in 1944.

Shipments of finished steel by the United States Steel Corp. in March showed an increase of 307,154 tons over February, with deliveries of 1,869,642 tons, but fell 5125 tons below March, 1944. For first quarter shipments totaled 5,001,245 tons, a decrease of 360,109 tons from the same period last year, due to difficulties during the first two months, cold weather and transportation delays as well as shortage of manpower cutting into production severely in January and February.

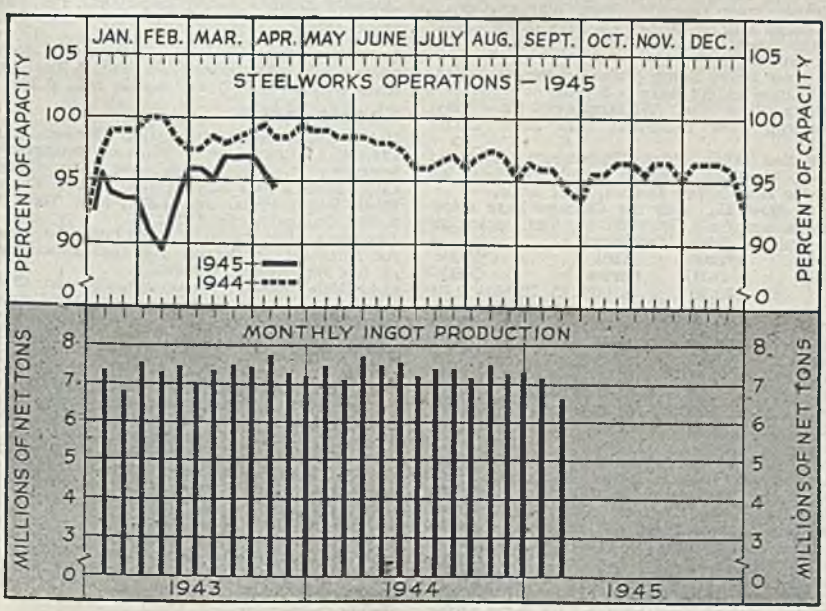
With steel and iron products holding at unchanged ceiling prices average composite prices show no change. Finished steel composite is $57.55, semifinished steel $36, steelmaking pig iron $24.05 and steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Apr. 14	Change	Same Week 1944	Same Week 1943
Pittsburgh	88.5	—3	93.5	98.5
Chicago	98.5	—2.5	100.5	100.5
Eastern Pa.	94	—1	95	94
Youngstown	91	—2	94	97
Wheeling	93.5	None	94.5	93
Cleveland	88.5	—5	92.5	92
Buffalo	90.5	None	90.5	90.5
Birmingham	95	None	95	100
New England	90	None	89	100
Cincinnati	89	+3	87	93
St. Louis	80	None	80	93
Detroit	90	None	88	96
Estimated national rate	94.5	—2	°98.5	°99

°Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	April 14	April 7	Mar. 31	One Month Ago Mar., 1945	Three Months Ago Jan., 1945	One Year Ago Apr., 1944	Five Years Ago Apr., 1940
Finished Steel	$57.55	$57.55	$57.55	$57.55	$57.35	$56.73	$56.08
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	23.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	16.10

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	April 14, 1945	Mar. 1945	Jan. 1945	Apr. 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.20	2.20	2.15	2.10
Plates, Philadelphia	2.25	2.25	2.225	2.15
Plates, Chicago	2.20	2.20	2.18	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.15	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.65	3.61	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.18	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.65	3.61	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.80	2.70	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Finished Material	April 14, 1945	Mar. 1945	Jan. 1945	Apr. 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$25.19	$25.19
Basic, Valley	24.50	24.50	23.50	23.50
Basic, eastern del. Philadelphia	26.34	26.34	25.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	24.69	24.69
No. 2 foundry, Chicago	25.00	25.00	24.00	24.00
Southern No. 2, Birmingham	21.38	21.38	20.38	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	24.30	24.30
No. 2 fdry., del. Phila.	26.34	26.34	25.84	25.84
Malleable, valley	25.00	25.00	24.00	24.00
Malleable, Chicago	25.00	25.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$19.75	$20.00
Heavy Melt, steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	16.70	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill; Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives, Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill, Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. Ports).

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. Ports, $52.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lbs., $2. Do., over ⅜—41-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific Ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c. (Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6 40c	5.75c
Transformer			
.2	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05

Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c

Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c

Woven fence, 15½ gage and heavier, per base column ..... .67c

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base, Standard spikes, 3.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	.....	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅝ and ¾ x 6-in. and shorter ... 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 50 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
⅞-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ... $2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace *7.00
Connellsville, foundry 7.50- 8.00
Connellsville, prem. fdry. 7.75- 8.10
New River, foundry 8.50- 8.75
Wise county, foundry 7.25- 7.75

By-Product Foundry

Wise county, furnace 6.75- 7.25
Kearney, N. J., ovens 12.65
Chicago, outside delivered 12.60
Chicago, delivered 13.35
Terre Haute, delivered 13.10
Milwaukee, ovens 13.35
New England, delivered 14.25
St. Louis, delivered ..... †13.35
Birmingham, delivered 10.50
Indianapolis, delivered 13.10
Cincinnati, delivered 12.85
Cleveland, delivered 12.80
Buffalo, delivered 13.00
Detroit, delivered 13.35
Philadelphia, delivered 12.88

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol 15.00c
Toluol, two degree 28.00c
Solvent naphtha 27.00c
Industrial xylol 27.00c

Per lb. f.o.b. works

Phenol (car lots, returnable drums) 12.50c
Do., less than car lots 13.25c
Do., tank cars 11.50c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls., to jobbers 8.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8000 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	4.012[1]	5.727[1]	3.874[1]	4.106[1]	5.106[1]	5.374[14]	4.744[14]	4.144[21]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.705[1]	5.272[1]	3.618[1]	3.922[1]	4.272[1]	5.168[15]	4.872[25]	4.072[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.694[1]	5.252[1]	3.494[1]	3.902[1]	4.252[1]	5.044[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.896[1]	5.341[1]	3.696[1]	4.041[1]	4.391[1]	5.346[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	4.071[1]	5.465[1]	3.871[1]	4.165[1]	4.515[1]	5.521[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.73[1]	5.26[1]	3.45[1]	3.819[1]	3.819[1]	4.90[15]	4.40[10]	3.75[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.81[1]	3.50[1]	4.80[15]	4.30[10]	3.65[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.50[1]	5.00[1]	3.45[1]	3.60[1]	3.60[1]	4.90[13]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.50[1]	3.50[1]	4.80[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.50[1]	5.188[1]	3.45[1]	3.60[1]	3.60[1]	5.027[13]	4.40[24]	3.75[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.40[1]	.....	3.35[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.709[1]	5.281[1]	3.550[1]	3.700[1]	3.700[1]	5.15[13]	4.500[24]	3.800[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.265[1]	5.765[1]	3.965[1]	4.215[1]	4.215[1]	5.758[13]	5.443[24]	4.443[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.165[1]	5.665[1]	3.865[1]	4.115[1]	4.115[1]	5.658[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.761[1]	5.291[1]	3.525[1]	3.675[1]	3.675[1]	4.975[12]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.55[12]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.35[1]	3.50[1]	3.50[1]	4.80[15]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.65[1]	5.15[1]	3.35[1]	3.60[1]	3.60[1]	5.381[15]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.787[1]	5.287[1]	3.487[1]	3.737[1]	3.737[1]	5.422[15]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.73[1]	5.23[1]	3.618[1]	3.768[1]	3.768[1]	5.068[15]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[3]	3.81[3]	3.91[3]	5.41[3]	3.61[3]	3.86[3]	3.86[3]	5.407[15]	4.46[24]	4.361[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.797[1]	5.297[1]	3.497[1]	3.747[1]	3.747[1]	5.322[15]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	4.015[5]	4.065[5]	4.165[5]	5.78[5]	4.065[5]	4.215[5]	4.215[5]	5.415[13]	4.78[24]	4.38[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.65[1]	5.903[1]	3.55[1]	3.70[1]	3.70[1]	4.90[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	4.00[4]	5.85[4]	4.158[4]	4.20[4]	4.20[4]	5.40[26]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.35[3]	5.50[3]	3.863[3]	4.313[3]	4.313[3]	5.463[15]	4.10[10]	3.65[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	5.05[4]	7.20[4]	5.10[4]	4.95[4]	6.75[4]	6.15[12]	7.20[6]	5.583[30]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.75[7]	6.35[7]	4.65[7]	4.50[7]	5.75[7]	6.50[15]	7.30[13]	5.333[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.85[27]	6.50[27]	4.75[27]	4.75[27]	6.30[27]	5.90[15]	6.60[13]	5.533[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.85[6]	6.50[6]	4.75[6]	4.25[6]	5.45[6]	6.10[15]	7.05[15]	5.783[21]	.....	.....	8.00[23]
Seattle	4.35[6]	4.45[6]	4.85[6]	6.50[6]	4.75[6]	4.25[6]	5.45[6]	6.10[15]	7.60[13]	5.783[21]	.....	.....	8.00[23]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles. [19]—100 to 749 pounds; [20]300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70 .90	.35-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del	2715	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	....		$30.50
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $24.50
Valley base 24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Myrtle Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $66.55

First Quality

Pa., Ill., Md., Mo., Ky. 52.85
Alabama, Georgia 52.85
New Jersey 57.70
Ohio 46.95

Second Quality

Pa., Ill., Md., Mo., Ky. 47.90
Alabama, Georgia 39.15
New Jersey 50.50
Ohio 37.10

Malleable Bung Brick

All bases 61.65

Silica Brick

Pennsylvania 52.65
Joliet, E. Chicago 60.65
Birmingham, Ala. 54.65

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press 31.95
Wire cut 29.90

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick $54.00
Chem. bonded chrome 54.00
Magnesite brick 76.00
Chem. bonded magnesite 65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c. 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir 5-7%, tit. 9-11% and boron 0.53-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.908 and $2.028 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9126, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309, Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight alloyed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l. and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for silicon, bulk, c.l., 5.80c, 2000 lbs. to 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder; spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. F.O.B. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ½c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ½ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N.Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Boroal: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Machine Shop Turnings	13.75
Mixed Borings, Turnings	13.75
Shoveling Turnings	15.75
No. 2 Busheling	15.50
Billet, Forge Crops	21.25
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turning	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	11.50-12.00
Short Shovel Turnings	13.50-14.00
Mixed Borings, Turnings	11.50-12.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	12.50-13.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06*
No. 2 Heavy Melt. Steel	14.06*
No. 1 Bundles	14.06*
No. 2 Bundles	14.06*
No. 1 Busheling	14.06*
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel, Turnings	11.06*
Chemical Borings	13.06*
Low Phos. Clippings	16.56*
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

*Inland base ceiling; Boston switching district price 99 cents higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Mach. Shop Turnings	14.00
Short Shovel, Turnings	16.00
Mixed Borings, Turnings	14.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	14.00-14.50
Cast Iron Borings	13.00-13.50
Machine Shop Turnings	12.00-12.50
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-12.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	16.25-16.75
No. 3 Galv. Bundles	14.25-14.75
Machine Turnings	9.00- 9.50
Mix. Borings, Sht. Turn	9.50-10.00
Short Shovel Turnings	10.00-10.50
Cast Iron Borings	9.50-10.00
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	13.00
Short Shovel, Turnings	15.00
Mixed Borings, Turn.	13.00
Cast Iron Borings	14.00
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	9.00- 9.50
Cast Iron Borings	10.00-10.50
Short Turnings	11.00-11.50
Low Phos Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	7.00- 8.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

LOGEMANN
Presses for Sheet Scrap

THE NATION NEEDS YOUR SHEET SCRAP!

