STEEL

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NEWS

TECHNICAL

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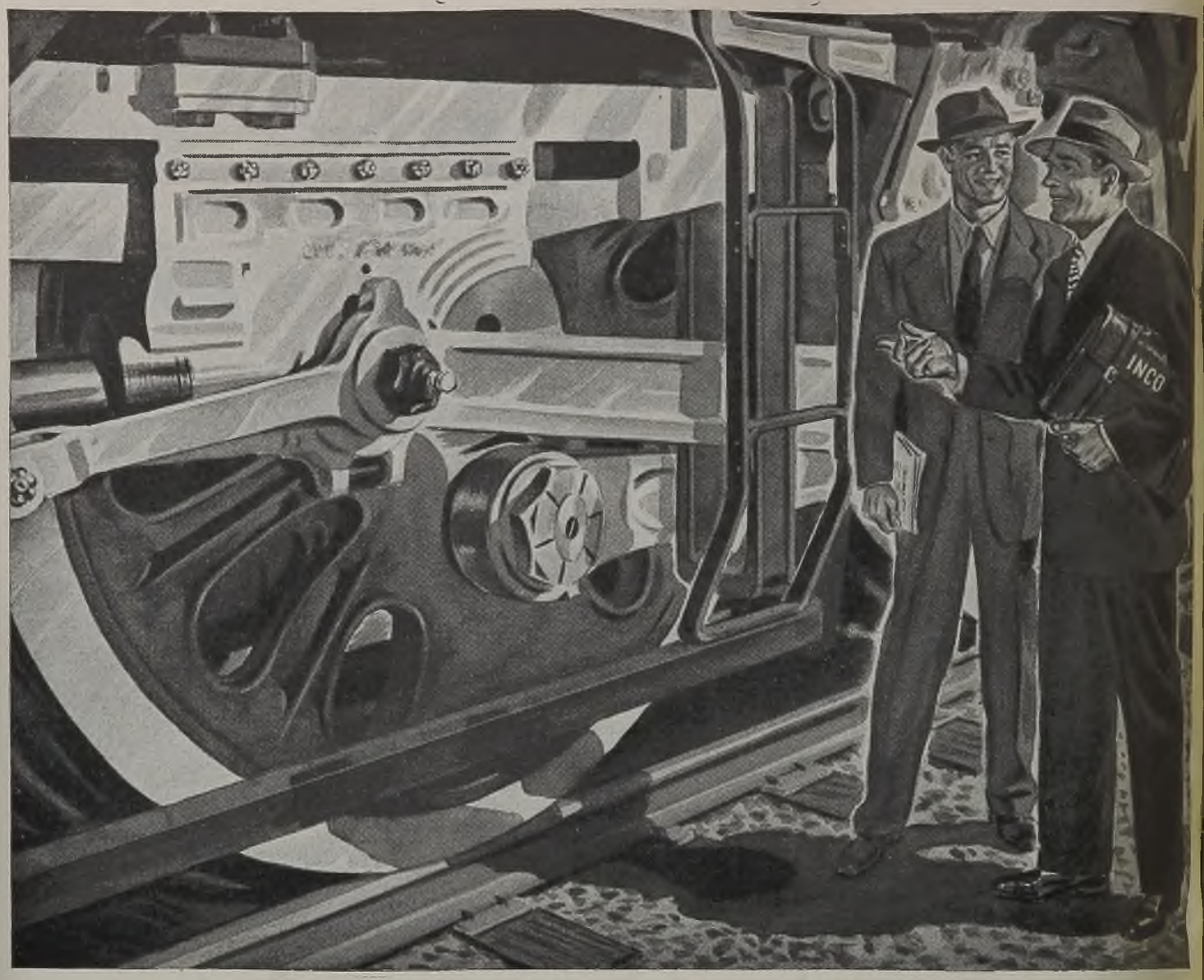
MARKETS



NICKEL AIDS THE RAILWAY INDUSTRY

to KEEP 'EM ROLLING!

Railroad men perform near-miracles every day. With less locomotive capacity and fewer freight cars than a decade ago, last year they moved about two-thirds more ton-miles of freight and over 100% more passenger-miles than in 1940. Figures for this year show substantial increases.

Now, with locomotive-miles per month boosted about 40% above the pre-Pearl Harbor figure, railroaders rely upon the enhanced mechanical properties Nickel adds to iron, steel and non-ferrous alloys.

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* Nickel *

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*

STEEL
July 31, 1944

Danger on the Left!

What is one to make of the confusion attending the convention of the Democratic party? Did anything transpire at that hectic meeting to indicate that if the Democratic administration is granted a fourth term, it will provide the stability in government and the honest refereeing which American industrialists desire?

If one assumes that the party, like the leopard, cannot change its spots, then the answers are clear. In that case, if re-elected, the Democrats will offer only four more years of the kind of rule we have endured during the past 12. This would mean four more years of government by personal whim; of one-sided umpiring; of continued deterioration in the treasury, justice, labor and agriculture departments; of back-seat driving by invisible brain trusters; and of kowtowing to favored pressure groups. It would also mean another generation of erratic decisions by a "packed" Supreme Court. On the record, the Democrats have nothing constructive to offer those who think American business deserves a square deal.

But wait! For some time President Roosevelt has been trying to convince the public that he is veering toward the right. He declared the "new deal" passe and said "Win the War" was his new objective. At Chicago he maneuvered the public political execution of Wallace and the selection of Truman. In his party platform and in his acceptance speech he gave lip service to free enterprise, reduction of wartime controls, aid to small business, and encouragement to risk capital with an emphasis which does not jibe with past performances.

Do these gestures mean that Candidate Roosevelt is swinging to the right?

We think not. We believe he is deliberately throwing a cloak of pretended conservatism over a determination to continue in the old rut. Perhaps he feels he must do this to offset the fear generated in some quarters that his alliance with Hillman and the communists is dangerous to the nation.

In short Mr. Roosevelt is pretending to be what he is not. Had Wallace been chosen, the party would have stood forth for what it really is—a left wing labor party. With Truman, the party parades as a semi-conservative party, which it is not.

This deception will not fool industrialists. They, in common with every American citizen, must decide whether they want a President who daily courts the danger of becoming a Charlie McCarthy to Edgar Bergen Hillman and his $3,000,000.

NOT THE ONLY GOATS: From the amount of emphasis placed upon the need for more workers in foundries and forge shops, one might be led to believe that this manpower problem is the only bottleneck in the heavy truck program. Unfortunately the problem is not as simple as that. There are many other angles to it.

For instance, while there are scores of foundries on truck work which need more men acutely, there are others which have sufficient manpower but are beset by other difficulties. One foundryman complains that whereas he once could count upon 18,000 man-hours of work per week from his working force, now he can expect only 14,000 man-hours per week from these men and women. His problem is absenteeism. In Cleveland more than a thousand foundry workers were idle as a result of a strike. This is not a case of manpower shortage.

There is a tight situation in components for trucks

(OVER)

other than castings and forgings. It is not quite fair to publicly dramatize the foundries and forge shops as sole goats in the heavy truck difficulty.

—pp. 36, 53

* * *

LITTLE THINGS COUNT: Our war effort has required unprecedented volumes of valves and fittings. Programs for ships, synthetic rubber, high-octane gas, chemicals and other essentials have created a demand for these products far in excess of capacity at the time of Pearl Harbor.

Valve manufacturers met this challenge in various ways. The Crane Co. decided to meet it more through increased production efficiency than through extensive plant expansion. It has completed a comprehensive modernization of its steel foundry and castings cleaning department and in the process has introduced time and labor saving practices permitting marked increases in output.

The story of this achievement accents the importance of little things. A simple change in the method of charging electric furnaces reduced charging time from 40 to 3 minutes. Relocation of equipment resulted in a more efficient use of floor space. Ingenuity applied to mechanical handling equipment and to the segregation and routing of work in process increased overall efficiency sharply.

By virtue of this modernization, the Crane Co. probably has contributed more effectively to the war effort than if it had taken time out to build a new plant.

—p. 68

* * *

PRODUCTION MOUNTING: Due to the fact new war orders have more than offset cancellations and cutbacks, industrial production is being maintained at a high level. The index of orders for manufacturers durable goods has risen steadily from a recent low of 294.4 in February to 354.8 in May. Reflecting this upturn are substantial improvements in steel output, electric power production, coal shipments, etc.

This renewal of intense demand raises a question as to the adequacy of raw material supplies. Thanks to favorable weather and in spite of a serious shortage of lake seamen, the iron ore fleet has managed to keep on schedule, or slightly ahead of it, in the movement of ore to lower lake ports. This achievement is all the more noteworthy in view of the unprecedentedly heavy consumption of ore in past months. Consumption of scrap also is at a high rate, but authorities feel that supplies will be adequate.

—pp. 33, 66

BEHIND SCHEDULE? Signs of internal conflict in Germany and Japan emphasize the need in the United States of making sure that we have good plans for meeting the challenge of cutbacks and reconversion. We have plans, but are they adequate?

As to cutbacks, we are told on good authority that thus far they have not become a "significant problem." Many have been on paper only; others have occurred in plants with such heavy backlogs of other orders that the shock was easily absorbed.

Likewise, reconversion to date has not been a "significant problem" for the simple reason that there have been few opportunities to reconvert. Donald Nelson's fight to get reconversion going on a modest scale was due largely to his fear that unless we can gain some pilot experience in shifting from war to peace, we will have unnecessary trouble when the signal is sounded for wholesale reconversion overnight.

Planning to ease the shock of cutbacks and to facilitate reconversion need not interfere with the war effort. We fear the nation is behind schedule in its blueprints for these eventualities.

—pp. 38, 40

* * *

KILOWATTS FOR WAR: Winning this war involves attention to numerous details seldom if ever encountered in previous military experience. For instance, Westinghouse Electric & Mfg. Co. is building for the United Nations twenty-four 1000-kilowatt and ten 5000-kilowatt portable self-contained steam-electric power plants to be used for military and civilian purposes in areas where local power facilities have been destroyed.

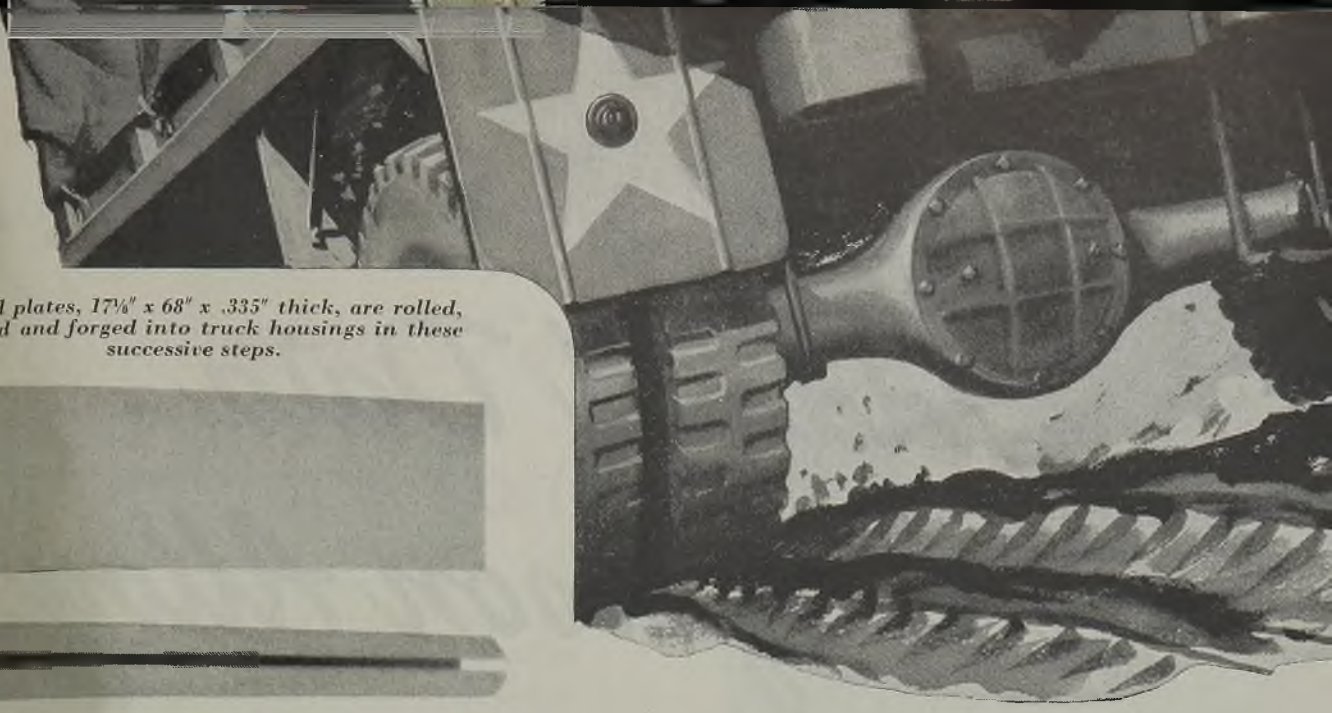
These units are called "power trains." Each consists of a suitable number of specially-constructed railroad cars on which are mounted steam condensers, turbo-generator units, switchboard, air compressors, boiler feed water pumps, steam generating equipment, repair shops and quarters for the operating crew.

Construction of power trains is but another illustration of the extraordinary extent to which this unusual war has called upon the resources of industry for equipment not ordinarily considered as conforming to the traditional pattern of military combat.

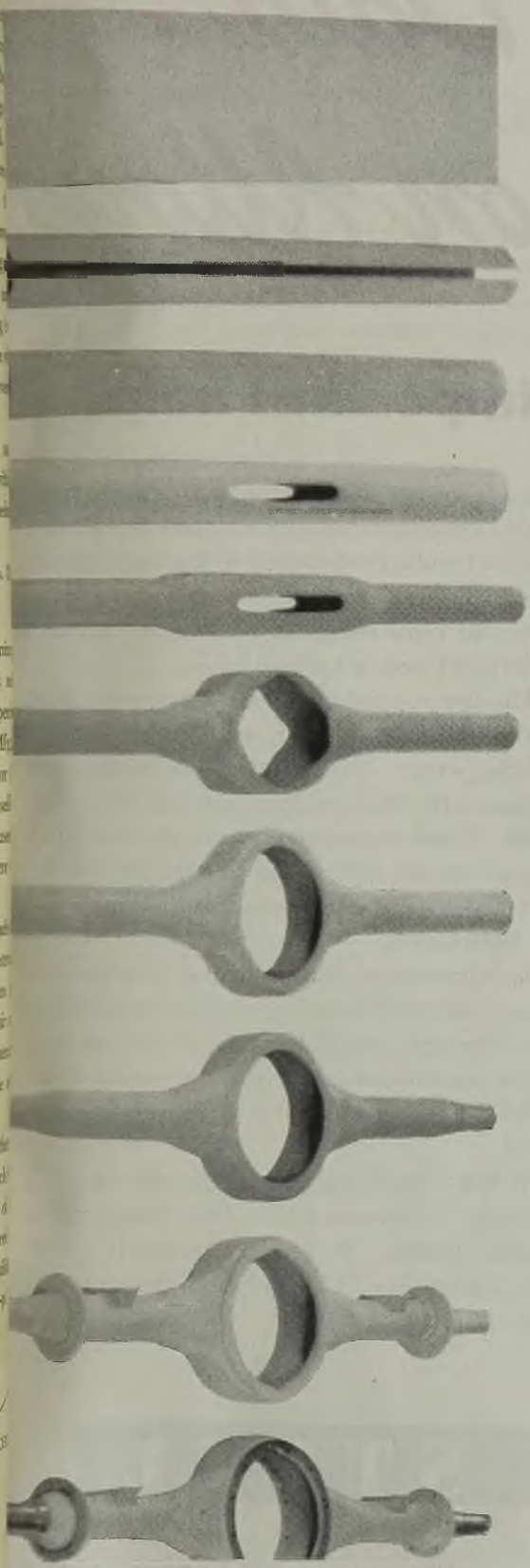
—p. 80

E. L. Shaner

EDITOR-IN-CHIEF



land plates, 17⅛" x 68" x .335" thick, are rolled, rmed and forged into truck housings in these successive steps.



FORMED TRUCK HOUSINGS— the Test of Fine Steel

In Buchanan, Mich., the Clark Equipment Co. produces one-piece tubular forged truck housings—a great contribution to the truck industry, and proof of the uniformity and quality of steel from Inland.

Many thousands of these housings are made from Inland plates, which are first rolled into tubes, welded by the multi arc atomic hydrogen welding process, and formed by severe cold working as well as hot working operations. The housings are then heat treated, developing a higher yield point, and higher fatigue properties. These housings have great strength commensurate with durability and toughness.

It takes uniform high quality steel to make truck housings this modern Clark way. That is why Inland steel was chosen—steel that is controlled step by step, from ore mines to finished product, by skilled technicians who daily make hundreds of tests and inspections. This job of checking and rechecking is so thorough that you can always depend on Inland Steel.

We invite you to let our Inland men help you select the right steel for finer, stronger products and more economical fabrication, whether for war or for the peace to come.

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NEW

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Are you getting this important help?

Ryerson has always exercised close control over alloy steel quality and for several years has furnished the chemical analysis and heat treatment response data with each alloy shipment. Now, this service has been extended under the Certified Steel Plan to give new additional information . . . much more helpful than before.

A new type of Report, containing both hardenability and analysis data, now is being sent with each Ryerson alloy shipment. In addition to the chemical analysis, every alloy heat stocked by Ryerson is subjected to four separate end-quench tests in our own laboratory. The results of these tests, when interpreted through tables of known physical relationships, reveal the obtainable tensile strength, yield point, elongation and reduction of area for 1, 2, 3 and 4 inch rounds quenched and drawn at 1000°, 1100° and 1200° F. Reports include all this test and heat treatment information, plus recommended working temperatures. Thus, you know the complete chemical analysis, what working temperatures to use; and how the steel will respond to heat treatment.

Ryerson continues to positively identify all alloys. They are color marked according to type. Large bars are individually stamped, and smaller bars are bundled and tagged with a heat symbol. This identification is entered on every Report Sheet; so cross-reference verification between Report and steel is unmistakable.

Whether you order a single bar or many tons, you can be sure Ryerson will furnish Reports covering every alloy shipped. Both steel and Reports are delivered together on local shipments. When shipment is made by other than Ryerson motor service, the Reports are sent by first class mail and addressed to the heat treating department.

We believe the uniform high quality of Ryerson alloys—the careful testing—accurate identification—the new, complete guide data—metallurgical counsel—and quick shipment—make Ryerson your number one source for alloy steels from stock.

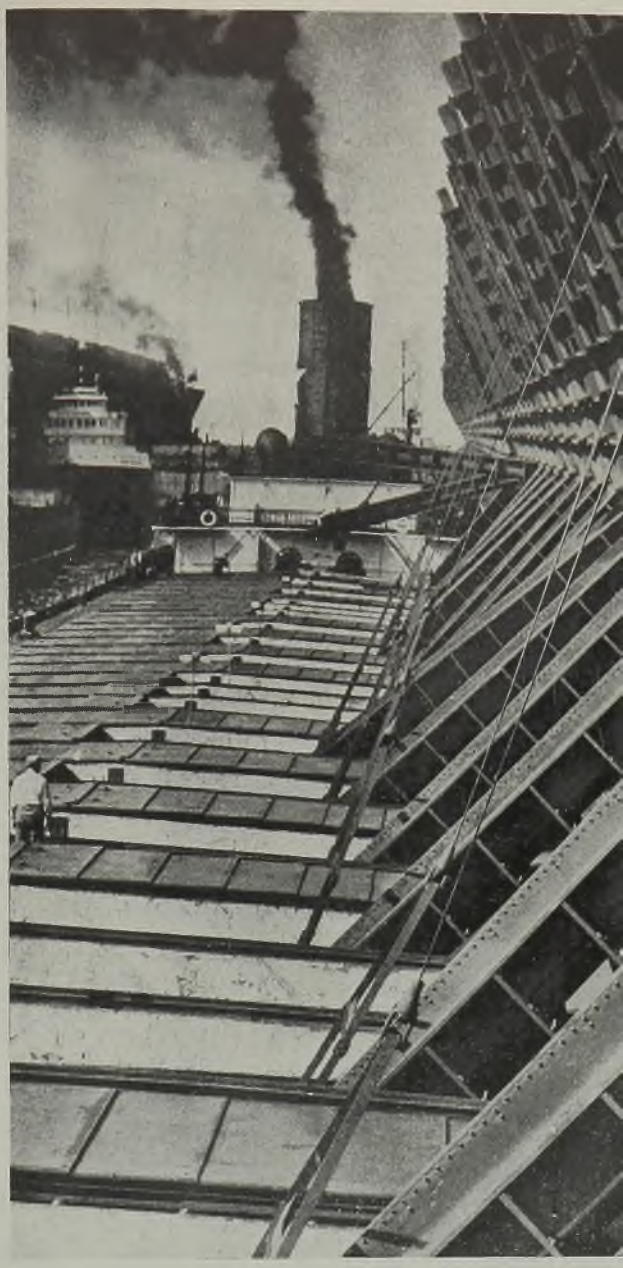
We urge you to use this unique service.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

RYERSON STEEL

Lake Ore Movement On Schedule; Fear Of Shortage Fades

Stocks at lower lake ports and furnaces at mid-season reported slightly larger than at like period of 1943 despite record-breaking consumption. Excellent weather helping to offset acute manpower shortage



Multiple chutes at upper lake docks load ore carriers in jig time, contributing to the accumulation of comfortable stocks at lower lake docks and furnaces to tide steelworks over the winter months when lake shipping is closed. NEA photo

AIDED by excellent weather and with all vessels in commission, the American Great Lakes fleet is moving tremendous quantities of iron ore, coal and grain.

Despite the acute shortage of seamen, vessel operators have been able to put all of the 312 Great Lakes ore carriers in commission, 299 of which are in the ore trade compared with 308 last year at of 313 in commission. Trip capacity of the fleet is now at the record tonnage figure of 2,940,090 gross tons. Because of the limited number of men on the vessels this season, some delay in the movement of ore has occasionally been experienced while waiting for crew replacements.

Iron ore shippers feel that the 90 million gross ton goal tentatively set for the 1944 season could easily be reached if demand prospects for the winter and early spring months warranted such a movement.

Stocks of Lake Superior iron ore at lower lake ports and furnaces July 31 were estimated to be slightly above those recorded at the close of the like 1943 month. This, combined with the fact monthly consumption has been averaging only moderately above a year ago, prompts most lake vessel interests to predict that the 1944 ore movement will about match the 84 million tons brought down last year.

Prospect of continued near-record steel output production over the winter months, which is primarily dependent on war developments, is expected to be the deciding factor in establishing iron ore shipping schedules for the closing months of this season.

For the first seven months this year consumption of Lake Superior iron ore is estimated to have reached a new all-time peak for the period of 51,540,000 gross tons. This is slightly above the 51,248,000 consumed in the like months last year, and the 49,127,000 tons used in the like 1942 period. Peak monthly consumption of 7,765,000 gross tons occurred in January, 1943.

Active blast furnaces in the United States and Canada, depending principally on Lake Superior ore, July 1 numbered 173 and 7 respectively. This compares with 161 and 9 active on the same date last year. On July 1 last 13 furnaces depending on this ore were idle in the United States, 3 in Canada.

With the vessel movement of iron ore to date this year about 4 million tons above the comparable period last season, stocks at lower lake ports and furnaces up slightly and consumption at about the same level as a year ago, little concern is felt as to the adequacy of iron ore stocks through the late winter and early spring months next year. At the opening of navigation this season iron ore stocks totaled 17,891,801 gross tons, or equivalent to about 2½ months' needs at the current consumption rate. In 1937 and 1929 ore stocks on May 1 totaled 14,632,000 and 15,929,000 gross tons respectively.

Iron and steel scrap supply outlook for this winter will also have an important bearing on prospective iron ore consumption over coming months. The Bureau of Mines reports scrap inventories on May 31 recorded the first monthly increase this year to 5,966,000 gross tons. However, this is almost one million tons below the 6,905,000 tons reported on the like date last year.

Consumption of scrap was up slightly during May, amounting to 4,683,000 tons and compared with 4,723,000 reported in the corresponding 1943 period. Little concern is shown over scrap supplies later this year, as indicated by the compara-

tively slow movement of this material out of dealers' yards. Active demand is noted for No. 1 heavy melting steel and cast scrap grades, but buying of other material is lagging.

Record movement of coal and grain by vessel is a factor which has retarded iron ore shipments somewhat this year. Vessel interests anticipate the movement of coal this season will reach 53.5 million tons, compared with 52 million last year. Shipment of grain may total 525 million bushels, or 100 million more than in 1943.