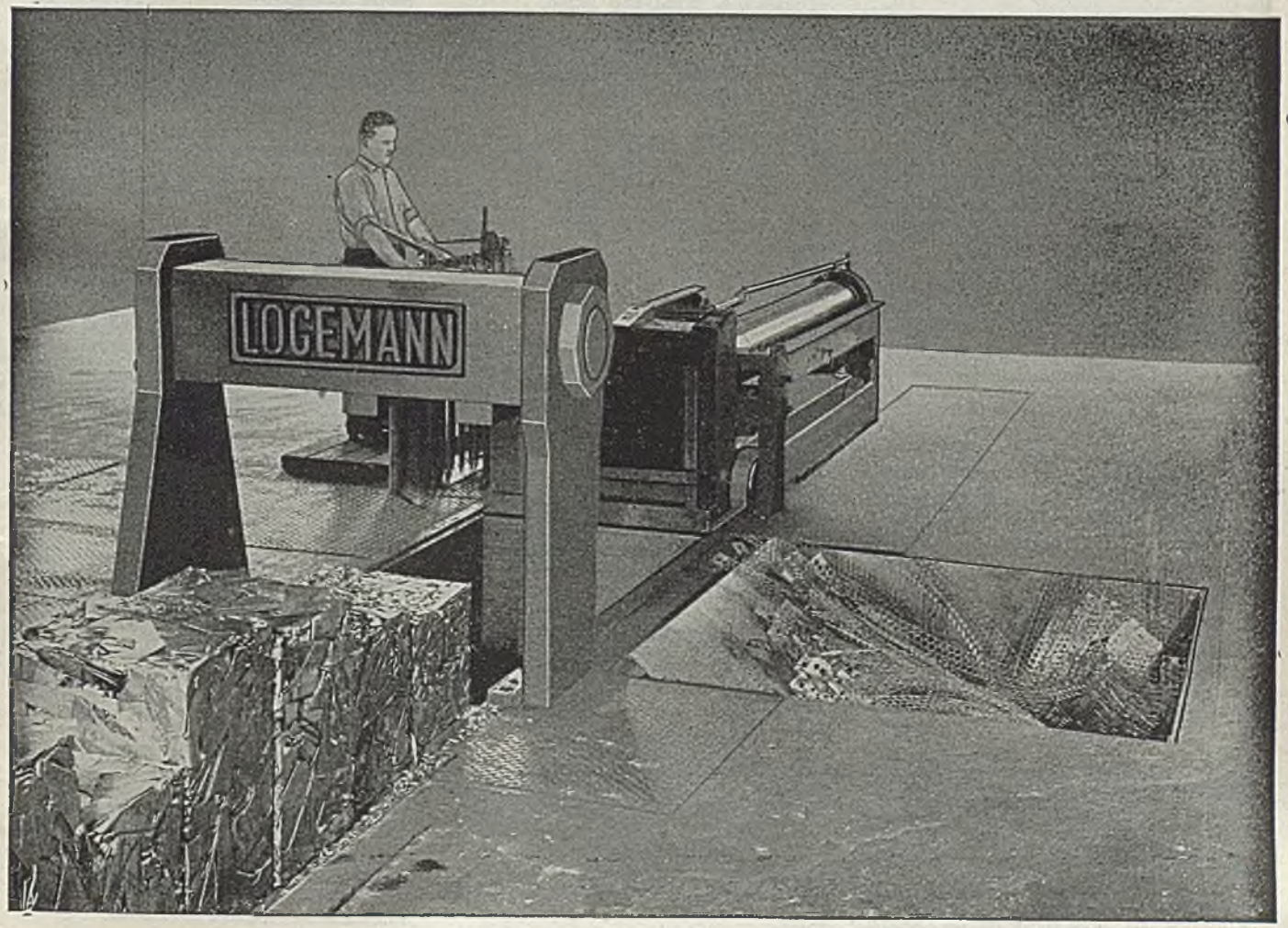
In mills, industrial plants and scrap yards, LOGEMANN SCRAP PRESSES are working day and night to prepare sheet scrap for the furnaces.

Sheet mills particularly recognize the value of the years of experience and the performance records which back up LOGEMANN designs and workmanship.

The line includes scrap presses *designed for mill Service,* presses *designed for automobile plant conditions,* presses *designed for general plant applications.* Write for details.

The scrap press illustrated operates in one of the largest industrial plants. Compresses scrap from three directions to produce high-density mill size bundles. Built in various capacities.

LOGEMANN BROTHERS COMPANY
3126 W. Burleigh St. **Milwaukee, Wisconsin**



NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05% max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $161 to $165 in smaller quantities

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.80c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more: New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 180

Sheet buying is slower, though pressure for nearby delivery is still strong, and mills are unable to accommodate it except under directives. As a result little new tonnage is being placed, delivery promises being in November for plain hot-rolled, with hot-rolled pickled and cold-rolled in December and January. Sheets for shell containers and incendiary bombs are in demand as fabcators are pressed for delivery of these components.

Chicago — Demand for sheets for shell containers and incendiary bombs continues under great pressure as manufacturers of these items are pushed for deliveries. Indicative of this is instance of a toymaker now making incendiary bombs and just having its contract tripled. A district landing mat maker, who recently had its contract reinstated, was unable to get coverage on 10,000 tons of 10-gage hot-rolled sheets from usual source for May, June and July delivery, but arrangements have been made for another local mill and a Detroit producer to furnish. April needs of 2000 tons had previously been arranged by directive on the first mentioned mill. Manufacturers of less essential items, such as stoves, unit heaters and certain farm implements have been told by WPB to make their steel inventories go as far as possible.

New York — An appreciable slowing up in sheet business is noted here. Considerable interest prevails for nearby shipments, which mills cannot handle without a directive, and as directives are now being issued conservatively by Washington, relatively little demand is being translated into actual business. There is still some future buying, but inasmuch as deliveries are so far extended, it is not mounting up to a recent volume.

Some consumers complain of inability to obtain shipments in third quarter, asserting that they only now are being granted allocations. This appears to be the case particularly in connection with Marine Commission work.

While orders here are tapering, mill shipments continue to become somewhat more extended, indicating a higher level of activity in some other sections. However, there appears to be somewhat of an overall easing for backlogs are not mounting as rapidly.

In general deliveries on hot-rolled pickled and cold-rolled sheets fall in December and January of next year, with plain hot-rolled shipments quoted for November in most instances, with still a little available in October.

The situation in silicon sheets is highly mixed, with producers quoting all the way from September well into next year, depending upon grades. Deliveries on low silicon sheets, used for fractional horsepower motors and similar equipment, appear most extended. However, less capacity is being devoted to the very low silicon grades. Although shipments on high silicon sheets can still be had late in third quarter, there is considerable pressure for these sheets for radar and portable communications equipment for the armed forces, with a result that some directives have recently been issued.

Boston — Narrow cold strip deliveries, both high and low-carbon, in September represent an improvement with some mills, although no general progress is being made toward reducing backlogs and cutbacks are limited. Hot-rolled strip is relatively more extended beyond commitments to rerollers and ranges into first quarter next year. Sheet buying is slower but spotted with emergency tonnage, including one directive for cold-rolled for delivery in May and June, for chemical bombs, moved forward from fourth quarter. While limited hot-rolled carbon sheet tonnage is available in September, most mills are in October and beyond on both hot and cold-rolled. Consumption holds and there are few cutbacks. For shell containers one fabricator is taking delivery on about 250,000 small heads, 14 gage, from the Youngstown district, in addition to heavy cold-rolled sheet tonnage.

Some mills are booked for the remainder of the year on hot-rolled pickled and an order directing warehouses to take 50 per cent of second quarter in plain hot-rolled, specifying revisions within ten days, subject to canceling, is causing cancellations among some distributors of specialties. This has been a minor factor as a whole in this area but shipments of cold-rolled to jobbers are also held more strictly to directives. Silicon sheet schedules are tightening. Additional wide strip mill capacity from easing plate demand is not yet materially reflected in improved sheet deliveries.

Cincinnati — Steady pressure con-

tinues for sheet deliveries even though tonnage recently stored because of transportation difficulties has been shipped. The tight situation is partly reflected in the carryover of about one month's production. Directives have diminished but suggested means to relieve the overload have not yet proved effective. No cutbacks which might be traced to the situation in Europe have appeared.

St. Louis — Pressure for sheets and strip continues heavy with the year's capacity booked. Production is increasing slightly as labor conditions improve. Directives still are a handicap. Substantial V-E cutbacks are expected and mills with tin plate capacity plan quick changeover to meet anticipated heavy demand. Sheet cancellations this year are not expected to be more than enough to advance deliveries two months. Decline in plate needs may release considerable capacity to sheets.

Cleveland — The few openings occasionally occurring in mill rolling schedules are filled quicky. Heavy demand is noted for electrical sheets, with some interests booked through the year. Delivery promises on stainless sheets are also lengthening, into September in a few instances. Most sellers quote hot-rolled pickled sheets for November and December. However, overall sheet steel orders have eased somewhat. Some sellers report slight headway made against the exceptionally large carryover tonnage, which in a few instances represented almost 30 days' output at the close of last month.

Pittsburgh — Buying on military sheet needs has apparently reached a plateau and some sources in the industry believe this represents the peak and the likelihood is that new buying will be somewhat less and there may be cancellations. Best available information at the moment is limited to rumors but they are based on the new army thinking which has resulted in substantial reduction in future ordnance programs. Some producers anticipate gaps in sheet schedules by third quarter. There is little chance of any large change in second quarter schedules on new sheet items.

Philadelphia — Sheet schedules are becoming less rapidly extended, except in the case of stainless sheets, on which some producers are now moving into fourth quarter. Demand for rocket and jet propulsion programs contribute particularly to heavy backlogs in stainless, it is claimed. Hot-rolled pickled and cold-rolled sheets are generally available in December and January and plain hot-rolled in October and November. Galvanized can be had early in fourth quarter, although some producers have long since been booked for the entire year.

Steel Bars . . .

Bar Prices, Page 180

Expected revisions in shell and other munitions production cause barmakers to look forward to some easing in the present tight situation. At present deliveries on current orders for carbon bars are in fourth quarter and on quality bars some makers are sold to the end of the year. Some shortening in projected ammunition production has appeared and new lines not yet in operation may be abandoned before being put in service.

New York—Despite some curtailments in specifications for light arms and ammunition, bar demand in this district continues well sustained. Bolt and nut manufacturers appear to be pressing for tonnage as hard as ever and sizable tonnages are being placed for ordnance of various descriptions. Specifications for cold-drawn bars for the rocket program are increasingly heavy, with a result that most cold drawers are sold out for the remainder of the year on larger sizes and most have little tonnage available before November on small specifications.

Indications, however, that the entire shell program may come in for a thorough shaking down in the near future, effecting especially new lines not scheduled to get into production for another two or three months, are causing trade leaders to look for easing in forward commitments. With the possible exception of rockets and one or two other types of ammunition the entire program may come in for downward revision.

At present plain carbon bars are being quoted for delivery in October and November in a number of cases, with shipment on hot top quality bars extended into next year.

Chicago—Barmakers here are experiencing greatest pressure for rocket and shell steel as manufacturers are being pushed by the armed services for production. This demand creates tightness in the whole bar line, carbon and alloy alike. There are several indications that

shell steel directive may be reduced soon but demand for other products will more than absorb the open capacity.

Boston—Approximately 50,000 tons of shell billets will be affected if cancellation follows suspension of the projected 105-mm program at Lowell, Mass., to have been produced by United Shoe Machinery Corp. Three mills were to have supplied the material, starting with June delivery. Alloy bar orders have declined and extensions in deliveries appear to have halted with some mills, notably electric furnace. Some sizes are back to September from October. Open-hearth alloys are in November with few exceptions. Carbon bars are also slower. Extended delivery with most fabricators is more of a factor than cutback cancellations to date. Reflecting some cutbacks, however, small sizes of both hot and cold-rolled carbon bars are now available in June with some producers. With the exception of marine hardware consumption is holding and heavy buying by the arsenals, notably Watertown, is active.

Offered as surplus, numerous lots of bars are appearing, 343 tons of cold-finished class B screw stock, and 200 tons of NE 8627 alloy chain rods, at Boston. Material of more standard specifications in good condition finds a market, but special stock moves slower. One 680-ton lot of standard round cold-finished rods has been taken by Moe Bros. Mfg. Co., Fort Atkinson, Wis. Some jobbers are also piecing out stock with odd lots of standard products.

St. Louis—Bar producers find pressure increasing, although reinforcing bars are easier. Capacity is booked four to five months, mainly for shell production.