Production of iron ore in the United States in May increased 72 per cent over April and totaled 12,317,128 gross tons, the Bureau of Mines states. Most of the increase occurred in the Lake Superior district. Production and shipments during the first five months of 1944 totaled 27,829,136 and 25,095,050 tons, respectively, compared with 25,409,782 and 20,761,987 tons, respectively, in 1943.

Not once during the entire war emergency has so much as one hour's production been lost at any furnace because of a shortage of iron ore. This record has been achieved despite the fact that imports of foreign ore, which in peacetime approached 3 million tons a year, virtually ceased during the war.

In the three years 1941-1943 more than 300,000,000 gross tons of ore were shipped from the nation's mines, the equivalent of a full four years' shipments at the maximum prewar level. This achievement is all the more remarkable because it was accomplished with a minimum expansion of facilities. Substantially every ton of iron ore consumed in the first three years of war came from old mines.

In no year before 1941 did iron ore shipments from the Lake Superior region reach 67 million tons. Under war pressure, however, the mine operators succeeded in increasing shipments over 20 per cent in each of the years 1941 through 1943, and in 1942 they went 40 per cent above the prewar peak.

Latest official figures for the Lake Superior iron ore shipments this season through 7 A.M., July 24, of 39,113,405 gross tons, compared with 35,110,978 tons in the like 1943 period. Weekly shipment figures during July compared with year ago are presented in the table below.

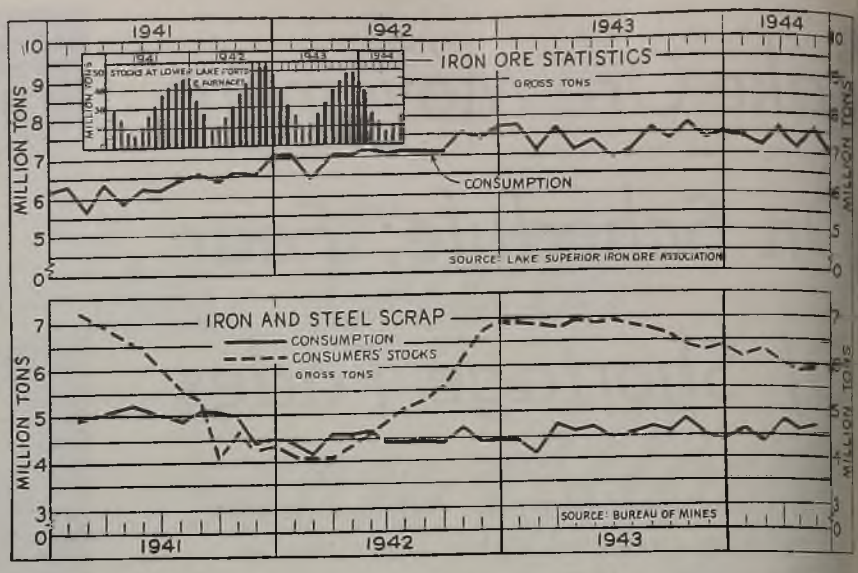
Iron Ore Shipments

(Gross Tons)

Week Ended	1944	1943
July 24	2,898,513	3,023,572
July 17	3,053,553	3,076,300
July 10	2,990,718	2,927,498
July 3	2,797,283	3,073,214

Lake ore shipments reached their all-time peak in 1942 when nearly 92,100,000 tons were brought down the Great Lakes. For the three years 1941 through 1943, iron ore vessel shipments totaled nearly 256,000,000 tons—and would have been even higher except for the 1943 season being one of the worst years for weather encountered in recent history.

Trend in monthly Lake Superior iron ore shipments and consumption to date this year compared with that recorded in 1943 and 1942 is shown in the following tables.



Iron Ore Shipments

(000—Gross Tons)

Month	1944	1943	1942
July	13,300*	13,589	13,405
June	11,975	11,864	12,625
May	12,114	10,975	12,677
April	5,288	1,955	7,789
March	.....	.....	793
Total	42,677*	38,383	47,358

*Estimated.

Iron Ore Consumption

(000—Gross Tons)

Month	1944	1943	1942
July	7,250*	7,156	7,176
June	7,112	6,940	7,034
May	7,558	7,374	7,240
April	7,273	7,186	7,007
March	7,659	7,723	7,109
Feb.	7,207	7,104	6,403
Jan.	7,482	7,765	7,158
Total	51,541*	51,248	49,127

*Estimated.

Alloy Steel Production in First Half 1944 Smaller

Total of 5,466,323 tons of alloy steel was produced in the first half of 1944, about 12 per cent of total steel production during the period, the American Iron and Steel Institute reported last week.

By comparison, alloy steel production in the first half of 1943 totaled 7,255,395 tons, or about 16½ per cent of total steel output. Total steel production in the first half of this year was three per cent above the corresponding period a year ago, and the decline in alloy steel production reflects a sharp decline in demand.

June alloy steel production amounted to 865,967 tons, compared with 931,381 tons in May and 1,098,953 tons in June a year ago.

Open hearth furnaces produced 576,377 tons of alloy steel in June, the remainder coming chiefly from electric furnaces.

First Half Pig Iron Output Higher Than 1943 Period

PIG IRON production in June totaled 5,056,627 net tons, compared with 5,342,866 tons in May, which was only a shade lower than the all-time record made in March. The shorter month was responsible for most of this decline. In June, 1943, production totaled 4,836,283 tons. For six months total production was 31,481,620 tons, compared with 30,343,443 tons in the corresponding period last year. June output was at 91 per cent of capacity, compared with 94 per cent in May. Rate of operations for the first six months averaged 93.6 per cent of capacity, compared with an average of 95.2 per cent for five months. In June, 1943, production was at the rate of 92.8 per cent of the capacity then available. Details of June production are as follows:

District	Pig iron	Ferro, spiegel	Total June	Total Year to date	Per cent capacity
Eastern	918,696	18,642	937,338	5,754,775	87.4
Pittsburgh-Youngstown	2,068,739	16,049	2,084,788	12,869,412	90.8
Cleveland-Detroit	497,408	.....	497,408	3,154,984	91.5
Chicago	1,059,230	.....	1,059,230	6,679,444	93.5
Southern	337,763	14,010	351,773	2,192,536	97.5
Western	126,090	.....	126,090	830,469	64.8
Total	5,007,926	48,701	5,056,627	31,481,620	91.6

American Iron and Steel Institute. Companies included above during 1942 represented 99.8 per cent of total blast furnace production.

J. S. Steel Earnings in First Half Up Slightly Over Like 1943 Period

OWING to severe restraints on the el industry in recruitment of labor, manpower situation was generally ht with all producers, Irving S. Olds, airman, United States Steel Corp., serted last week in a statement ac- mpanying the corporation's first half nancial report.

The corporation's first half net profit taled $32,382,533, equal to $2.27 a mmon share, comparing with $31,086,- 3, or $2.12 a share, reported in the e 1943 period. Second quarter net rnings were $15,354,917, against $15,- 9,456 in corresponding quarter last ar.

Referring to the steel production out- ok, Mr. Olds commented that free- m from spot strikes would prove to a help. During the last quarter, he id, the corporation was handicapped 189 work stoppages, which resulted loss of 311,000 tons of steel and 110,000 tons of coal, and in his opinion all of these stoppages were entirely unjustified.

Discussing the plate situation, he said that the new plate mills at Homestead, Pa., and Geneva, Utah, should be in full production by the middle of September. At Homestead, three out of four outlets have been completed, and at Geneva three out of five will have been completed by Aug. 15, with the remaining two a month later.

The corporation's electrolytic tin plate mills are operating around 45.5 per cent of capacity, due to the rigid controls on tin plate.

Bethlehem Earns $1.71 A Share in Second Quarter

Bethlehem Steel Co.'s net for the quarter ended June 30 was $6,733,843 after all charges and federal taxes. This compares with a profit of $6,432,538 in the March quarter and $6,614,210 in the June quarter last year. Second quarter earnings were equivalent to $1.71 a common share, against $1.61 per share in the March quarter and $1.67 in the June quarter, 1943.

Directors declared a dividend of $1.50 on common shares, the same as was paid in previous quarters.

Current operations are at 105 per cent of capacity and for the second quarter averaged 103 per cent. In the preceding three months operations averaged 103.5 per cent and in the second quarter last year the average was 98.7 per cent.

J. & L. Earnings

Jones & Laughlin Steel Corp., Pittsburgh, and subsidiaries report for the quarter ended June 30 net profit of $1,879,835. This compares with $2,411,248 in the like 1943 period.

Sheet & Tube Net

First half net profit of Youngstown Sheet & Tube Co., Youngstown, totaled $1,798,017, equal to 95 cents a common share, compared with $2,257,425, or $1.22 a share, in like 1943 period.

Sloss-Sheffield Reports

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., has first half net profit of $342,155, or 51 cents per common share. In comparable 1943 period company earned $478,211, or 79 cents a share.

M. A. Hanna Report

Second quarter net profit of M. A. Hanna Co., Cleveland, totaled $1,025,348, bringing earnings for the first half of $1,868,761, equal to $1.50 a common share. First half 1943 profit was $1,885,328, or $1.54 a share.

Acme Steel Income

Acme Steel Co., Chicago, reports second quarter net profit of $436,844, equal to $1.33 a share, compared with $509,554, or $1.55 a share, in same period last year.

Granite City Earnings

Net profit for the first half of $203,685, equal to 53 cents a share on capital stock, is reported by Granite City Steel Co., Granite City, Ill. This compares with $221,912, or 58 cents a share, for like 1943 period.

Sharon Steel Reports Net

Sharon Steel Corp., Sharon, Pa., reports second quarter net profit of $141,233, compared with $166,512 in corresponding 1943 quarter. Net earnings for the first half amounted to $307,745, or 40 cents a common share, against $935,436, equal to $2 a share, in comparable period last year.

Present, Past and Pending

NAVY PLACES 6800 STEEL WAREHOUSE UNITS

W YORK—More than 100,000 tons of steel frame and corrugated sheets will be re- ired for 6800 warehouse units just placed by the Navy for export. Butler Mfg. ., Kansas City, Mo., will build 3000 units and Stran Steel Division, Great Lakes el Corp., Detroit, will build 3800.

BETHLEHEM BUILDING TWO NEW ORE CARRIERS

ALTIMORE—Bethlehem-Sparrows Point Shipyard Inc. has laid the keels for two 25,- 00-ton ore vessels as a start on a program of replacement.

RFC REPORTS ON TRANSACTIONS IN SURPLUS STEEL, SCRAP

ASHINGTON—Iron and steel scrap totaling $11,670 has been declared surplus to ate, Reconstruction Finance Corp. announced last week. Sales of steel declared urplus to date totaled $36,752 compared with cost of $42,528. RFC has acquired urplus steel to date totaling $929,822 and held on July 15 surplus steel costing 387,294.

CONTINENTAL BUYS GRAY MARINE MOTOR CO.

ETROIT—Continental Motors Corp. has purchased assets of the Gray Marine Motor o., to be operated as an independent subsidiary, with John Mulford as president.

PERMIT USE OF COPPER IN TIE PLATES, SPIKES

ASHINGTON—National emergency specifications for steel products, contained in hedule 7 of Limitation Order L-211, have been modified to permit the use of cop- r, subject to Copper Division approval, to produce steel tie plates and spikes.

COMPLETES SURVEY OF STEEL EXPANSION

ASHINGTON—Metal Division of the Bureau of Foreign and Domestic Commerce has st completed an extension survey of the steel expansion program.

DR. FRANK TONE, CARBORUNDUM CO. HEAD, DIES

AGARA FALLS, N. Y.—Dr. Frank J. Tone, chairman, Carborundum Co., died July at his home after a long illness. He was 75.

CERTAIN SCRAP EXEMPTED FROM RENEGOTIATION

ASHINGTON—Iron and steel scrap has been exempted from contract renegotiations der certain conditions, WPB said last week. Exemption applies only to dealers d brokers.

Use of German prisoners of war, such as these shown entering an American Army camp, has been proposed as a possible means of alleviating the acute shortage of foundry workers, held as the chief threat to heavy truck production

Truck, Heavy Ammunition Needs Bulge; Manpower Shortage Acute

Foundry labor is chokepoint in attaining truck and tank goals. Fifty thousand more workers wanted for explosive and shell-loading plants as ammunition consumption in war theatres exceeds earlier expectations

NEW paradoxes are being brought forth constantly by the ever-changing picture on the production front in the United States.

While the basic reconversion program slowly takes shape, urgent new calls for specific kinds of war materiel come from military leaders. Materiel programs which a few months ago were being cut back are enlarged, sometimes beyond their original goals.

Currently causing concern to the military is the production of heavy trucks, which according to the War Department, "have become a No. 1 item of military importance on a parity or urgency with the B-29 bombers and the heavy artillery."

An appeal for increased production was issued by the department after a three-day conference in Washington attended by Lieut. Gen. Brehon Somervell, commanding general, Army Service Forces, with representatives of the truck industry and war production officials. General Somervell warned that "the 1944 truck program will fall short of requirements by more than 80,000 unless immediate action is taken."

Nub of the problem is manpower. The shortage is especially acute in the gray iron and malleable foundries which supply components for the trucks. Representatives of foundries and the truck builders believe that 4500 additional men placed in key foundries would solve the shortage and help meet production schedules. All components of the truck industry have been placed on the national urgency list of "must" programs and are allowed the highest priority for labor referral through the United States Employment Service.

One proposal which is being considered as a possible solution to the foundries' labor shortage is the use of German prisoners of war.

Another proposal which is receiving attention of the War Production Board is the inauguration of wage incentive plans. A survey of foundry and forge plants where incentive plans were tried showed production increased 42 per cent.

In protest against a WPB release intimating that the foundry labor shortage was caused in part by an abnormally high rate of turnover "due to onerous working conditions and low wages", the Steel Founders' Society of America recently addressed a letter to the WPB taking exception to the statement. Attached to the letter were figures from the Bureau of Labor Statistics showing foundry wages and the foundry labor turnover rate, comparing favorably with other industries.

With the truck industry asked to virtually double its production in the heavier truck brackets, General Somervell stressed that adequate facility expansions have been made in foundries, axle, transmission and component plants to provide capacity for the increased production need—provided labor can be obtained to man them.

Placing of high urgency requirements on tanks and components also has accentuated the foundries' problems in areas producing this material. This castings industry has been given the highest labor referral priority. The War Department recently asked for a big expansion in tank output—a program which once was cut back sharply—in view of the unexpectedly high losses in the invasion of Europe.

Similarly, lessons of the war have caused demands for heavy artillery and

War Plants Closed as Workers Walk Out for Trivial Reasons

Pleas of military leaders for increased production to sustain Allied successes unavailing. Cutbacks in war contracts, suspension of union officials, transfers and wage adjustments cited as causes for work stoppages

DESPITE pleas by military leaders that production of war material must be stepped up immediately to sustain recent Allied successes, war plants last week were plagued by an epidemic of strikes. Most of the stoppages were for trivial reasons and were of short duration.

Typical of the walkouts were the following:

Eleven hundred workers at the National Malleable & Steel Castings Co., Cleveland, left their jobs following a War Labor Board ruling which granted wage increases to 400. Spokesmen for the union, the AFL Auto Workers, said members voted to stay away from their jobs for two weeks in the hope that the critical shortage of castings would force the government to take more liberal action.

The American Rolling Mill Co. was forced to suspend operations at its Ashland, Ky., plant when 2100 workers struck in protest against the changing of hours of one worker in the galvanizing department.

"Too many rivets" was held the cause for a stoppage at the Michigan City, Ind., plant of the Pullman-Standard Car Mfg. Co. One hundred and twenty riveters refused to work because they claimed they were required to drive too many rivets to earn their base pay under a contract set up in 1942. Between 500 and 600 were affected by the walkout.

Three thousand workers at the Ohio Crankshaft Co., Cleveland, were idle in a dispute over the discharge of two workers who had refused to accept a transfer.

Production of aircraft engines at the Packard Motor Car Co., Detroit, was curtailed by a strike of 900 metal polishers in a wage rate dispute.

Gun mount output was halted at the Norge Division of Borg-Warner Corp., Muskegon, Mich., when 1200 struck in protest against the discharge of a union steward.

Briggs Mfg. Co.'s Outer Drive plant at Detroit was closed twice in one week when 1500 workers manufacturing ball turrets for bombers quit in a wage adjustment dispute.

War Labor Board directed striking employes at the Western Foundry Co., Chicago, to return to their jobs.

Under Secretary of War Robert Patterson called upon strikers at the Centrifugal Fusing Co., Lansing, Mich., to resume production. Wages and the discharge of an employe two years ago were at issue.

Five hundred employes of Truscon Steel Co., Cleveland, halted work briefly to protest failure of the War Labor Board to rule on a wage increase application.

Employes at the Worthington Pump & Machinery Corp., Holyoke, Mass., staged a "stay-in" strike to protest a cutback in Navy orders.

McKinney Tool Co., Cleveland, employes struck when one employe was discharged.

War Labor Board called upon workers at the Wright Aeronautical Corp. plant at Lockland, O., to return to their jobs of producing aircraft engines, after the union had asked Presidential seizure of the plant. Union spokesmen charged the stoppage was caused by suspension of union officials as employes of the plant.

The WLB last week announced that 182 unsettled wage cases involving gray iron, malleable and steel foundries would be handled with the "utmost dispatch" by regional offices. The board set forth a five-point program covering principles for wage determination and stabilization decisions.

eavy ammunition to be increased and he War Department has asked the War Manpower Commission to supply about 0,000 additional workers to operate explosive and shell-loading plants, curtailed year ago in the first major cutback in he war production effort.

The blanket of fire laid down in Italy and Normandy and the islands of the Pacific and the almost continuous bombing of Europe have been so heavy as to lower the stores of shells, bombs and other heavy ammunition to a point below which it cannot be permitted to go.

Steel plants, blast furnaces and coke ovens also are feeling the manpower pinch. E. G. Grace, president of Bethlehem Steel Co., last week told WMC Commissioner McNutt the industry needs men right now for essential work and that jobs are open in every principal steel production center in the country.

The labor shortage in the steel and allied industries prompted speculation that a 54-hour week might be ordered in these industries. The War Department already has decreed the longer workweek for civilian employes of the Army Service Forces.

To study ways of fully utilizing the abor forces available, Mr. McNutt has appointed a WMC Industry Associations Committee of nine members representing approximately 750 industries. Function of the committee will be to encourage pecific industries and industrial groups o co-operate in the exchange of applied ew discoveries, ideas and methods that ave resulted in a reduction of manower requirements. They also will be

(*Please turn to Page* 134)

Hazlett Succeeds Parsons As J. & L. Sales Chief

Adam J. Hazlett has been elected vice president in charge of sales of the Jones & Laughlin Steel Corp., Pittsburgh, succeeding Lewis M. Parsons, who, as of July 27th, has resigned.

In addition, Mr. Parsons has resigned as a director and member of the executive committee. Mr. Hazlett has been general manager of sales for the corporation since February.

At the same time, W. Reavis of the law firm of Jones, Day, Cockley & Reavis, Cleveland, was elected a director of the corporation.

Burley Heads Carbon Bar Sales for Republic

J. V. Burley, who has been general manager of sales of the Steel and Tubes division, Republic Steel Corp., Cleveland, last week was named manager of sales of the Carbon Bar division of Republic. He succeeds the late R. W. Hull. At the same time, J. A. Ireland has been appointed to succeed Mr. Burley as general manager of sales of the Steel and Tubes division.

Postwar Model Ban Is Removed

New WPB regulation, effective July 22, authorizes manufacture of experimental models where such does not hamper war work. Action is second in series of four moves toward resumption of peacetime manufacturing

AUTHORIZATION to produce postwar experimental models if they do not interfere with war production went into effect July 22.

This was the second step in the series of four actions recently approved by the War Production Board to provide a basis for eventual reconversion of industry and such extra civilian goods production as can be conveniently undertaken at this time without hampering the war effort.

The first of WPB's reconversion orders became effective July 15 when prohibition against non-war use of aluminum and magnesium was revoked. The third order, permitting manufacturers to place orders for machinery and tools which will be needed for peacetime production, becomes effective July 29, while the fourth order, permitting WPB's field offices to grant "spot" authorizations for the manufacture of civilian goods, is scheduled to become operative Aug. 15.

Rules covering postwar model production are contained in Priorities Regulation No. 43. These grant blanket authorization to any person to engage in such production provided such activity does not cost more than $5000 a month in a single plant, including all direct costs.

To assure that production of experimental models does not interfere with output of war and essential civilian goods, WPB has provided, in addition to the requirement that labor and manpower may not be diverted, that:

1. Only the minimum number and minimum size of models necessary to prove the suitability of the article for commercial production or use may be made. This does not permit trial production runs of experimental models.
2. Materials made available specifically for another purpose may not be used to make experimental models.
3. Models may not be distributed to promote sales or create demand, and shall not be displayed to the trade or the public. Production of samples is specifically prohibited.
4. Models of houses, buildings, or structures involving construction may not be made under the rules. Experimental construction jobs will continue to be governed by provisions of Order L-41.

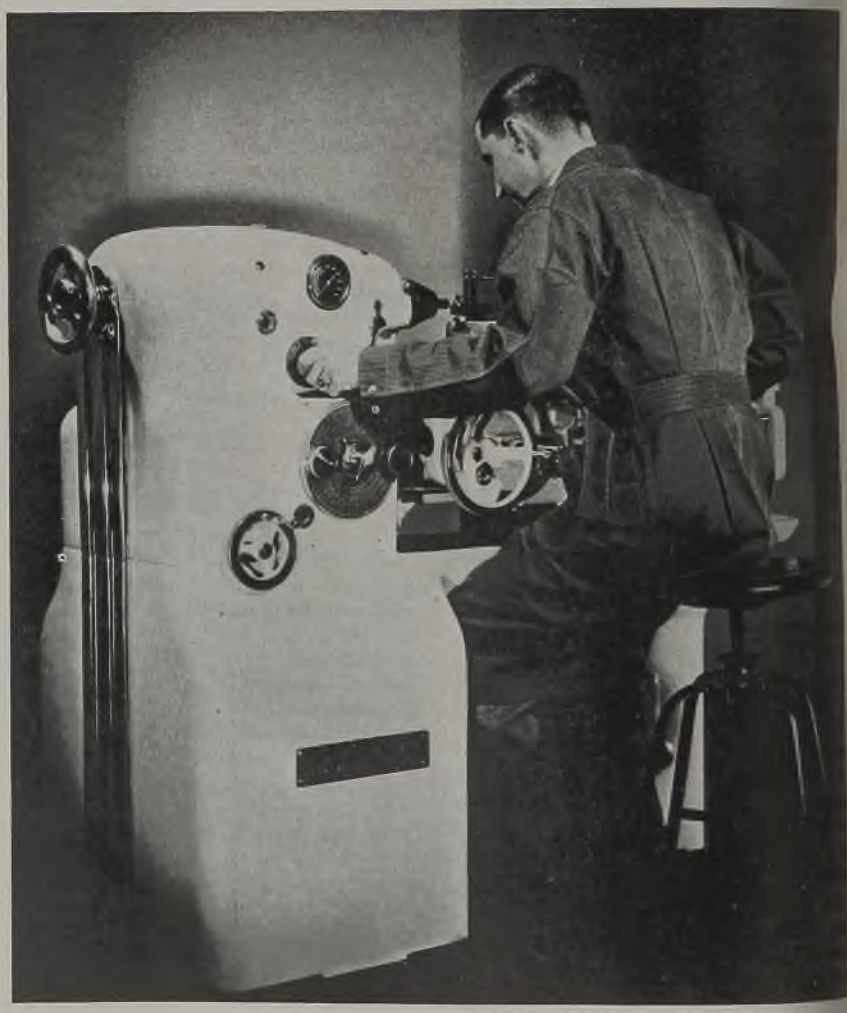
At the same time that the new priorities regulation was announced, WPB issued an amendment to the WPB order (P-43) giving priorities assistance to laboratories. This order assigns a preference rating and allotment symbol to get materials to conduct the manufacture of experimental models. It has been amended to conform to the new priorities regulation. Materials for making models may be obtained with the use of an AA-3 preference rating and the allotment symbol V-9. Controlled material orders may be placed with this symbol.

Order No. P-43, relating to laboratories, previously could be used to get materials for the manufacture of experimental models if such manufacture was not prohibited by a WPB order or regulation. The new priorities regulation supersedes all existing orders and regulations which limit or prohibit the manufacture of models of civilian type items. Under its provisions such things as models of refrigerators and printing presses may be made.

The following five instances are specific illustrations of the application of the new priorities regulation:

1. Order L-18-b prohibits the production or assembly of any new domestic vacuum cleaners or attachments. The new regulation permits a person to make experimental models of domestic vacuum cleaners or attachments regardless of order L-18-b.