Pittsburgh — Cancellation of the December shell program will affect backlog of bar tonnage for third quarter and beyond. All new shell facilities which were authorized in the December program have now been canceled, with the exception of three plants which were substantially complete and which will go into production soon. There have also been reports that some part of the current program may be reduced after the fall of Germany. This has not been denied but there has been no definite information as to types of shells to be cut back.

Cleveland — A 10 per cent reduction in the artillery ammunition program authorized last December is expected to be reflected almost immediately in reducing top-heavy mill order backlogs for large rounds, and other bar stock to a less extent. Reduction in the amount of steel allocated for production of new farm machinery for second quarter should also ease bar mill rolling schedules during the period. The industry has been allocated 195,000 tons of CMP materials for second quarter, against 256,000 used in the initial three months and 279,000 during the June quarter last year. Requirements for the aircraft, heavy truck, and railroad equipment programs remain heavy.

Steel Plates . . .

Plate Prices, Page 181

Decided easing in plate demand, as has been expected, is apparent in all markets, especially in the East. While most mills have tonnage to carry into June some are able to make May deliveries and in some cases are soliciting business for June. Maritime Commission requirements have been reduced again and the recent Navy cut has relieved some of the pressure. Most of the relief comes from dwindling shipbuilding requirements.

Chicago—Plate load continues to lessen but not to the extent here as in seaboard areas. In one instance, however, Maritime Commission requirements for June have been reduced again and this, with the recent cancellations for Navy combat ships, has created open space in June for some platemakers. At least one interest is actively soliciting business for that month. Another evidence of the improving situation for plates is the fact that WPB is abolishing warehouse plate reservations as of June 1.

New York—Some plate tonnage is still being accepted here for May delivery. However, most sellers are quoting June with some important producers out of the market entirely for the remainder of first half. Ship specifications, the backbone of the plate market, are expected to be off sharply by third quarter.

Boston—Dwindling tonnage for shipbuilding is not being replaced in other directions. Approximately 8500 tons of plates and shapes, mostly plates, to be placed by the New England Shipbuilding Corp., Portland, Me., for 12 small tankers will about end Maritime Commission tonnage for New England. The Lawley yard at Neponset has placed steel for six small tankers. Placements for Navy ships has not recovered from recent heavy cancellations in this district. Orders for a large part of these plates, notably for destroyers, had been placed

with mills. Railroad orders are slow and in one instance second quarter delivery has been deferred to October, indicating the railroads have not been consuming plates as heavily as expected. Orders are maintained by the car-building shop at Worcester, Mass., for rapid transit units and trolleys. While some third quarter tonnage has been placed against allotments, sheared plates are available for July shipment and in exceptional circumstances even June delivery is possible. However, the load on sheared mills is relatively heavier than on universal mills, with billet supply tight for the latter, with some mills. Although the program has been eased, one fabricator of Navy pontoon tonnage has contracts which will carry well into the summer. Loss of plate tonnage accounts largely for decline in mill orders from this area compared with early second quarter last year.

St. Louis—Platemakers expect a 60 per cent reduction in plate needs by July. The Maritime Commission program is near completion and reduction of the Navy program is expected to be felt here. Capacity will be diverted to sheets and to plates for repairs. Slightly better labor condition is increasing production.

Pittsburgh — Plate bookings extend solidly through second quarter for the most part, with the gaps caused by Navy cancellations now filled up by later tonnage which has been pushed ahead in the schedule. Most of the canceled tonnage was for shipment in June or later, with the result that little immediate effect has been noticed. There is a substantial volume of new plate business for miscellaneous applications which is to be shipped during second quarter. Plate for the tank program authorized in December, and to be delivered third quarter and later, has now been canceled.

Philadelphia — Eastern plate mills are booked up for virtually first half, although new orders are falling behind production, indicating an appreciable decline in third quarter operations if further cutbacks do not result in curtailment sooner.

Southern Shipbuilding & Dry Dock Co., Chester, Pa., has booked ten C-E-type cargo ships for the Netherlands, with approval of the Maritime Commission. Twenty small coastal-type cargo ships, also for the Netherlands, have been placed with the Albina Engine & Machine Works, Portland, Oreg.

Tubular Goods . . .

Tubular Goods Prices, Page 181

Boston — At least part of 25,000 tons of 14-inch seamless tubing estimated to be required for production of 500-pound bombs at two plants by Walsh Construction Co., at South Boston, Mass., and Portland, Me., has been allocated, deliveries to start in May. Room has also been found on mill schedules for large lots of seamless for mortar shells, about four-inch. Most producers are filled well through the year and some displacements have been necessary. Butt and lap-weld pipe deliveries are generally in July, with some sizes of the latter in August. Butt-weld buying is steady but lap-weld is slow. A mild flurry in cast pipe inquiry is far below normal and the district foundry continues inactive. Cast iron pipe is subject to keen competition with nonmetallic pipe in alternates.

Pittsburgh — Oil country demand is heavy and far above current authorizations. There is some hope that steel for third quarter and later will be more easily available. Rounds for seamless tubes will be in better supply as a result of lighter shell demand. Mechanical tubing demand is less but this has no effect on the immediate situation because backlogs now extend through this year in most cases. Galvanized pipe shipments are lighter and standard pipe demand in the secondary market is steady.

Rails, Cars . . .

Track Material Prices, Page 181

New York—Inquiries will be brought out shortly for 30,000 freight cars for shipment to France. Purchases will be made under the auspices of the Foreign Economic Administration by the War Department. The French originally asked for 74,500 cars and it is the plan that eventually this number will be bought. However, all attention for the time being will be centered on the 30,000 cars.

A precise breakdown of the classification involved has not yet been announced, but it is believed the order will be principally box cars and gondolas and possibly a number of flat cars. The original program of 74,500 contained 37,000 box cars of 20 metric tons each, 25,000 gondolas of 20 metric tons, 7000

flat cars of 40 metric tons, 3000 tank cars and 2500 caboose cars.

An Egyptian commission arrived in this country recently and is interested in a substantial number of cars and locomotives, which Egypt is planning to finance from funds at hand. The French equipment, it is understood, will be financed by an equipment trust arrangement, with the French paying 20 per cent down upon receipt of the equipment and financing the remainder over a period of 30 years, with the United States serving as banker and with interest charges of 2% per cent per annum.

Speed in filling the French order will depend upon action of the War Production Board in making materials available.

Domestic freight car awards in March were 2500, compared with 1750 in February and 7200 in January, bringing the total for the quarter up to 11,450 cars. Further comparisons follow:

	1945	1944	1943	1942
Jan.	7,200	1,020	8,365	4,253
Feb.	1,750	13,240	350	11,725
March	2,500	6,510	1,935	4,080
April	....	4,519	1,000	2,125
May	....	1,952	870	822
June	....	1,150	50	0
July	....	795	4,190	1,025
Aug.	....	3,900	8,747	0
Sept.	....	400	6,820	1,863
Oct.	....	2,425	5,258	0
Nov.	....	1,065	870	0
Dec.	....	16,245	2,919	135
Total	....	53,221	41,355	26,028

Chicago — Steel supply for railroad car builders is improving. As result of the original cutback in domestic car building schedules to make room for critical war materials, 105,000 net tons of steel were subtracted from second quarter materials, equivalent to about 6000 cars. Since then about 35,000 tons have been returned to Office of Defense Transportation by the War Production Board, so that the total cutback has been reduced to 70,000 tons, requiring rescheduling of about 4000 cars from third to fourth quarter. The gain of about 2000 units is mainly in box cars.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 181

Chicago—Although reinforcing awards in this area last week can be counted on one hand, a number of projects are awaiting formal award. New jobs out for bid are light. Biggest award is 1375 tons for the Naval Ammunition Depot, Crane, Ind., the business going to a local supplier. Virtually all tonnage going today is for new war plants or expansions, or companies making high priority supplies.

Wire . . .

Wire Prices, Page 181

Boston — Decline in wire orders is slight, although second and third quarter allotments to some consumers have been reduced, 25 per cent in some cases. Under CMP, advance orders had been placed and some are now subject to reshuffling to meet revised tonnage. There are no changes in major tonnage for the war program under continuing directives, notably rope, tire bead and signal corps material. Indications are that rope and tire bead wire, especially the latter, will be in heavy demand indefinitely. There is expectation, however, among producers that considerable volume now in backlogs will be subject to schedule readjustments. Thus far there have been few revisions downward on major war orders and changes involving Navy orders on books are expected to be less than for the Army. There are fewer directives but considerable volume of important miscellaneous wire is seeking place on mill schedules for delivery ahead of other tonnage. While deliveries of rods to some mills have bolstered inventories, others are pressing for semi-finished.

Structural Shapes . . .

Structural Shape Prices, Page 181

Boston — Suspended contracts which had been placed in this area, one for a brass plant in Ohio and a forge shop at Lowell, Mass., involve 2200 tons of shapes with one fabricator. Material has been fabricated for the Lowell plant, 1500 tons, and shipments were to have started this week from two shops, this job having been scheduled for rush completion. Part of the steel for the Ohio extension was taken from warehouse. Awards include 1200 tons for treadway bridges, to a welding shop, and 350 tons for industrial buildings, one a laboratory extension. Demand for shipbuilding is off, with an estimated 2000 tons to be placed by a Maine yard. Plain material deliveries on most sizes are in August.

New York — Structural activity is light, with bids closed on 160 tons for

a truck shop addition for Magor Car Corp., Passaic, N. J., and on approximately 100 tons for a freight office and shed for the New York Central at Thirty-seventh street and Tenth avenue. The Navy is inquiring for about 100 tons for work at Maspeth, L. I.

Philadelphia — Deliveries on structural shapes have not yet been reflected in the reduction in the shell program. Leading shape mills still quote August, with structural activity spotty. Virtually the only important new inquiry in this district calls for 1200 tons for additional warehouse facilities at the Philadelphia Navy Yard, bids opening April 20.

Chicago — Awards and inquiries for structural shapes have been more numerous in the past few days, and represent chiefly new war plants or expansion. In one instance, 1000 tons placed for expansion at a Chicago steel mill, release will await V-E day or WPB priority. The halting of construction of tank plants, announced last week, includes one plant in this area, that of expansion of the Ordnance Steel Foundry Co., Bettendorf, Iowa, for which bids are being taken on 500 tons of shapes. With end of the European war now in sight, fabricators expect inquiry to quicken as manufacturers turn attention again to postwar production and facilities. A district mill has booked 9000 tons of sheet piling from Navy Bureau of Yards and Docks for August and September delivery.

Pig Iron . . .

Pig Iron Prices, Page 183

While there is no oversupply of pig iron, melters in general are receiving sufficient to meet needs under prevailing shortage of labor. Inventories are being built up to the 30-day limit. Shortage of foundry scrap increases the proportion of iron in the melt. In some cases producers have piled some iron but the total is not important and it probably will be shipped within a short time.

New York — While problems are still complicated by scarcity of cast scrap, most district foundries appear to be able to get enough iron to make up for deficiency in scrap and thus maintain operations at the limits set by available labor supply. There are some exceptions, but in general this is true. As for manpower, there has been little improvement over recent weeks, so that in most cases foundries have not been able to handle all of the work being offered.

Boston — More consumers are getting pig iron inventories in line with the 30-day limit. Although subject to some flexibility shipments are geared more closely to this regulation. Some melters who took no iron last month are accepting tonnage. Ratio of melt is slightly higher because of shortage of foundry scrap. Deliveries from Buffalo are heavy but overall supply is tight. The load is being carried almost entirely by merchant furnaces, with one exception. Only a limited volume of southern iron finds its way to stove shops from time to time. Heavier melt by textile mill equipment foundries is indicated. Draper Corp., Hopedale, Mass., has largely converted to normal production, with increased foundry facilities, including automatic molding equipment soon to be in operation and machine tools representing cost of more than $1 million. Other shops in this industry are on the uptrend on looms and other textile machinery.

Buffalo — With consumers apparently observing the 30-day limit, pig iron releases have tapered somewhat and one producer reports piling a small tonnage. Sellers expect accumulations to move next month, either by heavier buying or lifting of the inventory limit. Consumers would prefer to carry more iron.