2. Order M-126 prohibits the use of iron or steel (except screws, nails, strap-



Many of the machine tools of the future may look like this modernistic model of pleasing appearance constructed by one of the leading builders for marketing after the war. Note the dial conveniently located at the operator's finger tips for setting speeds and feeds. An innovation also is the tachometer above the operator's hand for showing spindle speeds. As indicated by this model, color dynamics will be featured in postwar equipment. The model shown here is by the Monarch Machine Tool Co., Sidney, O.

ing or small hardware) in step ladders. he new regulation permits a person to ake experimental models of step ladders containing iron or steel steps, regardless of order M-126.

3. Order L-28-c prohibits producers om making more than three sizes of as ranges and specifies the permitted pes. The new regulation permits a erson to make other sizes of gas ranges r experimental purposes.

4. Order L-192 prohibits producers om making construction machinery and quipment except in accordance with roduction schedules approved by WPB. he new regulation permits a person to ake experimental models of construcon machinery and equipment even ough such experimental models do not ppear in the production schedules approved under order L-192.

5. If experimental models can be ade within provisions of existing orers and regulations of WPB, it may e done without complying with the ost and other limitations of the new egulation. For example, the manufacre of cast iron boilers is restricted by er L-187 which merely limits the mber that can be made. Accordingly, person may make experimental models cast iron boilers within his quota unr that order without complying with cost and other limitations. However, he wants to make experimental modof such boilers outside of his quota, must comply with those limitations.

Reconversionists Win Out

While there has been much pulling l hauling between factions within PB and between WPB and the armed vices over civilian goods resumption, now appears certain that, for the ment at least, those favoring a start ward reconversion have won out. The rt, however, will be slow and may be layed should military reverses be entountered.

The fact must not be forgotten, hower, that demands of the military forces mounting in several directions add to the severity of the pinch in manwer and certain vital materials. As inted out several days ago by Arthur Bunker, vice chairman of the WPB duction Executive Committee, in a neral policy statement on cutbacks page 40), military production proms now in force indicate there will little opportunity for conversion unthe war has progressed considerably her.

For the most part government officials w the initial Nelson reconversion ors as a foundation for the orderly tching back of industry to peacetime duction, the program permitting dual transition in step with the war's gress. By starting conversion now, s said, industry will avoid the poslity of being wholly unprepared for major shift which will come when many collapses and one-third or more current war production will not be uired.

Summary of Essential Civilian Goods Programmed for Production

SUMMARY list of the more important hard goods programs of the Office of Civilian Requirements, War Production Board, has been issued.

Requests received by WPB regional directors from manufacturers who seek authorization to produce civilian goods after restrictions on materials are released will be checked against these lists in order that the more essential needs may be met first. Table I contains lists of goods in which there are the most serious shortages; table II, serious shortages; and table III, other products.

The first column gives the name of the item while the final column gives the amount estimated to be produced during the third quarter of 1944. The second, third and fourth columns list the amounts required at three different levels, assuming building construction activity at present levels.

Level 1 represents minimum essential requirements, assuming controlled distribution through rationing or some similar system so that products actually get to those specific people or uses for which they were programmed by WPB.

Level 2 represents minimum essential requirements, assuming no control on distribution. Level 3 means an unrestricted supply of products, in terms of quality products in unrestricted lines, based on probable production.

TABLE I—MOST SERIOUS SHORTAGES

(All figures are in units except as noted)

Product	Quarterly Program—Level 3	Quarterly Program—Level 2	Quarterly Program—Level 1	Production (Estimated) 3rd Quarter
Mechanical Refrigerators	1,226,250	250,000	12,500	0
Sewing Machines	210,000	80,000	.....	0
Vacuum Cleaners, Domestic	648,425	125,000	.....	0
Electric Ranges	261,000	75,000	33,294	11,375
Space Heaters, Electric	125,000	37,500	.....	0
Heating Pads, Electric	375,000	107,500	.....	0
Commercial Appliances, Electric, Not Cooking or Heating	$1,755,000	N.A.	$702,000	$400,000
Electric Fans, Domestic and Commercial	700,000	234,370	10,000	10,000
Vacuum Cleaners, Industrial	4,500	1,500	900	500
Farm Radio Batteries	*121,600	*91,200	.....	*45,000
Typewriters	91,000	60,000	36,000	2,000
Laundry & Dry Cleaning Machinery, Com'l.	$8,500,000	$6,000,000	$2,000,000	$2,885,000
Washing Machines	725,000	350,000	225,000	0
Ironing Machines	82,500	42,000	.....	0
Floor Finishing & Maintenance Machinery	3,100	1,250	300	300
Vacuum Tubes	16,500,000	10,000,000	4,500,000	4,500,000
Refrigeration, Air Conditioning, Etc.				
Water Coolers	19,000	N.A.	9,000	0
Walk-In Coolers	2,760	N.A.	920	0
Evaporative Coolers	100,000	N.A.	35,000	0
Dairy Refrigerators	4,020	N.A.	1,340	0
Display Cases	22,800	N.A.	7,600	0
Dough Retarders	1,800	N.A.	600	0
Reach-In Coolers	8,580	N.A.	2,860	0
Portable Electric Lamp Shades	40,500,000	7,925,000	.....	0
Portable Electric Lamps	8,500,000	4,250,000	.....	0
Motion Picture (35 mm) Equipment	4,394	3,625	4,221	1,290
Bathtubs	100,000	35,000	9,000	7,555
Plumbing Fixture Fittings and Trim	†8,069,000	†8,069,000	†8,069,000	†8,476,000
Gas Hot Plates	35,000	35,000	.....	11,500
Oil Ranges	123,000	110,000	N.A.	50,000
Coal and Wood Stoves (Sheet Metal) With Grates, Etc.	40,000	30,000	N.A.	12,000
Fuel Oil Stoves, Portable	210,000	100,000	30,000	40,000
Oil-Fired Floor Furnaces	5,637	2,750	.....	0
Class B Oil Burners	69,145	30,042	12,335	0
Class B Stokers	75,000	37,500	.....	0
Electric Water Heaters	45,000	30,000	12,500	6,500
Snow Shovels	972,000	508,000	.....	0
Furnace Scoops	374,280	480,000	.....	0
Steel Tray Wheelbarrows	150,000	100,000	83,000	31,500
Steel Wheelbarrow Trays	50,000	50,000	42,000	0
Hand Hair Clippers, Domestic Electric	271,400	108,600	.....	N.A.
Hand Hair Clippers, Commercial	61,200	N.A.	21,250	N.A.
Wrist and Pocket Watches	4,019,300	2,375,000	.....	N.A.
Cases for Imported Watch Movements	1,000,000	950,000	.....	N.A.
Carpet Sweepers	488,000	375,000	.....	100,000
Mop Wringers, Commercial	62,500	31,250	.....	0
Roasters, Black Steel	250,000	250,000	.....	17,500
Stainless Steel Cooking Utensils:				
Commercial	N.A.	57,000	.....	0
Domestic	N.A.	260,000	.....	0
Firesets	130,333	46,000	N.A.	10,200

*, thousands of cells; †, pounds.

(*Please turn to Page 40*)

Civilian Goods Programmed for Production

Product	Quarterly Program Level 3	Level 2	Level 1	Production (Estimated) 3rd Quarter
Grates	211,675	130,425	N.A.	8,100
Fireplace Screens	189,000	103,500	N.A.	12,300
Hair Pins and Bob Pins	‡5,710	‡4,180	.....	‡1,565
Coal Hods	450,000	450,000	.....	Negligible
Funnels	250,000	231,000	.....	40,000
Galvanized Oil Cans	360,000	384,000	.....	150,000
Domestic Oil Storage Tanks	83,102	44,000	44,000	12,500
Hydro-Pneumatic Tanks	55,200	55,200	55,200	12,500
Aluminum Cooking Utensils	†16,667,000	†5,000,000	.....	0
Gutters, Downspouts and Other Sheet Metal Rain Goods	§33,556	§22,600	§19,600	§9,667
Chains:				
Auto Tire	**4,903	**4,903	**4,903	0
Farm Tractor Tire	**404	**404	**404	**167
House Trailers	12,000	10,000	4,500	9,000

TABLE II—SERIOUS SHORTAGES

Bicycles	753,405	150,000	75,000	75,000
Fuses (Under 2300 Volts)	24,675,000	24,675,000	.....	18,500,000
Commercial Cooking and Heating Appliances, Electric	$690,000	N.A.	$276,000	$150,000
Office Machinery (Except Typewriters)	$13,900,000	$10,465,000	$3,200,000	$9,700,000
Scales and Balances	$4,600,000	$2,000,000	$1,000,000	$1,600,000
Commercial Dishwashers	N.A.	N.A.	1,604	1,604
Ice Refrigerators	150,000	150,000	.....	100,000
Flashlight Cases	6,250,000	2,175,000	.....	500,000
Kerosene Mantle Lamps	61,850	41,850	.....	40,000
Tubular Lanterns	345,290	345,290	.....	345,000
Scullery Sinks	7,100	7,100	7,100	6,000
Shower Stalls	4,000	4,000	4,000	3,750
Cast Iron Boilers	26,000	26,000	26,000	24,000
Cast Iron Radiation	††1,750,000	††1,750,000	††1,750,000	††1,225,000
Gas Ranges and Cook Stoves	483,000	250,000	125,000	170,000
Coal and Wood Ranges and Cook Stoves	168,000	150,000	100,000	100,000
Oil Cook Stoves	82,000	70,000	N.A.	35,000
Oil Table Stoves	88,000	57,000	N.A.	50,000
Combination Ranges	46,900	25,000	5,000	23,000
Portable and Drum Ovens	138,000	125,000	75,000	120,000
Commercial Cooking Equipment, Non-Electric	N.A.	N.A.	15,803	15,823
Food Serving and Preparation Fixtures and Equipment	N.A.	$1,500,000	.....	N.A.
Gas Radiant and Bathroom Heaters	247,000	125,000	105,000	100,000
Gas Circulating Heaters	124,000	65,000	20,000	52,000
Gas Floor Furnaces	47,500	20,000	7,500	10,000
Schoolroom Stoves	400	300	N.A.	160
Laundry Stoves	28,000	28,000	28,000	26,000
Fuel Oil Stoves, Other Than Portable	105,000	50,000	5,000	40,000
Warm Air Distribution Equipment (carbon steel)	**25,000	**18,000	**11,000	**13,530
Furnaces, Warm Air (cast iron and steel)	55,000	55,000	40,000	42,000
Class A Stokers	6,550	6,550	6,550	4,549
Low Pressure Steam and Hot Water Heating Specialties	‡2,947,000	2,947,000	2,947,000	2,326,000
Gas Sidearm Water Heaters	75,000	75,000	75,000	71,000
Underfired Water Heaters	165,000	165,000	165,000	156,000
Coal-Fired Water Heaters	96,000	96,000	96,000	91,000
Indirect Water Heaters	25,000	25,000	25,000	23,700
Household Kitchen Cutlery	$156,000	$43,800	.....	N.A.
Household Table Cutlery	$450,000	$300,000	.....	N.A.
Scissors and Shears	$2,287,000	$1,600,000	.....	$1,100,000
Alarm Clocks, Electric and Spring Wound	4,363,437	2,750,000	.....	1,370,000
Animal Traps and Cages	$1,453,834	$1,191,000	.....	N.A.
Blued Steel Drip Pans	380,900	380,900	.....	N.A.
Clothes Pins, Metal Spring	N.A.	65,803,000	.....	N.A.
Miscellaneous Household Articles	N.A.	$15,000	.....	N.A.
Heat and Flame Resistant Cooking Utensils	N.A.	$8,407,000	.....	N.A.
Insecticide Spray Guns	2,500,000	1,500,000	.....	1,400,000
Kitchen Tools	$14,545,000	$2,500,000	.....	N.A.
Wire Garment Hangers	200,200,000	76,250,000	.....	60,000,000
Curtain Rods	10,728,000	10,728,000	.....	N.A.
Emblems, Pin Tickets and Tags	$5,818,600	$4,475,000	.....	$4,000,000
Common Pins	$926,000	$703,200	.....	$375,000
Safety Pins	$601,000	$530,000	.....	$350,000
Fountain Pens	9,050,000	2,750,000	.....	2,300,000
Umbrellas	4,168,000	1,200,230	.....	1,100,000
Baby Carriages	233,000	233,000	.....	150,000
Galvanized Pails	6,000,000	6,000,000	.....	4,320,000
Galvanized Utility Baskets	315,000	180,000	.....	N.A.
Wash Tubs	2,667,000	2,000,000	.....	1,800,000
Sofa Beds and Lounges	210,000	101,400	.....	100,000
Metal Plastering Bases and Accessories	7,468	2,049	1,782	1,340
Screen Cloth (Square Feet)	144,129,000	85,005,000	.....	77,145,000
Metal Edged Gypsum Plank (Square Feet)	524,575	524,575	524,575	293,750
Manhole Fittings	15,000	15,000	.....	9,000
Gasoline Flat Irons	43,750	25,000	.....	N.A.