Philadelphia — Recent suspension of a number of blast furnaces in the Pittsburgh district because of shortage of coal had repercussions here, for some basic consumers shut off from supply from Swedeland, Pa., where operations of one stack were suspended because of mechanical difficulties, had been relying on shipments from western Pennsylvania to fill the gap. These shipments failed to arrive. However, there has been no curtailment yet in steelmaking as a result of this failure, and with heavy melting steel moving more freely and the Swedeland furnace likely to get back in operation late this month it is possible that no important curtailment in ingot production will be necessary. Meanwhile, due particularly to aid of Buffalo furnaces, supply of foundry iron here has proved fairly adequate. One southern producer who ships to this district figures a loss of 10 per cent in April output because of suspensions due to recent coal mine strikes.

Pittsburgh — The coal strike caused a coke shortage which resulted in the banking of the equivalent of 15 blast furnaces in the Pittsburgh and Cleveland districts. No. 1 furnace, Duquesne

Works of Carnegie-Illinois Steel Corp., which has been down for repairs, was scheduled to go back into production week before last but has been held up until after the coal stoppage. The same thing is true of No. 2 furnace, Lorain Works, National Tube Company. No. 3 furnace at the Farrell Works of Carnegie-Illinois was down for three days for repairs and is back in operation. Most of the idle furnaces were banked April 5, and it is a possibility that there will be continued production loss this week until coke stocks can be restored to normal.

Cleveland — Pig iron output in this district is more than ample to meet immediate requirements, permitting some foundries to build inventories to the 30-day maximum limit set by WPB. Foundry melt has tended to increase in recent weeks, reflecting somewhat better labor supply situation and intensive efforts to meet castings requirements for the increased heavy truck program. However, on the basis of present order backlogs and plant capacity, foundries could increase output up to 30 per cent, if adequate manpower were available. Currently 11 out of 14 blast furnaces are pouring iron here, with Republic Steel Corp. banking its No. 5 unit at the Corrigan McKinney plant because of the coal shortage due to mine strikes.

Cincinnati — Pig iron, though tight, continues adequate to balance available manpower and coke. While such bottlenecks exist, foundries shun proffered castings business which would require expansion in melt. Deliveries of pig iron are better, but stocks are so low that prompt shipment is frequently urged. The proportion of northern iron coming into the district was increased slightly, representing production shifts.

Scrap . . .

Scrap Prices, Page 184

Office of Price Administration has authorized scrap dealers to charge commission of 50 cents per gross ton on materials sold at the same price at which it was purchased, even though below ceiling. Since Nov. 16 commission was allowed only on scrap bought and sold at ceilings. Other changes effective April 14 include provision for changes in specifications on railroad scrap in line with changes by the Association of American railroads; permits sale of heavy melting steel from railroad equipment demolished by a dealer on railroad property to sell at the ceiling for railroad heavy melting steel, resulting in an increase of $1 per ton over previous practice; preparation-in-transit privilege is allowed on cast iron in Zone C, which covers central and eastern areas; provisions of iron and steel scrap regulation are extetnded to cover all export scrap or scrap sold to an exporter, making domestic maximum prices applicable to all export scrap sales.

Buffalo—Scrap contracts extend into May with additional sales of about 10,000 tons at ceiling prices for steelmaking grades and unchanged prices on turnings. Unprocessed scrap is reported in plentiful supply, with insufficient labor to work it. One cargo, 5000 tons, has arrived from the Duluth area and four to six boats are expected this month with 20,000 to 25,000 tons. Dwindling reserves by a leading consumer have been aided by lake arrivals and local purchases. Prices on specialties show some easing, though ceilings continue to be paid.

St. Louis—Scrap shipments show some improvements and mills have reserves for three to four weeks, which could be increased except for tendency to hedge against possible cutbacks. Manpower shortage still limits preparation. Some mills are said to be taking no supplies from remote sources. Machine turnings still are a glut but other grades are at ceilings.

Boston — Prices bid for unprepared heavy melting steel are slightly easier. Port differentials for low phos are waived and turnings, in abundant supply, are also soft. In the main no open break has spread beyond continued weakness in turnings. Crushed turnings on long hauls are slightly below ceilings. Freight charges are a factor at shipping points. Except for good strictly No. 1 heavy melting, mill pressure for scrap has eased. More consumers are inventory-minded and production of light industrial scrap, relatively large, reflects this. At least one eastern Pennsylvania melter is reported to have canceled some orders and shippers late in getting out material have been threatened with cancellation. Ratio of alloys is high in turnings and three-way material is easy at $5. Volume of shipyard scrap continues downward with Boston Navy Yard offering 600 tons of unprepared heavy melting and 300 tons of light iron, estimated accumulation in May, with bids April 19. Borings for chemical use are at ceiling with demand absorbing supply.

Cincinnati—Scrap dealers and brokers

are pushed to meet demands of foundries, but an easier situation exists on open-hearth and blast furnace grades. There is evidence, through allocation elsewhere of material usually absorbed here, that this district is more adequately stocked than others. Prices of heavier scrap are strong at ceilings. General activity should show a seasonal upturn but is hampered by labor scarcity.

Los Angeles—With Army ordnance scrap in undisclosed quantities entering the market and mill buying static the situation shows little change. Collection and preparation are slowed by lack of labor and prices are well under ceiling and soft. Shipments to the East are less than a month ago. Turnings form the largest item in stockpiles. Heavy grades are relatively scarce but supply is adequate.

Chicago — Scrap buying continues on an even basis, with 30-day transactions prevailing. Chief demand is for heavy melting open-hearth and electric furnace grades, with prices at ceiling. Within the past two weeks blast furnace grades showed some strengthening, due largely to the fact that principal demand is from outside the territory. However, the trend appears to be downward again, holding all grades of turnings and boring well below ceiling. Machine shop turnings are $9 to $9.50. Mixed boring and turnings, and cast iron borings are $9.50 to $10 and short shoveling turnings are $10 to $10.50. Prices up to $11.50 on these items no longer are heard. The trade approves the change in OPA regulations permitting 50-cent commission on material sold for same prices as paid. It is too early to appraise effect of other changes in regulations.

Cleveland — Mills continue in the market for all good quality scrap available, despite early prospect of the end of European hostilities. Stocks at steel producers' plants are still relatively low. However, the necessity for occasional allocation of scrap to prevent temporary curtailment of ingot operations in some centers is no longer in evidence. A substantial improvement in movement of heavy melting steel to consuming points has developed in recent weeks, reflecting easing in the rail car shortage. Volume of production scrap is still heavy, consisting largely of turnings. Dealers are processing more material through yards, although manpower shortage remains chief difficulty.

Philadelphia — Heavy melting steel is coming out in increasing volume. One large consumer who recently held up shipments on turnings has now applied such action to all grades except cast, which continues scarce. Melting steel inventories are light, however, and there is little disposition on the part of most consumers to build them up. This is ascribed to the fact that supplies are more easily available and that the European war may come to an end at any time. On the other hand, some buyers are still pressing hard for scrap, with one interest drawing on turnings in the Philadelphia area for Sparrows Point. This helps to sustain turnings prices here at ceiling, although the tone of the market on this material is weak.

Pittsburgh — Instead of reducing pressure on scrap deliveries the coal strike has tightened the situation because of a drop in available supplies of pig iron and hot metal, due to blast furnace suspension. Demand for scrap for open hearths has been greater. On the other hand,

some plants have been forced to take off open hearths, which has tended in part to balance the higher percentage of scrap in the charge.

New York — While scrap is moving much more plentifully than a few weeks ago it is still well below the average for this month in other years, due particularly to shortage of labor. Easiness in turnings may lead to reduction in prices soon, according to leading trade interests.

Warehouse . . .

Warehouse Prices, Page 182

Boston — Volume of warehouse buying is slightly under the high level of last month, due partly to unbalanced inventory in alloys and cold-finished bars, notably. Outgoing volume still exceeds replacements and total stocks are affected. Distributors are well supplied in some items, including plates, but are pinched for products in best demand. Current pressure on mills is mainly directed toward better balanced stocks.

St. Louis — Warehouse inventories continue to decline, second quarter expected to be the worst of the year. Sheets, tubes and bars are especially tight and recent diversion of some structural mill capacity to shell rounds is causing pressure for shapes from stock. Increasing directives to mills are pushing warehouse orders aside.

Los Angeles — Demand for steel from warehouse shows no slackening. Receipts show slight increase but not sufficient to keep inventories balanced. Labor shortage in warehouses continues. Alloy plates and tubes are hardest to obtain. Mill delivery of galvanized sheets is slowest.

Cincinnati — Warehouses are pushed to get out orders with manpower available, the situation being due partly to effects of the river flood which brought backed-up demand. Individual orders are heavier, as mills lag in deliveries to fabricators. Conditions point to a decline in jobbers' stocks during second quarter.

Metallurgical Coke . . .

Coke Prices, Page 181

Pittsburgh — Since a high percentage of mines supplying suitable coking coal were affected by the strike, both beehive and by-product coke operations were practically down last week. One unofficial estimate placed maximum activity at 30 per cent of capacity with no possibility of normal operations before the first of this week.

Iron Ore . . .

Iron Ore Prices, Page 182

Domestic production of iron ore in February was 2,397,097 gross tons, according to the Bureau of Mines. This was 3 per cent less than in January and virtually the same as in December. Shipments in February were 1,139,434 tons, a decline of 4 per cent from January. The Lake Superior district supplied 56 per cent of the February production, a total of 1,330,804 tons. Most was stockpiled, shipments being only 52,025 tons. Lake Superior stocks increased 28 per cent and totaled 5,803,464 tons at the end of the month, compared with 7,603,656 tons a year earlier. Stocks of ore at all domestic mines Dec. 28 totaled 7,274,009 tons, an increase of 21 per cent over stocks at the end of January.

Nonferrous Metals . . .

Nonferrous Prices, Page 186

New York — Copper deliveries to brass mills next month will decline, reflecting cutbacks in small arms ammunition, although cable and wire products are expected to maintain requirements. March deliveries of copper and zinc were at an alltime record, 218,488 tons of refined copper and 94,494 tons of zinc.

Production of crude copper last month was 76,234 tons and refined 76,395 tons, indicating heavy dependence on imported metal and stockpile withdrawals. The latter situation is expected to ease somewhat in May.

Zinc demand is also showing the effect of ammunition cutbacks. Zinc shipments for first quarter totaled 269,802 tons, compared with 210,699 tons in first quarter, 1944. Slackening shipbuilding schedules are also affecting near future estimates for brass mills and inventories following recent heavy deliveries are also a factor in slower demand ahead.

With heavier importations of lead indicated, a better balance between supply and consumption is expected shortly. Consumption of refined lead approximates 70,000 tons a month. No easing of the tight tin supply is in sight and conservative regulations will remain in force indefinitely.

"Period 1" Planning Gains As V-E Day Comes Nearer

(*Continued from Page 79*)

der with the machine tool people since last autumn, but the orders have been unrated.

In line with the PEC recommendations, WPB now is working out the mechanics for allowing these orders to be included in machine tool production schedules in such a way that their production will not interfere with the production of items needed in the continued prosecution of the war.

To keep the economy of Canada in as close step as possible with the United States, WPB is planning to cut back contracts for United States account in Canadian factories at about the same rate as contracts with manufacturers in this country. This policy, Mr. Krug explains, is designed to avoid the confusion that would result if Canadian factories resumed civilian goods production before plants in this country were permitted to do so.

Congress is considering means for easing the financial problem of reconversion for manufacturers. A bill which would permit corporations to convert their excess profits tax postwar credit bonds into cash 60 days within the end of hostilities in Europe has been introduced in the House by Rep. Frank Carlson (Rep., Kan.). Mr. Carlson told the House this bill is "but the first step in a series of tax moves that should be made to provide full employment."

In the Revenue Act of 1942, Congress provided for a postwar refund of 10 per cent of the excess taxes paid by corporations. This credit is represented by bonds issued to the taxpayers. Under present terms, the bonds cannot be used by the owning corporations until the second year after the end of the war on all fronts. The Carlson bill would advance this time to 60 days after General Eisenhower proclaims German resistance has ceased.

Other tax relief being considered (although not yet incorporated in bills) would permit the full amount of plant amortization charge-off (now 20 per cent a year) on all terminated contracts. Provision also would be made for accelerated depreciation allowances, and liberalization of the loss carry-over and carry-back provisions of the present law.

The smoothness with which our economy can be shifted from an all-war to limited-war, limited-peacetime basis depends to large extent on how rapidly and how effectively the measures now being worked out by the war agencies and by Congress can be placed in effect. For the WPB, details of the problems will be worked out by the 11 subcommittees of the CPO, listed below:

War Programs and Released Resources—Bertrand Fox, chairman. This committee will make statistical analyses of military cutbacks and translate these cutbacks into terms of military end products, materials, manpower and facilities.

Co-ordination of Cutbacks and Re-

PEAK PERFORMANCE

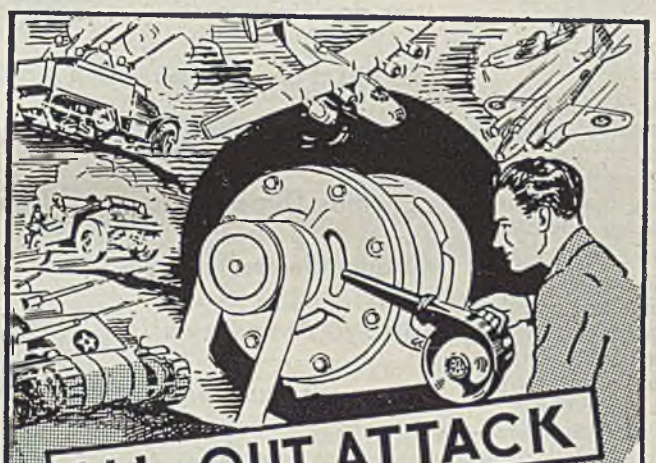
READY-POWER

FOR ELECTRIC INDUSTRIAL TRUCKS

Trucks powered with READY-POWER gasoline-electric units are ready to go when you want them. Constant source of power permits unlimited hours of operation.

THE READY-POWER CO.

3842 GRAND RIVER AVENUE — DETROIT, MICHIGAN, U. S. A.



ALL-OUT ATTACK *against* DUST *with* TORNADO

MOTORS, generators, machinery, run with fewer shutdowns, repairs and replacements, if dust is kept "all out" with the powerful blast of clean, dry air from the TORNADO Portable Electric Blower. 1 H.P. universal motor. Weight, 14 lbs. Plugs in anywhere. Costs less than 3c an hour to operate. *Investigate!*

Write for details and FREE TRIAL OFFER

BREUER ELECTRIC MFG. CO.

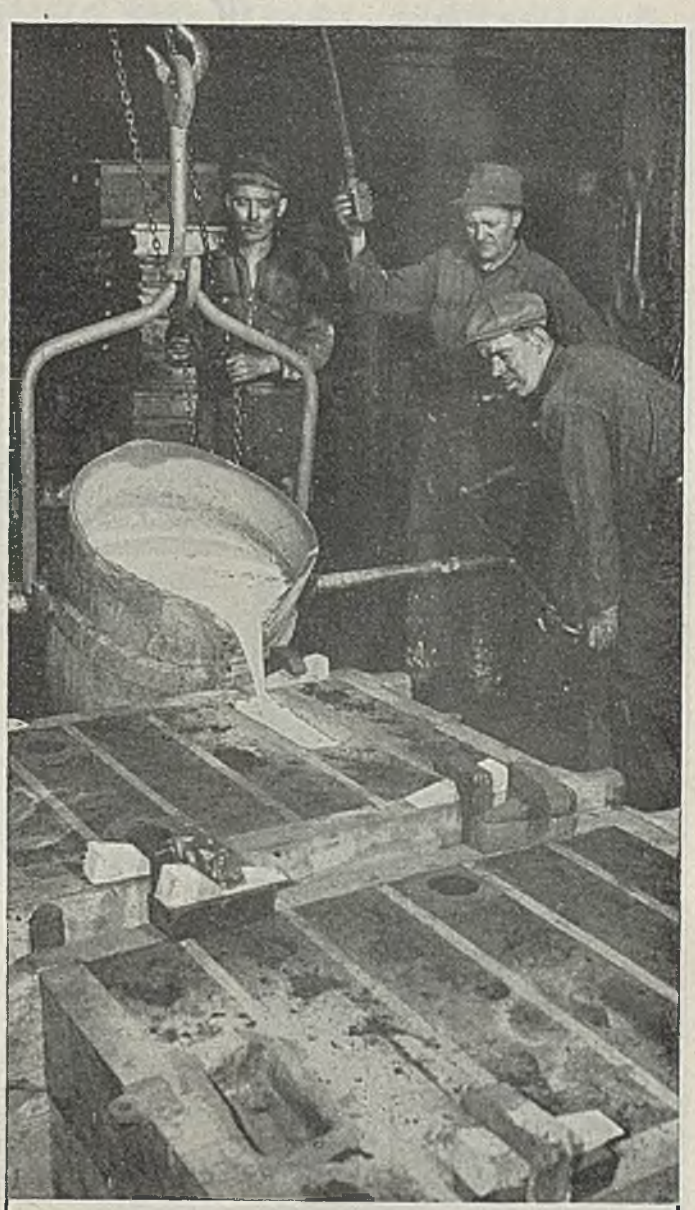
5128 N. Ravenswood Ave., CHICAGO 40, ILL.

Take the DUST out of INDUSTRY

Built with BREUER'S BALL BEARING

TORNADO

PORTABLE ELECTRIC BLOWERS



COMMERCIAL IRON WORKS

has the

KNOW HOW

Since 1916

CASTINGS IN
BRONZE • GREY IRON
SEMI-STEEL

•

FOUNDERS WITH A
Reputation!

PORTLAND 14, OREGON

sumption—John H. Martin, chairman. This committee will deal with community problems, problems of principal plants and the utilization of particular facilities.

Non-War Programs—S. W. Anderson, chairman; Shaw Livermore, deputy chairman. This committee will deal with critically needed consumer products; critically needed producers equipment; and end products; materials and components for "pipe line filling" and urgent non-military construction.

Preparation for Reconversion—W. C. Skuce, chairman. This committee will determine the condition of reconversion industries and make plans for major industries; it will also examine control modifications facilitating reconversion, experimental models, needed capital equipment and "pipe line filling."

Construction and Construction Controls—John L. Haynes, chairman. This committee will determine the status and prospects of essential civilian construction, the problems of reconversion in the construction industry and desirable changes in construction controls.

Basic Priority Controls—John C. Houston, chairman. This committee will recommend the simplified priorities system, the timing of and methods for eliminating the Controlled Materials Plan, and the function of the Spot Authorization Plan, inter-agency directives, component scheduling and industrial inventories and surplus materials.

Order Structure and Reports—John F. Skillman, chairman. This committee will review WPB's L, M and other orders and recommend revocations for modifications to be put into effect at V-E Day or at specified dates thereafter.

Distribution Controls—A. C. C. Hill Jr., chairman. This committee will deal with consumer end product distribution controls, distributors' inventories, and the rationing of gasoline, fuel oil, tires, solid fuels, stoves, shoes and other items.

Imports, Exports, Shipping, Stockpiling and Subsidies—Edward Browning Jr., chairman. This committee will deal with domestic raw materials subsidies, import raw materials subsidies, imports and import shipping controls, export priorities and controls and stockpiling.

Manpower Controls and Relations—Ralph Hetzel, chairman. This committee will examine the relationship of War Manpower Commission controls to WPB plans; manpower provisions in WPB controls; manpower clearances, labor conditions related to manpower; production urgency ratings for manpower and related field operations.

Small Business, Newcomers and Veterans—Bernard L. Lamb, chairman. This committee will examine the problems of small businesses in the reconversion period, veterans priorities and the problems arising in the establishment of new enterprises.

The CPO executive is W. E. Haines, executive assistant to the program vice chairman. Other members of the top committee are: Lincoln Gordon, deputy program vice chairman; Samuel L.

Shober Jr., deputy vice chairman for field distribution; James Douglas, deputy, metals and minerals vice chairman; George Seltzer, special assistant to the vice chairman for labor production; I. N. P. Stokes II, assistant general counsel; Mrs. Prudence Bowen, Office of Procedures; and Charles Weiler, Office of War Utilities.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

26,000 tons, 170 hangars, various locations, for U. S. Engineers, Columbus, O., 50 hangars to American Bridge Co., Pittsburgh; 45 to Fort Pitt Bridge Works, Pittsburgh; 40 to Luria Steel & Trading Co., New York, and 35 to Utica Structural Steel Inc., Utica, N. Y.

15,000 tons, treadway bridges for United States engineers, 11,712 units, larger part to Blaw-Knox Co., Pittsburgh, and American Bridge Co., Pittsburgh, with 2000 units, approximately 1200 tons, to Ace Welding Co., Boston.

1000 tons, building 24C and extension No. 16, Acme Steel Co., Riverdale, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.; Norris Construction Co., Chicago, contractor; bids March 15.

800 tons, cracking unit, Houston, Tex., for Foster-Wheeler Corp., to Mosher Steel Co., Houston, Tex.

535 tons, 460 tons in underpass beam spans, Fort Worth, Tex., and 75 tons in turntable extension, Cleburne, Tex., for Atchison, Topeka & Santa Fe railroad, to American Bridge Co., Pittsburgh; bids April 3.

250 tons, manufacturing buildings, Bloomington, Ill., for Sylvania Electric Products Inc., to Mississippi Valley Structural Steel Co., Decatur, Ill.; bids March 19.

225 tons, laboratory building extension, Pittsfield, Mass., to American Bridge Co., Pittsburgh, through Stone & Webster Corp., Boston, engineer-contractors.

205 tons, extension to machine shop, Continental Foundry & Machine Co., East Chicago, Ind., to American Bridge Co., Pittsburgh; bids March 5.

190 tons, sheet piling, highway bridge, federal aid road between Fontanelle and Nickerson, Neb., for state, 122 tons to Carnegie-Illinois Steel Corp., Chicago, and 68 tons to Bethlehem Steel Co., Bethlehem, Pa.; bids March 15.

125 tons, building, United States Rubber Co., Bristol, Conn., to Providence Steel & Iron Co., Providence, R. I.

100 tons or more, two 375-ton crane barges, Army Transportation Corps, San Diego, Calif., to National Iron Works, San Diego; Bellingham Iron Works, Inc., Bellingham, Wash., awarded four steel crane barges, exceeding $200,000.

STRUCTURAL STEEL PENDING

1500 tons, inert storage buildings, Naval Ammunition Depot, Crane, Ind.; Johnson, Drake & Piper, New York, contractor; bids April 3.

1470 tons, storehouses, Torrance, Calif., for U. S. Navy.

300 tons, new washer and filtration plant, Swift & Co., Bartow, Fla.

300 tons, turbine room extension, Central Illinois Electric & Gas Co., Rockford, Ill.; Stone & Webster, Boston, engineers.

200 tons, expansion Chevrolet aviation engine plant No. 1, Tonawanda, N. Y.; Albert Kahn Associates, Detroit, architects.

Unstated tonnage, soybean processing plant, Frankfort, Ind., for Swift & Co.; bids April 23.

Unstated tonnage, office, laboratory and experimental facilities, Bell Aircraft Corp., Niagara Falls, N. Y.; Wright & Kremers, Niagara Falls, N. Y., contractors.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1375 tons, 55 smokeless powder containers, Naval Ammunition Depot, Crane Ind., to Inland Steel Co., Chicago; Maxon Construction Co., Dayton, O., contractor; bids March 27.

781 tons, inert storage buildings, Naval Ammunition Depot, Crane, Ind.; general contract to Johnson, Drake & Piper, New York; bids April 3.

110 tons, additional magazines, proving ground, Dahlgren, Va., to Bethlehem Steel Co., through National Structures Corp., New York, contractor.

REINFORCING BARS PENDING

1600 tons, veterans hospital, Tomah, Wis., for U. S. Veterans Administration; Gust K. Newburg Construction Co., Chicago, low bidder on general contract; bids April 3.