†, pounds; ††, square feet; ‡, millions; §, thousands of linear feet; **, short tons.

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Cutbacks Procedure Announced

Orderly transition from war to peace production, with minimum dislocation of employment and maximum utilization of resources, will be sought

PROCEDURE by which the Staff of the Production Executive Committee of the War Production Board will handle cutbacks and other production adjustments so that there will be the least possible dislocation of employment and the greatest utilization of resources was announced last week by Arthur H. Bunker, deputy vice chairman of the WPB and director of the Production Executive Committee.

Membership of this committee includes representatives of the War and Navy Departments, the Maritime Commission, various sections of the WPB, Smaller War Plants Corp., and the War Manpower Commission. With Mr. Bunker as director, the committee's Staff includes Stacy May, director of the Bureau of Planning and of WPB, in charge of long term-planning, and W. B. Murphy, WPB deputy vice chairman for production, in charge of handling current adjustments.

Safeguards All Public Interests

"The fundamental idea in our plan of operation is to bring every important production adjustment under the close scrutiny of every branch of the government which may be affected, and thus safeguard all various public interests which these branches are intended to serve," stated Mr. Bunker.

"Our experience shows definitely that cutbacks are not now significant as an overall problem. In a majority of the cases cutbacks have involved no substantial release of resources. Either they have involved paper cuts only—cases in which the curtailment affected future peak schedules which had not yet been achieved by the plant in question—or they have been applied to concerns with such large backlogs of military orders that the cut in question could be taken without releasing men or slackening the production pace.

"In essence, the task of the Staff is to guide the incidence of cutbacks so as to provide orderly readjustment of war production to meet military needs, and transition from war to peace production. Right now, because war needs are so great, present work actually amount

training for coping with the bigger oblem which lies ahead.

"The task, however, definitely never ill be the prevention of cutbacks. On e contrary, it is most desirable to fa- litate the systematic handling of them order to accelerate reconversion."

As to methods, the PEC Staff reviews ery program cutback proposed by a ocurement service involving a reduc- n of as much as $1,000,000 in the al value of the items to be delivered in e current month or in any one of the ceeding six months, under all prime ntracts for the same procurement item. addition, the Staff is notified of each ange in any single outstanding con- act which reduces the value of items be delivered during the current month d succeeding three months by $200,- 00 or more.

The $1,000,000 figure covers programs, hich usually include several contractors, that, in fact, the Staff reviews many ntracts under a million. The $1,000,- 00 figure is a test figure and will be duced if necessary.

In the cases reviewed to date, only 23 r cent of the prime contractors were fected by curtailments amounting to as uch as a $1,000,000 monthly rate; more an 10 per cent more were between 00,000 and $1,000,000; some 62 per nt were between $100,000 and $500,000, and about five per cent were under $100,000.

While the contracts of $200,000 are not reviewed before the cutback is imposed by the procurement service, the Staff requires notification prior to the action, and so can move to place alternative work in the plant.

The determination to cut back a particular program is made by the procurement agencies—the Army, the Navy, and Maritime Commission—on the basis of changing military requirements.

If more than one contractor is involved, and the cutback doesn't cancel production of the entire item, the first task of the Staff is to determine where the cutback should be placed among the various plants affected. Thus, generally, it may be more desirable to cut a plant in a tight labor area than in a loose one. Also, it is frequently more desirable to cut the less efficient producer rather than the more expert one. However, no rigid formula is applicable.

In all cases in which it appears that the cut will release production resources, study is made by the Staff's military subcommittee to determine whether the manpower and facilities involved can be employed for the manufacture of any other military item; whether the manpower released can be better employed at other war plants engaged in war production; or whether the facility must be left in a stand-by condition as an insurance for possible future increase in war production.

Meanwhile, the various PEC Staff representatives investigate the effects of the production adjustment upon materials, manpower, and the possibilities of using any facilities which might be released for civilian production, if the procurement agencies do not need the facility for war uses.

Final Settlement Made On IHC Tank Contract

Final settlement of International Harvester Co.'s $217,000,000 contract to produce tanks at Bettendorf, Iowa, was announced last week. Col. John Slezak, chief, Chicago ordnance district, called it the first major war contract termination of World War II.

Settlement involved negotiations with 438 "first layer" subcontractors and hundreds of additional subcontractors.

The War Department informed International Harvester of the termination on March 17, 1943, and about six months were required to establish procedures and methods of settlement.

Big Steel Saving Effected Through Container Cutback

Cutbacks recently effected in the Army's steel shell container program involve five types of containers, use of which had been declining. These cutbacks are permanent and will effect savings of 93,018 tons of steel during the last five months of this year. This saving will include 61,686 tons of sheets, 29,909 tons of tubing and 1423 tons of bars. Production of the remaining 15 types of containers is continuing at unchanged rates.

POSTWAR PREVIEWS

RECONVERSION—Manufacturers permitted to build working models of postwar products under second basic WPB order. Third order will permit placing of orders for machine tools and equipment. See page 38.

RE-EMPLOYING VETERANS—Veterans Personnel Division will help returning servicemen to obtain reinstatement in former jobs, as required by Selective Service act. See page 42.

MACHINE TOOL DISPOSAL—Analysis of how surplus was disposed of after World War 1 reveals mistakes that may be avoided when current conflict ends. See page 46.

AUTOMOBILES—Ford officials' confirmation that company will build light car, streamlined version of model "A", to sell for around $500 arouses interest in automotive circles. See page 53.

SMALL BUSINESS—Smaller War Plants Corp. chief proposes plan for subdividing large western war plants into small units to be leased to individuals or corporations by government. See page 63.

PRODUCTION EFFICIENCY—To gain full use of existing space and obviate need for expansion, Chicago plant on vital work carefully integrates processing and handling functions. Ample increase in volume accompanies saving in time and materials. Growth beyond normal requirements forestalled. See page 68.

SHEET-METAL SHORTCUTS—Shortcuts effected by aircraft industry in fabricating plane components facilitated by multi-purpose dies, versatile sheet-metal benders and stretchers, developments which may be adapted at an early date for making other end products. See page 72.

BULK SHIPMENTS—Navy materials handling laboratory takes "bugs" out of palletized loads idea. Bulk handling of war goods from producer to user now expected to carry over into postwar era. See page 97.

MEETINGS . . .

Society of Automotive Engineers: National West Coast transportation and maintenance meeting, Multnomah hotel, Portland, Oreg., Aug. 24-25.

Society of Automotive Engineers: National Tractor meeting, Hotel Schroeder, Milwaukee, Sept. 13-15.

National Tool and Die Manufacturers Association: First convention, Statler hotel, Buffalo, Sept. 28-30.

American Institute of Mechanical Engineers: Electric furnace steel conference, Pittsburgh, Oct. 5-6.

Society of Automotive Engineers: National aircraft engineering and production meeting and engineering display, Hotel Biltmore, Los Angeles, Oct. 5-7.

Gray Iron Founders' Society Inc.: Annual meeting, Netherlands-Plaza hotel, Cincinnati, Oct. 10-11.

Electrochemical Society Inc.: Niagara-Buffalo meeting, Hotel Statler, Buffalo, Oct. 13-14.

American Institute of Mechanical Engineers: Fall meeting, Iron and Steel division, Cleveland, Oct. 16-18.

American Society for Metals: National Metal Congress and War Conference, Cleveland, Oct. 16-20.

Veterans' Personnel Division To Aid Servicemen Regain Jobs

Selective Service to function through state directors and local draft boards in providing reinstatement. Will adopt firm attitude if employers are unwilling to observe terms of law. Labor unions pose numerous questions

VETERANS' Personnel Division, appointed by the director of Selective Service to carry out the veterans' assistance program as it was incorporated in the Selective Training and Service Act of 1940, as amended, has had many indications that it will receive the full co-operation of most employers in carrying out the intentions of Congress.

Under the law a veteran is entitled to reinstatement in his former position or to a position of like seniority status and pay:

1—If such a position was in the employ of a private employer, the United States government, its territories or possessions, or the District of Columbia.

2—If such a position was not a temporary position.

3—If he left such position subsequent to May 1, 1940, in order to enter upon active military or naval service in the land or naval forces of the United States.

4—If he satisfactorily completed his period of training and service and received a certificate to that effect.

5—If he is still qualified to perform the duties of such position.

6—If he makes application for re-employment within 40 days after he is relieved from service.

7—If such position is in the employ of a private employer, the employer's circumstances have not so changed as to make it impossible or unreasonable to reinstate the veteran to such position or to a position of like seniority, status, and pay.

Entitled to Following Benefits

The law provides that the veteran restored to a position with his former employer is entitled to the following additional benefits:

1—He shall be considered as having been on furlough or leave of absence during his period of service.

2—He shall be restored without loss of seniority.

3—He shall be entitled to participate in insurance or other benefits offered by the employer pursuant to established rules and practices relating to employes on furlough or leave of absence in effect with the employer at the time such person entered military or naval service; and

4—He shall not be discharged from such position without cause within one year after such restoration.

To carry out this mandate from Congress, the Selective Service System will function through the state directors and the local draft boards which have handled inductions into the armed forces during the past four years. The state directors and the local boards are instructed to establish committees needed to facilitate carrying out the purposes of the law. The local boards are instructed to utilize the services of the Veterans Employment Division of the United States Employment Service, War Manpower Commission, in aiding veterans to obtain new positions. In addition about 15,000 "re-employment committeemen" have been attached to local draft boards throughout the country to help carry out the program.

Prepared To Be Hard-Boiled

While the Selective Service System has reason to believe that it will receive full co-operation from most businessmen and industrialists in mustering returned veterans back into their old jobs, it also has reason to believe that there will be the usual exceptions. The Selective Service System, therefore, is prepared to take a hard-boiled attitude. Selective Service System spokesmen say that when an employer claims that his circumstances have so changed as to make it "impossible or unreasonable" to reinstate a veteran, they will insist on being convinced that such is the case. Unless an employer has gone out of business, or died, the burden of proof will be on him.

Following is the instruction as to how local boards are to proceed when employers offer objections:

"It is obvious that misunderstandings and disputes will sometimes arise between the returned veteran and his former employer in respect to reinstatement. The conditions of both will necessarily change, and in some instances in many respects. Whether such changes are sufficient to deprive a veteran of the rights which Congress meant to confer must, of necessity, depend upon the facts in each case. It is anticipated that the employer will meet the problem in a spirit of fair play and in appreciation of the sacrifices made by the veteran and that he will not take advantage of any technicality in order to evade his responsibility to the veteran.

"If, however, a dispute does arise between the employer and the veteran, a local board member or the re-employment committeeman should call personally to see the employer and attempt by every means possible to reach an amicable agreement, mutually satisfactory to the veteran and to the employer, but without sacrificing any of the veteran's rights.

"In trying to reach an amicable adjustment, the local board or its re-employment committeeman may call for assistance upon representatives of veterans' organizations or upon labor, civic, communal, or postwar planning groups, veterans' advisory committees, clearing house committees, or any other means which the state director may deem advisable."

If the local board, after doing everything it can, is unable to obtain the reinstatement of the veteran by amicable means, it is to send a report to the state director. Where legal proceedings are indicated the state director will refer the case, together with his recommendations, to the Director of Selective Service for submission to the Department of Justice, which, unless the veteran prefers to be represented by his own attorney, will act for him in bringing the case to court if that becomes necessary.

Many veterans, says the Selective Service, have become aware of [illegible] and ambitions which make them unwilling to return to their old jobs. In such cases the former employers are relieved of any obligation and it becomes the duty of the local boards to give them every assistance in locating the kind of employment they desire. The [illegible]

BRIG. GEN. FRANK T. HINES

Administrator of veterans affairs, General Hines has charge of the "human side" of demobilization," aids returning servicemen obtain jobs, administers medical care, aids in the resumption of education and similar matters

ssistance is to be rendered to veterans ot employed in regular jobs prior to heir military service.