900 tons, expansion, U. S. Rubber Co., Eau Claire, Wis.; George A. Fuller Co., contractor; bids April 17.

750 tons, water works, Louisville, Ky.; S. N. Nielsen Co., Chicago, low on general contract; bids April 3.

500 to 600 tons, veterans hospital, Fargo, N. D., for U. S. Veterans Administration; bids April 24.

500 tons, tire plant, Ottawa, Ill., for Inland Rubber Corp.; Darin & Armstrong Inc., Detroit, contractor; bids April 10.

300 tons, Armstrong Rubber Co., warehouse and office building, New Haven, Conn.

250 tons, turbine room extension, Central Illinois Electric & Gas Co., Rockford, Ill.; Stone & Webster, Boston, engineers.

150 tons, Naval air supply depot, Philadelphia; Ralph Herzog, Philadelphia, contractor, low.

Unstated tonnage, soybean processing plant, Frankfort, Ind., for Swift & Co.; bids April 23.

RAILS, CARS . . .

LOCOMOTIVES PLACED

National Railways of Mexico, 32 steam locomotives, 4-8-4 type, divided equally between American Locomotive Co., New York, and Baldwin Locomotive Works, Eddystone, Pa.; also seven diesel-electric units to Electro-Motive Division General Motors Corp., La Grange, Ill.

PIPE . . .

CAST IRON PIPE PLACED

240 tons, 8 and 10-inch, Southbridge, Mass. to Warren Cast Pipe Co.

CAST IRON PIPE PENDING

400 tons, 8-inch, Ashland, Mass.

400 tons, 12-inch, Braintree, Mass.

250 tons, 8-inch, Falmouth, Mass.

Vital War Production Cut By Gary Tin Mill Slowdown

Slowdown of workers on the hot pickling lines at Gary sheet and tin mills of Carnegie-Illinois Steel Corp. having continued until all lines were stopped for several days, the dispute last week was certified to the War Labor Board. A total of 911 workers are idle, of whom 130 are the union strikers in the pickling department.

Loss in production from March 11 when the slowdown started up to April 11 was 59,524 tons of sheet and tin plate for bombs, ration containers, shell containers, Army warehouses and Navy huts.

Slowdown started when workers on the pickling lines protested a new incentive

pay plan which involved speeding up the lines from 180 to 280 feet per minute. Plan had been approved by WLB, a directive of the latter Nov. 25, 1944, making it no longer necessary for labor to concur. On March 21, at which time production loss was 27,774 tons, workers agreed to give the plan a fair trial. However, the slowdown was resumed April 3 and grew progressively worse until the lines were forced down. No formal grievance has been filed.

CONSTRUCTION AND ENTERPRISE

OHIO

ASHTABULA, O.—Lake City Malleable Co., J. E. Green, engineer, is erecting a storage building 80 x 240 feet and a service building, to cost about $130,000. Wilbur Watson & Associates, 4614 Prospect avenue, Cleveland, are architects.

CLEVELAND—Cleveland Precision Ring & Products Co. has been incorporated with $1000 capital and 250 shares no par value to manufacture metal products, by W. E. Shepperd, 6515 Euclid avenue, and associates.

CLEVELAND—Automatic Die & Products Co., 5345 St. Clair avenue, plans a factory addition costing about $30,000. E. G. Hoefler, 5005 Euclid avenue, is engineer.

CLEVELAND—Metals Applied has been incorporated with $4000 capital and 100 shares no par value to do electroplating and polishing, by Vincent Obermayer, 2797 East 126th street, and associates.

CLEVELAND—Addressograph-Multigraph Co., 1200 Babbitt road, is building a one-story warehouse 80 x 123 feet. M. C. Smith, 26130 Zeman avenue, is contractor.

CLEVELAND—Phoenix Machine Co., 2711 Church avenue, Harry E. Bollinger, president, plans an assembly and storage building with three craneways. Walter G. Caldwell, Engineers building, is architect. Priorities have been asked.

CLEVELAND—U. S. Steel Wire Spring Co., 7800 Finney avenue, will build a one-story 138 x 190-foot plant costing about $100,000. Priorities have been asked of War Production Board.

ELYRIA, O.—Elyria Brass & Bronze Co., 836 Walnut street, is building a one-story 14 x 68-foot plant addition.

VERMILION, O.—Wakefield Brass Co., Carl Schroeder, manager, is adding about 9000 square feet to its floor space. Austin Co., Cleveland, is contractor.

WARREN, O.—Copperweld Steel Co. has been given WPB authorization for rehabilitation of its west bar pickler building for production of ingots to cost about $148,00.

MASSACHUSETTS

BEVERLY, MASS.—Metal Hydrides Inc., 14 Congress street, has let contract to Bond Bros., 77 Ferry street, Everett, Mass., for a 42 x 102-foot boilerhouse addition, to cost about $40,000.

BOSTON—Department of public works, W. T. Morrissey, commissioner, City Hall, plans an incinerator on Albany street, costing about $700,000, for postwar construction.

RHODE ISLAND

PROVIDENCE, R. I.—Narragansett Electric Co., 49 Westminster street, has plans by P. D. Creer, 31 Benevolent street, for a steam generating plant for postwar construction at cost of $2 million.

VERMONT

BRATTLEBORO, VT.—Board of selectmen, Town Hall, has plans under way for postwar construction of sewage treatment and disposal plant and sewers, costing about $250,000. Barker & Wheeler, 36 State street, Albany, N. Y., are consulting engineers.

NEW YORK

BUFFALO—J. N. Adams & Co., department store operator, plans an $850,000 expansion, including a new ten-story building and three additional stories on present structure. J. W. Cowper Co., Buffalo, is contractor. Starret & Van Vleck, New York, are architects.

PENNSYLVANIA

ERIE, PA.—Erie Resistor Mfg. Co., 644 West Twelfth street, plans postwar factory building costing about $500,000.

JOHNSTOWN, PA.—City, City Hall, has plans under way for postwar construction of combined sewage treatment plant and garbage incinerator, costing about $600,000, for postwar construction. William A. Goff, Broad Street Station building, Philadelphia, is consulting engineer. H. Lee Wilson, 205 City Hall, is city engineer.

PITTSBURGH—Dravo Corp., Neville Island, Pittsburgh has been given WPB authorization for rehabilitation and construction of facilities for production of rocket bodies, to cost about $1,169,000.

MICHIGAN

CHELSEA, MICH.—Federal Screw Works, Chelsea, has plans by Harley, Ellington & Day, 1507 Stroh building, Detroit, for a one-story plant costing about $50,000.

DETROIT—Center Pattern Works Inc., 1036 Dime building, has been incorporated with $10,000 capital to manufacture metal and wood patterns, by Arthur T. Perris, 4623 Third street.

DETROIT—Illuminating Engineering Co., 2419 Grand River avenue, has been incorporated with $10,000 capital to manufacture electric lighting fixtures, by Bert C. Pretzer, same address.

DETROIT—Industrial Associates Inc., 11639 Klinger avenue, has been incorporated with $50,000 capital to conduct a general manufacturing business, by Detroit Diamond Tool & Die Corp., same address.

ILLINOIS

BLOOMINGTON, ILL.—Sylvania Electric Products Inc., Williamsport, N. Y., has let contract to John Felmley Co., 603 Peoples Bank building for an electronic equipment plant estimated to cost about $250,000. (Noted April 9).

HAVANA, ILL.—Illinois Power Co., Monticello, Ill., plans construction of two 40,000-kw turbogenerator units on Illinois river south of here, to cost about $11 million.

OTTAWA, ILL.—Inland Rubber Co., 33 South Clark street, Chicago, plans tire and tube manufacturing plant costing about $250,000. Giffells & Vallet, 1000 Marquette building, Detroit, are engineers.

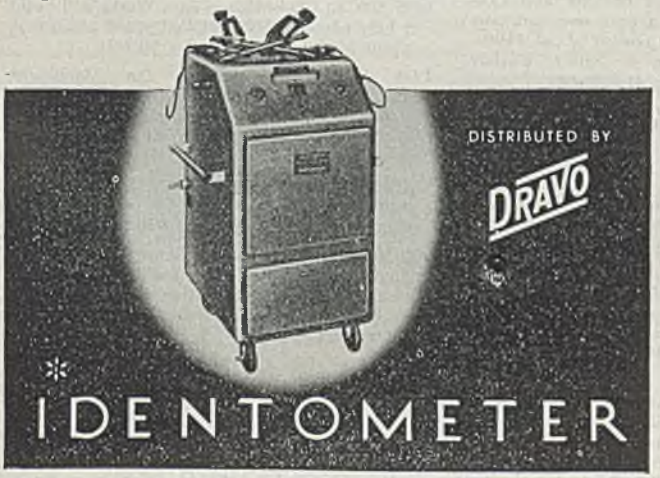
PEKIN, ILL.—Corn Products Co., South Second street, has plans under way for postwar increase in cerelose production, to cost about $4,500,000.

PEKIN, ILL.—Quaker Oats Co., South Second street, has plans for postwar construction of

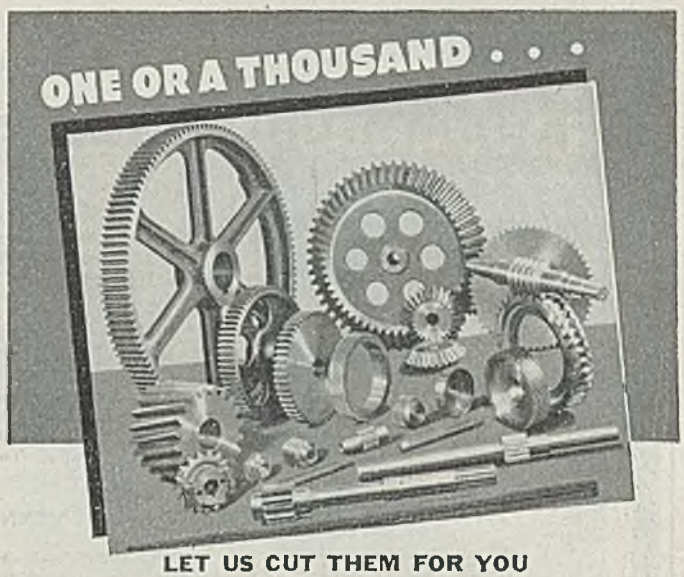
POSITIVE STEEL IDENTIFICATION

To Avoid Errors and Rejects

If you are processing ferrous material the chances are that Identometer can be a valuable tool in your quality control plan. Equipped with a known sample, this device will quickly tell if unknown pieces are: (1) of the same or different chemical composition, if the physical structures are the same; (2) of the same or different heat treatments, if the chemical composition is the same. ● Read the whole story of this new metallurgical tool! Bulletin 4H. Address—DRAVO CORPORATION, National Department, 300 Penn Avenue, PITTSBURGH 22, PA.



AN ELECTRICAL INSTRUMENT FOR THE INSTANT AND ACCURATE IDENTIFICATION OF MOST ROLLED OR FORGED FERROUS ALLOYS BY THE USE OF REFERENCE SPECIMENS



LET US CUT THEM FOR YOU

As specialists in Gear, Sprocket and Rack cutting to customer's specifications, we offer you the finest in engineering skill and production accuracy. Send blue prints for estimates. Write for our new Catalog and Engineering Handbook.

"Industrial"

Cut Gears • Sprockets • Racks

INDUSTRIAL GEAR MFG. CO.
4545 VAN BUREN STREET CHICAGO 24, ILLINOIS

HENDRICK

PERFORATED METALS

Hendrick follows your instructions *accurately*, whether for a simple machine guard, or an intricate small-hole punching in stainless steel, or other corrosion resisting material.

HENDRICK MANUFACTURING CO.
37 Dundaff Street Carbondale, Pa.

Sales Offices in Principal Cities
Please Consult Telephone Directory

Manufacturers of Mitco Open Steel Flooring; Elevator Buckets; Light and Heavy Steel Plate Construction

MERRILL BROTHERS
NEW DROP FORGED
VOLZ PLATE-LIFTING CLAMPS

Now Give You More

- STRONGER HOLD!
- GREATER LIFTING POWER!
- QUICK RELEASE!
- PLUS GREATER PLATE-HANDLING RANGE FROM 0" THICKNESS UP.

Designed for: "Come-alongs" on welded assemblies; lifting oil and ash barrels and other metal barrels or box containers; lifting large stamped tank heads or tops; angles and structural assemblies. Drop forged completely in ½-ton, 1-ton, 3-ton and 6-ton capacities.

Bulletins and Prices on Request

MERRILL BROTHERS
56-20 Arnold Ave., Maspeth, New York

Actual Size Photo
3 Carat Size—Common
1/16" Shank—$36.00 ea.

DIAMONDS for Production

RE-SET-ABLE • BIG-HED-NIB
(Trade Marks Registered)

Equip Now with "RE-SET-ABLE" Diamond Tools on Your Precision Grinding Production Line

LOC-KEY-SET
by Patented Process
U. S. Pat. 2,351,741

16
Factory Branches
Jobbers
Everywhere

● **RE-SET-ABLE** adds to life of your diamond . . . More work per carat. Exclusive patented setting is tender to the diamond . . . Holds firmly . . . Protects from damage . . . Guards against breakage.

No. 24 CN RE-SET-ABLES are now selling in 100 lots. Ask for easy No. 4 Catalog and Grinder's Instruction Card. Shows sizes to fit your machines. Tools backed by service unequalled.

All diamonds are LOC-KEY-SET for immediate shipment . . . Tools numbered in units of 1/8 carat (No. 1 size) and lettered to denote quality of diamond and style of mounting . . . 3 grades — Common (C). Medium (M). Select (S). (24-hour resetting service $1.00 postpaid.) Bigger stones in C grade are genuine economy in diamond use. For large wheels we recommend No. 60-CN.

DIAMOND TOOL COMPANY, Not Inc. SHELDON M. BOOTH, Pres.
938 E. 41st Street CHICAGO 15, ILL.

boilerhouse costing about $60,000.

ALABAMA

BIRMINGHAM, ALA.—Dixie Metal Co. Inc., 1507 Eleventh street North, Bessemer, Ala., plans alterations and additions to shell plant, to cost about $50,000.

VIRGINIA

RADFORD, VA.—American Viscose Corp., 350 Fifth avenue, New York, plans postwar plant on 741-acre site on New river, to cost about $10 million.

WISCONSIN

EAU CLAIRE, WIS.—National Pressure Cooker Co., manufacturer of cooking and canning machinery, plans a part one and part two-story plant addition costing about $100,000. Magney, Tusler & Setter, Foshay Tower, Minneapolis, are architects.

MINNESOTA

MINNEAPOLIS—Federal Aircraft Works, 3456 North Mississippi drive, manufacturer of aircraft skis and accessories, hoists, jacks, and welding machines, has let contract to Naugle-Leck Inc., Roanoke building, for a second-story plant addition.

MINNEAPOLIS—Durlee-Atwood Co., manufacturer of automotive supplies, has let contract to Naugle-Leck Inc., Roanoke building, for a one-story plant 50 x 120 feet, to replace recent fire loss.

ST. PAUL—Minnesota Mining & Mfg. Co., W. L. McKnight, president, 900 Fauquier street, plans postwar construction of four-story plant 200 x 580 feet, adjoining present plant, and one-story 50 x 75-foot building, to cost about $2,500,000. C. P. Pesek and W. A. Thomas, care owner, are engineers.

KANSAS

ABILENE, KANS.—Kansas Power & Light Co., 808 Kansas street, Topeka, has let contract for a power plant addition and several other structures to George Senne & Co., 510 East Fifteenth street, Topeka, Kans., at about $500,000. Black & Veatch, 4706 Broadway, Kansas City, Kans., are engineers.

WICHITA, KANS.—Lamp & Stove Co. has let contract to Hahner & Foreman Construction Co., 111 North Waco street, for a factory building costing about $50,000. L. Schmidt, 1832 East Second street, is architect.

IOWA

CEDAR RAPIDS, IOWA—Dearborn Brass Co., manufacturer of plumbing brass goods, has let contract to Morehead Construction Co. for a one-story machine shop addition 57 x 98 feet.

CLINTON, IOWA—Interstate Power Co. has plans to build a power plant near the du Pont cellophane plant at cost of $2 million, with 15,000-kw capacity. Sargent & Lundy, 140 South Dearborn street, Chicago, are engineers.

HARLAN, IOWA—Board of trustees, L. D. Billings, secretary, will open bids April 18 for a 1500-horsepower diesel engine and generator for municipal light and power plant.

OELWEIN, IOWA—Wardell-Moors Co., manufacturer of war goods, has let contract to John G. Miller Construction Co., Waterloo, Iowa, for a one-story plant 140 x 160 feet.

ARIZONA

PHOENIX, ARIZ.—Airesearch Mfg. Co. of Arizona Inc., South Twenty-eighth street, has DPC authorization for additions for heat treating and electrical equipment, to cost about $365,000.

CALIFORNIA

BURBANK, CALIF.—Lockheed Aircraft Corp., 2555 North Hollywood Way, will build a tooling warehouse 200 x 400 feet at Plant B-3 to cost about $227,000.

LOS ANGELES—General Tools Corp. has been incorporated with $25,000 capital by Ray H. Lindman and associates. O'Melveny & Myers, 433 South Spring street, are representatives.

LOS ANGELES—Metals Research Inc. has been incorporated with 2000 shares no par value by William Schroder, Roscoe, Calif., and associates. William A. Sherwin, 840 Roosevelt building, Los Angeles, is representative.

LOS ANGELES—Aluminum Body Corp. has been incorporated with $200,000 capital by Richard T. Callahan, San Gabriel, Calif. O'Melveny & Meyers, 433 South Spring street, Los Angeles, are representatives.

LOS ANGELES—Madsen Iron Works will build a new plant at 5631 Bickett street at cost of about $5000, covering 40 x 50 feet.

LOS ANGELES—American Tire Machinery Inc. has been incorporated with $500,000 capital by Arch B. Cleveland and associates. A. E. Coppleman, 416 West Eighth street, is representative.

SOUTH GATE, CALIF.—Rheem Mfg. Co., 4361 Firestone boulevard, is erecting a factory addition costing about $300,000.

VERNON, CALIF.—Norris Stamping Co., 5215 South Boyle avenue, will build a plant addition 150 x 760 feet, costing about $350,000. Webber & Co., 606 South Hill street, are contractors.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Frank G. Schenuit Rubber Co., Baltimore, $30,000 to provide equipment at a plant in Baltimore for production of airplane tires and tubes.

Eaton Mfg. Co., Cleveland, $600,000 increase in contract to provide additional equipment at a plant in Cleveland, making overall commitment $8,600,000.

American Steel Foundries, Chicago, $3 million increase in contract to provide additional equipment at a plant in Chicago, making overall commitment $29 million.

American Brass Co., Waterbury, Conn., $250,000 to provide additional equipment at a plant in Waterbury.

Luscombe Airplane Corp., West Trenton, N. J., $40,000 increase in contract to provide additional equipment at West Trenton, making overall commitment $250,000.

Day & Zimmerman Inc., Philadelphia, $1,450,000 increase in contract to provide additional equipment at a plant at Cressona, Pa., converted to a reclamation center, making overall commitment $3 million.

Davison Chemical Corp., Baltimore, $140,000 to provide additional equipment at a plant in Baltimore.

George A. Fuller Co., New York, $2 million for conversion of existing plant at Madison, Ill. Existing facilities valued at $5 million were originally constructed for General Steel Castings Corp. and will be operated as material reclamation center.

Cooper Alloy Foundry Co., Hillside, N. J., $35,000 increase in contract to provide additional equipment at a plant at Hillside, making overall commitment $400,000.

Koppers Co., Inc., Pittsburgh, $150,000 increase in contract to provide additional equipment at a plant at Granite City, Ill., making overall commitment $8,650,000.

Weatherhead Co., Cleveland, $420,000 increase in contract to provide additional equipment at a plant in Cleveland, making overall commitment $2,750,000.

Have It Galvanized by—

Joseph P. Cattie & Bros., Inc.

Gaul & Letterly Sts., Philadelphia, Pa.

Philadelphia's Oldest, The Country's Largest Hot Dip Job Galvanizer

Galvanized Products Furnished

LADLE SLEEVES • NOZZLES
FOUNDRY GATES • RUNNERS
(Longer Lengths)

Clay Manufacturers Since 1889
Also other Refractories

NATIONAL FIREPROOFING CORPORATION
PITTSBURGH 12, PA.

EQUIPMENT... MATERIALS

FOR SALE

2—1000 K.V.A. ARC FURNACE TRANSFORMERS

1—G.E. indoor type, air cooled, 3 phase, 60 cycle, Type HT, Form DH, Serial No. 4541694. Designed to furnish the following operating tap voltages of 160, 150, 140, 130, 120 with an impressed voltage of 13,200 on the primary.

1—Allis-Chalmers, indoor type, water cooled, 3 phase, 60 cycle, Serial No. 1A-3129. Designed to furnish the following operating tap voltages of 160, 150, 140, 130, 120 with an impressed voltage of 13,200 on the primary.

Write Box 831
STEEL, Penton Bldg., Cleveland 13, O.

1,500,000 lbs.
STAINLESS STEEL COILS

TYPE 302 2B FINISH ANQQS 772
GAUGES FROM .006 TO .110 • WIDTHS FROM 2 IN. TO 46 IN.
ALL TEMPERS
MRC MATERIAL FOR SALE AT REGULAR MILL PRICES,
SUBJECT TO PRIOR SALE
Wire—Write or phone us your requirements

C. B. S. STEEL AND FORGE

AGENTS FOR METALS RESERVE COMPANY

3321 EAST SLAUSON AVENUE . LOS ANGELES 11
TWX L.A. 151 PHONE LA 0147

We BUY and SELL

New Surplus Pipe and Tubes
Steel Buildings
Tanks
Valves and Fittings
Plates, Bars and Structural Steel

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards, St. Clair County, Ill.

FOR SALE

ALLOY STEEL

ROUND, HEX, SQUARE BARS
New York and Pittsburgh Warehouse Stocks

L. B. FOSTER CO.
9 Park Place, New York 7
Phone—Barclay 7-2111
P. O. Box 1647, Pittsburgh 30
Phone—Wainut 3300

FOR SALE

MEDART STRAIGHTENER, Size 2½ with extra set of new rolls.

UNITED ENGINEERING & FOUNDRY CO. 3 HIGH, 30" MILL 95" between housings with tilting tables and pinion stands.

BENKART STEEL & SUPPLY CO.
2017 Preble Ave., N. S. Pittsburgh 12, Pa.

FOR SALE

2 — Metal Alligator Shears

Address Box 335
STEEL, Penton Bldg., Cleveland 13, O.

HAMMER, Steam Forging 800 lb. Chambersburg.
LATHE, Turret 24" Gisholt, 6-1/4" hole.
PRESS, Forging 1000 ton United Steam-Hyd.
SHAPER, 36" Morton Draw Cut.
SHEARS, 38"—42"—54" x 1/8", B.D.
SHEARS, Alligator 1"—4".
SHEAR, Open End 22" blades 2-1/2" sq. M.D.
SLOTTER, 12" Putnam, 35" table, B.D.
STRAIGHTENER, Sutton 5 roll 3-1/2" rd.
STRAIGHTENER, 42" W-F, 11 roll, 2-5/8" dia.

WEST PENN MACHINERY COMPANY
1208 House Bldg. Pittsburgh 22, Pa.

BLOWERS--FANS EXHAUSTERS

"Lungs for Industry"

REBUILT and GUARANTEED

Prompt Shipments from a Large Stock
All Types — All Makes — All Sizes
And We Really Rebuild 'Em.
(WE BUY, SELL AND EXCHANGE)
(HAVE YOU A BLOWER FOR SALE?)

GENERAL BLOWER CO.
Phone: Canal 6340
404 North Peoria St.
CHICAGO 22, ILL.