Wherever possible, such veterans ould be taken, not sent, in person to ie office of the USES; no red tape is be permitted to hamper or confuse ie veteran in his pursuit of a job. Lo- il boards have special instructions as how to handle veterans who desire overnment jobs, or employment on the ilroads. They also are instructed as to e financial and other assistance avail- ble to veterans who desire to engage in gricultural activity. The instructions over all such matters as rehabilitation, ospitalization, medical appliances, pen- ons and financial problems.

Numerous questions have been raised, articularly by labor unions, as to the ossibility of appeals from ruling by the elective Service System with respect to ie placement of veterans in their old bs. It has been pointed out, for ex- mple, that veterans under the law are ntitled to take back their old jobs even ough it means the discharge of a work- who may have a better seniority status. he law, it has been pointed out, does ot say anything about the veteran hav- g to join the union when he is restored his old job in a union or closed shop.

"It is the duty of the Selective Service stem to see to it that the veteran ts his old job back. If there are any mplaints or any protests to be made olving its policy on seniority or union embership," says Col. Paul H. Griffith, rector of the Veteran's Personnel Divi- n, "the remedy lies in court procedure in an appeal to Congress.

"We appreciate the fact that an idle ilian worker gets just as hungry as an e veteran," says Colonel Griffith, "but der the law we have no latitude; our ly authority and responsibility is to e that the returning veteran gets his b back. We intend to let no obstacle stand in the way of that objective. Under the law, rehiring of veterans takes precedence over all union contracts. We can only depart from that attitude if Congress revises the law."

Colonel Griffith points out clearly the problem they might present "if 10 or 15 million of them, who have been trained in the art of killing, disciplined and taught to follow a leader without question—found themselves disillusioned and unemployed. The wrong type of leader might come along and find these men willing to follow."

IMPORTS FROM LATIN AMERICA TRIPLED

DOLLAR volume of imports from Latin American countries to the United States in 1943 was almost triple that of 1938, according to statistics compiled by the United States Department of Commerce.

One reason was the increased importation into the United States of strategic and essential materials, including lead, copper, mercury, manganese, industrial diamonds, quartz crystals, mica, tantalite, nitrates, sugar, industrial alcohol. coffee, tin, tungsten, fibers, balsa wood, cocoa and rubber.

Another reason was the fact that prices on imports reflected an increase of approximately 50 per cent over prewar levels.

Imports picked up substantially in the last half of 1943 as shipping conditions improved, an improvement which is being sustained.

The Commerce Department's import figures (in thousands of dollars) follow:

	1938	1941	1942	1943
Total for 20 republics	452,947	1,007,990	977,464	1,309,840
Mexico	49,030	98,445	123,939	192,704
Cuba	105,691	181,061	161,043	291,812
Central America	30,825	45,114	46,046	51,599
Costa Rica	4,102	8,719	6,042	8,895
Guatemala	9,529	12,706	15,506	16,201
Honduras	55,692	8,602	5,269	4,893
Nicaragua	2,478	3,157	4,572	5,661
Panama	3,352	4,727	2,745	1,457
El Salvador	5,672	7,203	11,912	14,492
Dominican Republic	5,745	9,745	8,411	11,665
Haiti	2,967	7,484	6,082	8,013
South America	258,689	666,141	631,944	754,047
Argentina	40,709	166,618	149,853	144,846
Bolivia	865	27,338	26,006	22,945
Brazil	97,933	183,892	165,215	228,498
Chile	28,268	111,721	139,890	141,416
Colombia	49,398	52,832	77,832	98,419
Ecuador	2,584	7,483	8,726	12,710
Paraguay	1,336	3,391	3,030	3,458
Peru	12,813	23,706	20,562	26,309
Uruguay	4,751	39,764	20,646	48,662
Venezuela	20,032	49,396	20,184	25,784

Wounded American soldiers recuperating at a field hospital on Saipan a few miles behind the front lines. Thousands of rehabilitated veterans are already returning to industry

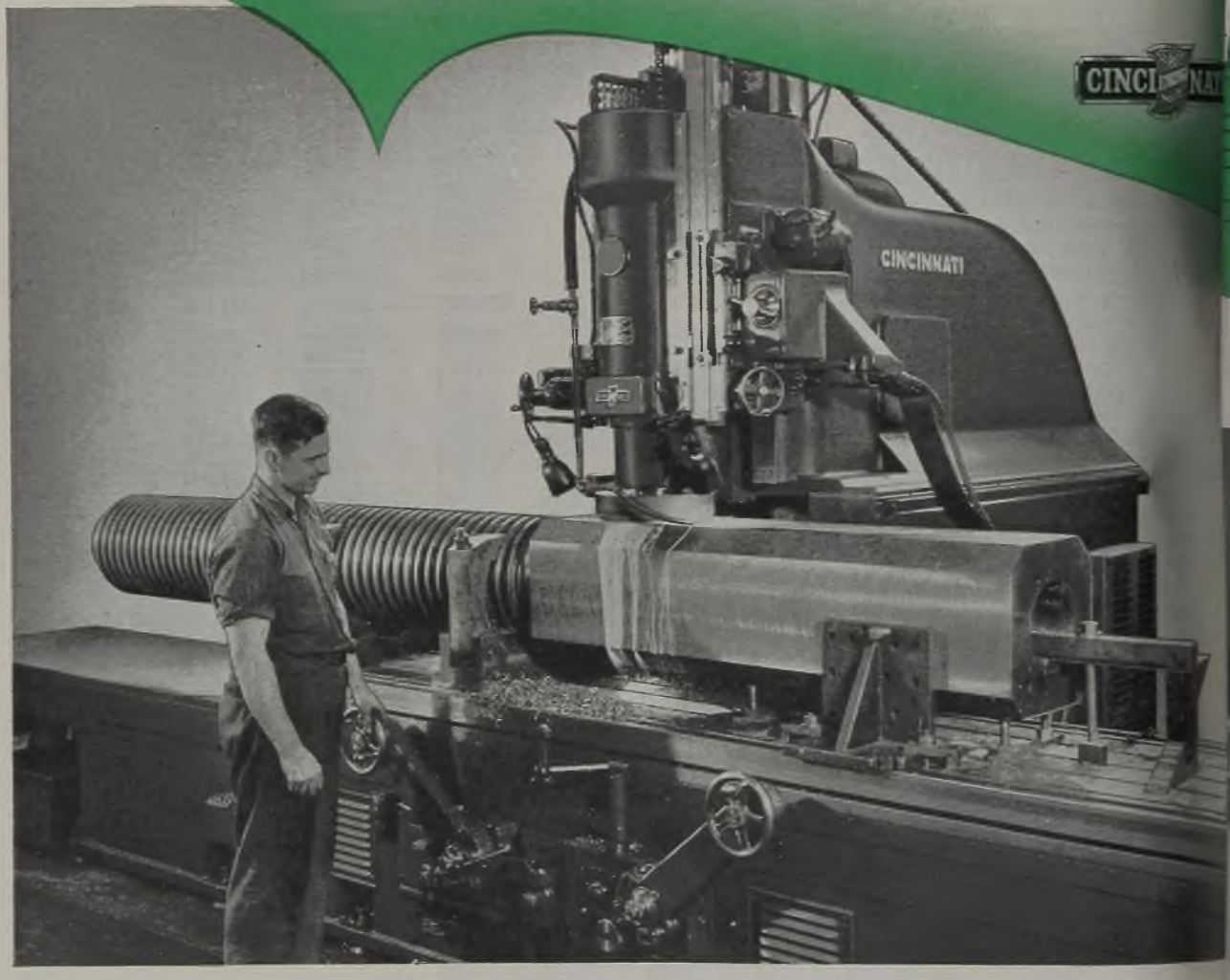
Urges Advertising of Export Price Controls

In advertising in Latin American countries, United States manufacturers and businessmen should tell how price controls operate to stabilize export prices, advises John C. McClintock, assistant coordinator of inter-American affairs. One of the most difficult problems facing the other Americas, he states, is increasing inflation. Many of the countries have experienced large increases in prices on goods imported from the United States, and consumers in those countries should be made to understand that such inflation is due to local profiteers rather than to United States manufacturers and businessmen.

Blooming Mill Hold-Down Screw

MILLED FASTER and MORE ACCURATELY

ON A CINCINNATI HYDRO-TEL



Notice the length and rigid construction of the Hydro-Tel Bed. This assures accurate milling of these long, heavy parts. The part being milled is over 100" long and weighs more than 4000 pounds.

Keep on buying WAR BONDS

THE CINCINNAT

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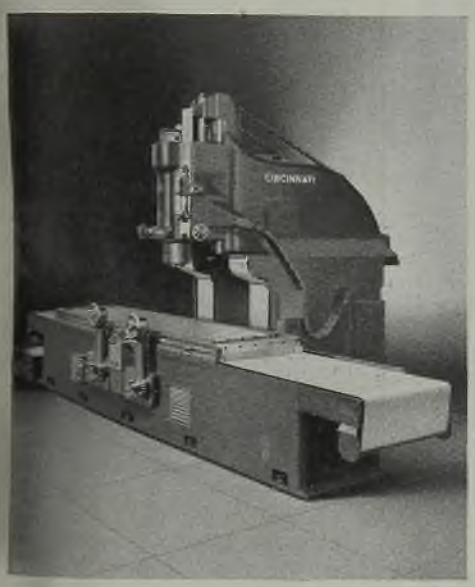


CINCINNATI *28-60 Vertical Hydro-Tel Milling Machine. A new catalog M-1284 giving complete details and specifications sent on request.*

● General-purpose milling machines must have the qualifications for handling a wide variety of milling operations and many types of work. How well the CINCINNATI Vertical Hydro-Tel handles the larger parts is illustrated at the left. Here a Vertical Hydro-Tel is milling the rectangular portion of a hold-down screw for a steel plant blooming mill. And although the part is long and heavy, the Hydro-Tel, because of its ample table length and rigidity of construction, easily handles the milling operation — milling to close tolerances and removing metal rapidly. ¶ One of the big advantages of the Hydro-Tel is ease of handling. Because of Servo control, hand traversing the table and adjusting the work and cutter to each other is just about as easy as winding your watch. In fact, every element of manipulation is designed and located for maximum efficiency and the reduction of fatigue. All told there are at least sixteen outstanding features that make the Hydro-Tel one of the most useful and desirable milling machines ever built. You'll be interested in learning more about these details and why they will prove beneficial to you. ¶ Talk over your milling problems with the engineers here at Milling Headquarters. They will be glad to give you the benefit of their fund of knowledge and experience. ¶ For complete details and specifications of the CINCINNATI Hydro-Tel Milling Machines, write for a copy of catalog M-1284. For a brief description of the entire CINCINNATI Milling Machine line, look in Sweet's Catalog File for Mechanical Industries.

CINCINNATI MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

Disposal of Surplus Machine Tools Following World War I Analyzed

Lack of information or policy by government caused confusion and delay in sales. War Department obtained 40 per cent return of cost on items sold up to 1923. Industry, then as now, profoundly affected by war demands

STUDY of the disposition of surplus machine tools by the War Department following World War 1, the uncertainty surrounding the sales program and the effect of the first war on the tool industry recently was completed by the Bureau of Labor Statistics, Department of Labor.

Government-owned machine tools sold by the War Department in the several years following the armistice numbered approximately 80,000, according to the study, which was authored by Caroline Buck Reeves of the Employment and Occupational Outlook Branch. These ranged from "small electric hand drills to large planers and boring mills," the War Department making no strict definition of the term machine tool and including in its tabulations many items never properly listed as machine tools.

Initial cost of the surplus tools to the government was approximately $50,000,000, although this cost was wrongly estimated at $300,000,000 by the War Department soon after the armistice. An inadequacy of records precludes a complete analysis of the disposition program.

On all tools sold up to 1923, on which the cost was known, the government received an average return on cost of 40 per cent. Tools costing several millions of dollars were transferred to other government departments. From the government's point of view, sales of machine tools were made without the bitter criticism directed at other more sensational sales of surplus materials.

"After World War 1," the study relates, "there was no positive and continued policy formulated by the War Department for the sale of surplus machine tools. Efforts at disposition continued for several years following the armistice and methods of disposal varied from sales at fixed prices to auction sales, sales for scrap, and sales by negotiated bids. Purchasers included manufacturers, dealers, middlemen, agents, foreign business groups, and foreign governments.