RAILS NEW AND RELAYING

TRACK ACCESSORIES
from **5** *Warehouses*

- PROMPT SHIPMENTS
- FABRICATING FACILITIES
- TRACKAGE SPECIALISTS

EVERYTHING FROM ONE SOURCE

L. B. FOSTER COMPANY
PITTSBURGH CHICAGO
NEW YORK SAN FRANCISCO

SELLERS — BUYERS — TRADERS

More for your Dollar! **IRON & STEEL PRODUCTS INC.** *40 Years' Experience*

13462 S. Brainard Ave.
Chicago 33, Illinois

"Anything containing IRON or STEEL"

RAILWAY EQUIPMENT AND ACCESSORIES

We can furnish rails, spikes, bolts, angle bars, locomotives, cranes and other railway material.

Write, wire or phone for prices

SONKEN-GALAMBA CORP.
108 N. 2d St. Kansas City, Kansas

RAIL-ACCESSORIES RAILWAY EQUIPMENT

• BOUGHT • SOLD •

DULIEN STEEL PRODUCTS, Inc.

of Washington — 200 National Bldg. SEATTLE 4, WASH.
of New York — 2280 Woolworth Bldg. NEW YORK 7, N.Y.

EQUIPMENT...MATERIALS

CRANES
FOR SALE OR LEASE

1—10 Ton Cleveland Heavy Duty, serial No. 8325, 100' span, 230 Volt D. C., Bucket Crane with runway 400' long—40' high. Runway can be easily covered.
1—50 Ton Cleveland Ladle Crane, 230 Volt D. C., Serial No. 8340.
1—1500# Sheppard Monorail Crane, 230 Volt D. C. with track.
1—2 Ton Capacity Northern Crane, 230 Volt D. C., 27' span.
3—3-5 Ton Floor Control Cranes 220/440, 60 Cy. A. C., 20' span.

HETZ CONSTRUCTION COMPANY
2490 W. Market St. • Warren, Ohio • Phone 4474

WANTED
6 ga. to 15 ga. HOT ROLLED SHEETS
22 ga. to 28 ga. H. R. or C. R. SHEETS
24 ga. to 26 ga. GALVANIZED SHEETS
From Idle and Excess Inventories
THE WATERMAN-WATERBURY CO.
Minneapolis 13, Minn., Phone: MAin 8701

ROLLING MILLS *and* EQUIPMENT
FRANK B. FOSTER
829 OLIVER BLDG. PITTSBURGH, PA.
Cable Address "FOSTER" Pittsburgh

CLASSIFIED

Help Wanted

ASSISTANT MANAGER
For National Field Service Dept. of Welding Rod Manufacturer

Leading manufacturer of nationally advertised gas and arc welding materials offers position of Assistant Manager of its large service department.

Desire graduate engineer with considerable welding experience, good speaker and writer, sales experience, willing to travel. Salary to start including bonus—$7,134.00. Good postwar opportunity.

If you have this background, are deeply sales minded and want to get ahead, write stating past history in detail. Address Box 868 STEEL, Penton Bldg., Cleveland 13, O

SHOP SUPERINTENDENT—FOR SHEET Metal Fabricating and Assembly Division of an old established corporation in Western Pennsylvania. Must be an experienced executive capable of organizing for economic production, production processes involving sheet and tube fabrication, forming, all types of welding and finishing. Experienced in incentive wage systems and labor relations. Now on War Contracts. A-1 postwar opportunity. Contract or job shop experience desirable. Send photo, full resume of experiences, education, references, availability and salary desired to Box 865, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: PROJECT ENGINEERS WITH experience in blast furnace, open hearth, blooming mill, hot and cold strip equipment. Permanent employment to those who can qualify. Salary. Statement of Availability required. Address Engineering Dept., Jones & Laughlin Steel Corp., Cleveland, Ohio.

ASSISTANT SUPERINTENDENT INDUSTRIAL Relations wanted by large steel plant in Chicago area. Broad experience in industrial relations activities required. State age, education, experience, availability, salary desired in first letter. Address Box 843, STEEL, Penton Bldg., Cleveland 13, O.

DRAFTSMAN EXPERIENCED WITH DRAWing dies, tool and jig layout. Postwar position, excellent conditions. Address Box 724, STEEL, Penton Bldg., Cleveland 13, O.

Help Wanted

Wanted
SALES ENGINEER

Here is a real opportunity for a young man (under 30) to establish himself with a new division of a nationally-known organization. If you are salesminded and have had some engineering experience in the metallurgical, aircraft or automotive fields, write today, giving full details. Better-than-average starting salary and unlimited chance for advancement.

Address Box 869
STEEL, Penton Bldg., Cleveland 13, O.

STRUCTURAL STEEL ENGINEER
An old and honored New England steel fabricating company which is expanding offers an opportunity to a personable engineer familiar with structural design. Ability to estimate platework and ornamental iron also desirable. This position offers great prospects for Post War progress to the right man.
P. O. Box 615 Pawtucket, R. I.

GENERAL FOREMAN—FOR SHEET METAL Fabricating and Assembly Division of an old corporation in Western Pennsylvania. Must be executive, capable of organizing for economic production, production processes involving sheet and tube fabrication, forming, all types of welding, and finishing. Now on war contracts. A-1 Postwar opportunity. Contract or job shop experience desirable. Send photo, full resume of experiences, education, references, availability and salary expected to Box 863, STEEL, Penton Bldg., Cleveland 13, O.

DESIGNER, DRAFTSMAN & ESTIMATOR Wanted. Must have full knowledge of A.S.M.E. construction on all types of pressure vessels and other complicated steel plate construction of refining equipment, etc. Plant located in Texas. Statement of Availability required. Address Box 828, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: MAN WITH GENERAL OFFICE or field sales experience by large reputable manufacturer of seamless and electric welded tubing, alloy and carbon steels. Please apply giving full information, experience, etc., to Box 754, STEEL, Penton Bldg., Cleveland 13, O.

TOOL AND DIE MAKERS EXPERIENCED withdrawing dies for Post War position, excellent conditions; give full particulars. Address Box 723, STEEL, Penton Bldg., Cleveland 13, O.

Help Wanted

Wanted
FOREMEN

A large and reputable manufacturer, specializing in the manufacture of medium and heavy machine tools, desires applications from qualified men for foreman positions open in the near future. Should be a journeyman machinist experienced in supervising and handling of labor relations of employees on the job. In replying, give full details of personal history, qualifications including training and experience, availability, salary requirements.

Address Box 871
STEEL, Penton Bldg., Cleveland 13, O.

ASSISTANT SUPERINTENDENT
A fast growing steel fabricating concern in the Northeast has a splendid future to offer a young engineer with shop experience and ability to handle men and methods. Structural, miscellaneous, ornamental, plate work provide a wide field of opportunity. Our employees know of this ad.
P. O. Box 615
Pawtucket Rhode Island

DESIGNER AND ESTIMATOR WANTED
For general plate work. Excellent postwar opportunity.
Write R. E. Jones
c/o Birmingham Tank Co., Birmingham, Ala.

SHEET METAL TOOL ENGINEER—With contract or job shop experience, capable of product engineering, process analysis, estimating of product and tool cost, tool, die, jig and fixture designing, and the executive ability to supervise programs with tool shops, production departments and customers. By an old corporation operating a sheet metal parts and assembly division in Western Pennsylvania. Now on war contracts. A-1 postwar connections. Send photo, full resume of education, experiences, references, availability and salary expected to Box 864, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: GRADUATE METALLURGIST with at least 5 years experience in electric melting of High Speed, Tool Steel in general, Stainless, etc. for supervising melting. Give all information including draft status, availability, etc. Reply Box 867, STEEL, Penton Bldg., Cleveland 13, O.

CLASSIFIED

Representatives Wanted | Representatives Wanted | Representatives Wanted

REPRESENTATIVE WANTED

Manufacturer's agent to sell STEEL CASTINGS: Large modern electric steel foundry, located in South: Division of prominent industrial company manufacturing wide range of steel products. Territory open at several important locations. Liberal commissions.

Address Box 837
STEEL, Penton Bldg. • Cleveland 13, Ohio

WANTED
Ambitious Representatives

Exceptional opportunity to sell nationally advertised AAA products approved and used by Government Agencies and large and small manufacturers for fabrication of metals, salvage, and reclamation. Good territories still open. Immediate commission earnings from $150.00 to $400.00 and up weekly. Qualifications: Technical or welding background indispensable. Essential position. If you are a hard worker and have ability, our Regional Manager will show you fine results of other representatives. Send outline of past technical and sales activities.

Write to
BENT LAUNE, Regional Manager
Room 1113
40 Worth St., New York 13, N. Y.

Positions Wanted

TWENTY YEARS EXPERIENCE ALL PHASES manufacturing including: product design, tool design, manufacturing supervision, inspection supervision, production control, plant layout, plant engineering, time and motion study, etc. Wartime activity includes major roles in planning, equipping and operating munitions plants. Twelve years with present employer making peace-time auto accessories. College trained engineer. Age forty-six. Skillful, resourceful, energetic, seasoned judgment. Seeking postwar opportunities. Address Box 873, STEEL, Penton Bldg., Cleveland 13, O.

METALLURGIST-ENGINEER

Chief Metallurgical Engineer for large steel mill desires supervisory position with definite postwar future in medium size company. Proven technical supervisor in making, shaping, and heat-treating of steel, specifications, applications, methods and procedures, and development engineering. Progressive, efficient, metallurgical engineering graduate, age 31, minimum salary, $400.00. Address Box 860, STEEL, Penton Bldg., Cleveland 13, O.

OPPORTUNITIES AND PROFITS

are of equal interest to distributors and manufacturers—use an ad on this page next week to let manufacturers know you are interested in taking on new lines.

Accounts Wanted

Manufacturers' Representative

Aggressive organization with valuable contacts in West Virginia and Eastern Ohio desires three or four additional representations in chemical, glass and steel lines—consumptive products preferred.

Address Box 870
STEEL, Penton Bldg., Cleveland 13, O.

MANUFACTURERS' AGENT IN DETROIT territory for 20 years, can handle one or two productive, preferred, or non productive accounts, in addition to present accounts. Address Box 861, STEEL, Penton Bldg., Cleveland 13, O.

Employment Service

SALARIED POSITIONS—This advertising service of 35 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Send for details R. W. BIXBY, Inc., 110 Delward Bldg., Buffalo 2, N. Y.

Opportunities

WANTED
POST WAR PRODUCTS

We have Modern Building suitable for manufacture of Heavy or Semi-Heavy Metal Products. 120,000 sq. ft. Electric Power. Steam Plant for heating and processing. Air Supply. Docking and Railway facilities.

We welcome inquiries from U. S. Manufacturers desiring a Canadian outlet for their product.

The Canadian Bridge Company Limited
Walkerville, Ontario

CONTRACT WORK

SCREW MACHINE CAPACITY AVAILABLE

from ¼" to 4¼", also hand screw capacity. Forward samples and blueprints.

Bridgewater Screw Products Co.
Bridgewater, Mass.

KING FOUNDRIES, INC., NORTH WALES, Pa. Gray Iron and Semi Steel Castings, also alloyed with Nickel, Chrome, and Molybdenum Wood, Iron, Brass, and Aluminum Pattern work.

EXCESS CAPACITY AVAILABLE

Large and heavy machine work. The Hilyard Co., Norristown, Pa.

Open Time Available
TOOLS JIGS DIES FIXTURES
Light Stamping

Send us your samples or blueprints for quotations. Prompt and efficient service.

PRODUCTION TOOL COMPANY
610 Sevier Ave., Knoxville 7, Tenn.

Send your Inquiries for
SPECIAL ENGINEERING WORK
to the
A. H. NILSON MACHINE COMPANY, BRIDGEPORT, CONN.
designers and builders of wire and ribbon stock forming machines.
We also solicit your bids for cam milling

SPECIAL MANUFACTURERS TO INDUSTRY... *Since 1905*

Metal Specialties comprised of STAMPINGS, FORMING, WELDING, SPINNING, MACHINING. All Metal or Combined with Non-Metal Materials

•

LARGE SCALE PRODUCTION
OR PARTS AND DEVELOPMENT ONLY

GERDING BROS.
SE THIRD VINE ST. • CINCINNATI 2, OHIO

ADVERTISING INDEX

~ ~ ~

Table of Contents, Page 71

Classified Advertisers, Pages 207, 208, 209