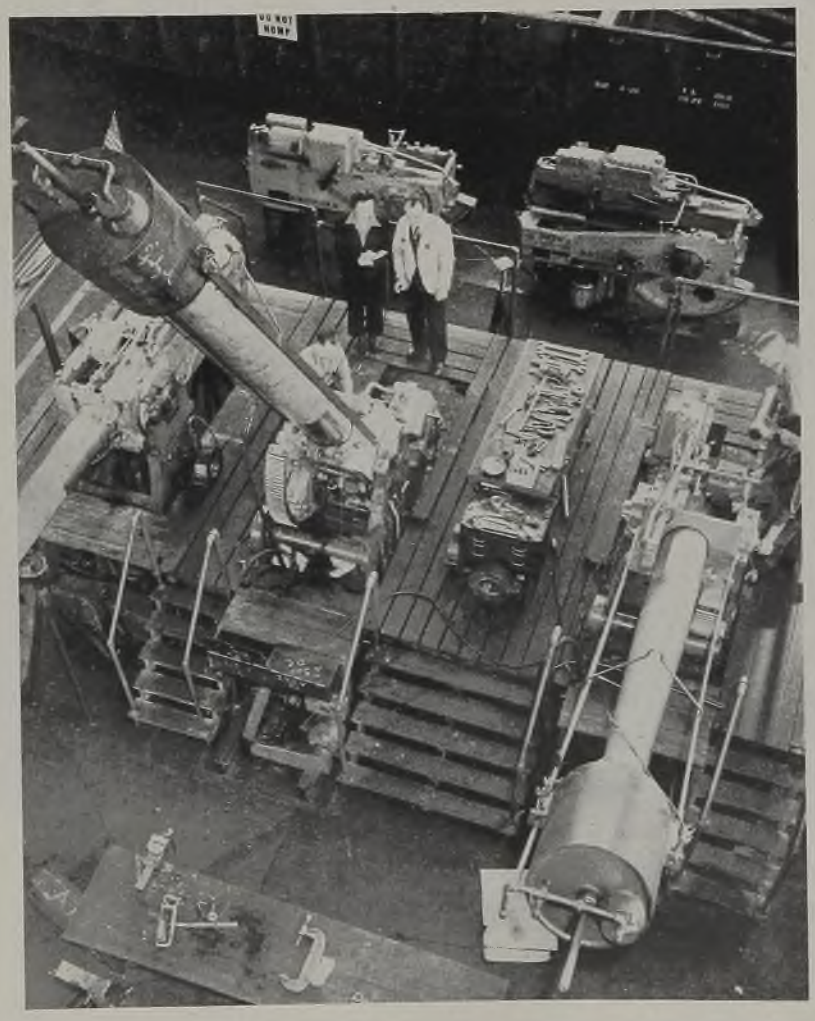
"Immediately after the armistice the industry found its future jeopardized with strangely inconsistent policies within itself and with no disposal policy on the part of the government. The armistice had come before war production was fully underway. There was no inventory of government-controlled machine tools and first announcements by the War Department on the value of those to be disposed of were so exaggerated as to strike consternation to the industry. With no detailed knowledge of the scope of the problem before it, there was little basis on which the War Department could formulate sound and comprehensive disposal policies."

Two Major Inconsistencies Noted

The study contends there were two major inconsistencies in the attitude of the machine tool industry, which were explainable by the lack of either information or policy by the government. "The industry, while urging the continuation of war contracts in order to maintain its existence, at the same time looked with fear upon any governmental policy for the disposal of surplus tools produced under these contracts."

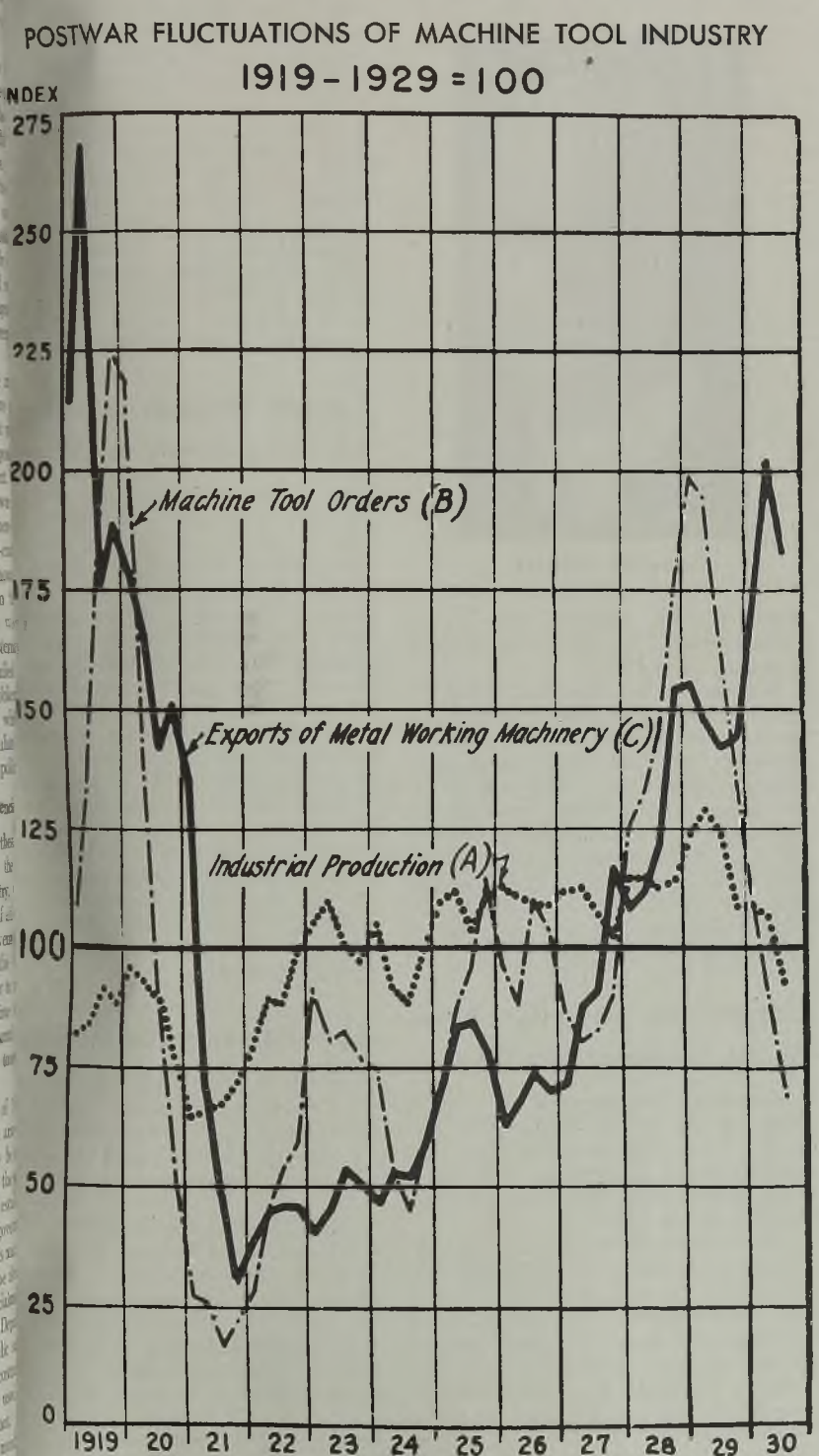
In the early months of 1919 it was not known how large an army nor what facilities would definitely be retained in the peace to come. At the same time under the procedures established for contract settlement, government-controlled equipment, such as machine tools in war plants could not be declared surplus until after contract claims had been settled. Before the War Department offered equipment for public sale, efforts were made to have the contractors take over as much as could be used in peacetime operation of his plant. All these factors delayed for many months the determination of what could be termed surplus.

During the early months following the



"FIRING" INDOORS: There is no roar or flash of flame when these 5-inch guns are "fired" at the U. S. Naval Ordnance plant operated by the Westinghouse Electric & Mfg. Co. With the aid of a barrel-like device fitted over the muzzle of the gun, naval inspectors get a bird's eye view of the recoil action

mistice, the War Department attempted to protect the industry and at the same time obtain a "fair return" on cost of the tools it held. Prices of machine tools had approximately doubled from 1914 to 1918, and the obtaining of the desired fair return without upsetting conditions in the industry was difficult. During the early months of 1919, representatives of the War Department and the tool builders conferred unsuccessfully on means of selling the surplus tools. Initial efforts were directed toward industry disposition of the surplus on a commission basis. The War Department at the same time was anxious to investigate the possibilities of foreign sales, especially in Belgium and northern France. Suggestions for these foreign sales were not favored by the builders who desired to retain the foreign market for their current output.



How the machinery industry fluctuated, as compared with all other industries, in the years following the first World War is shown above. Source: Industrial Machinery, 1930, and Bureau of Foreign and Domestic Commerce

Another suggestion for the disposal of the surplus was to lend and sell the tools to trade schools and colleges, at a small percentage of cost. Eventually, tools costing the government $2,145,022 were sold to schools for $321,753.

By early summer of 1919, the government and industry conferences were concluded without visible accomplishment. The sales office of the War Department had arranged to send representatives to Europe to attempt to arrange sales there. A contract was arranged with the French government to sell up to $25,000,000 worth of machine tools in that country, although only a fraction of the sales contemplated were made.

The War Department by now had adopted a policy of rapid disposition of the surplus, but slowness in declaring tools surplus brought a deterioration of machines. Auction sales and sales for scrap from 1920 on brought only a small return on cost. From 1919 to 1923 the return of original cost to the government dropped from 59 per cent to 13 per cent.

In the first few years following the armistice the machine tool industry measured with traditional sensitivity the barometer of economic conditions.

The industry's employment, which had increased from 30,082 in 1914 to 77,194 in 1918, dropped sharply. Machine tool shipments, as listed by the National Machine Tool Builders' Association, rose from $35,300,000 in 1914 to a peak of $220,600,000 in 1918, dropped to $36.-000,000 in 1921. Shipments through this period, in thousands of dollars:

1914	$35,300
1915	103,400
1916	141,400
1917	168,500
1918	220,600
1919	161,000
1920	151,500
1921	36,000
1922	43,300

Portable Water Drilling Rigs Used by the Army

To make sure our troops are provided with ample quantities of water under all conditions, portable drilling rigs are being provided on a large scale. Water suitable for drinking is found 40 to 500 feet beneath the surface in most parts of Europe; the drilling units have capacity to drill to 1000 feet. The rotary rig, to be used most frequently, is mounted on an 8-ton truck, is powered by a 4-cylinder motor, and has two hydraulic cylinders which generate drill pressure of 300 pounds per square inch. In addition there is a water hydraulic system which washes out dirt and rock as it is loosened by the drill.

Considerable other equipment supplied by the metalworking industry will be used. After the well is drilled and the casing put in position, a suction intake draws the water into a mobile purification unit, built inside a truck. The water is stored in 3000-gallon storage tanks.

Shift of Aluminum, Magnesium to Group III Features New Supply List

Reflects excess of supply over current war and essential industrial needs. Are first of the big-tonnage nonferrous metals to reach that group since early in 1942. Supply of many fabricated metal products continue tighter than primary metals

MALLEABLE iron castings, small and medium sized steel castings, automotive-type gray iron castings, forgings, flat-rolled steel products, cold-drawn seamless tubing, rails and wire rope, quality carbon bars and forging billets are listed in group I (materials in insufficient supply for essential requirements) of the latest Material Substitutions and Supply list released by the Conservation Division, War Production Board.

Nonferrous shortages are in copper-base alloy rod, bar, wire, tubing over 4 inches and condenser tubing; all insulated copper wire, cable cords (other than weatherproof wire and cable). Similar shortages are found in tungsten and molybdenum rod, wire and sheet, and to some extent in aluminum foil.

Shifting of the position of aluminum and magnesium from group II, the list of materials currently in balance between supply and demand, to group III, the materials that exceed current war and essential industrial needs, was one of the outstanding features of the report. These are the first important tonnage nonferrous metals to reach that group since early in 1942. Zinc and lead also have eased but remain in group II. "The supply of many fabricated and semifabricated metal products continues to be tighter than the metals themselves, "says Howard Coonley, director of the division, "because of scarcities of manpower or facilities.

"The lumber supply remains critical, especially for crating. Bituminous coal and residual fuel oil (except on the Pacific Coast) are currently in approximate balance, but both probably will be in short supply by winter. For this reason, users should order their winter fuel now while delivery facilities are available.

"The improved materials situation on many items reflects the results of both strict government regulation and voluntary co-operation by industry. The progress of the war probably will determine further improvement in the materials situation."

In addition to the ferrous and nonferrous metals mentioned above as being in short supply, the following metals are in group I: Cadmium, chromium metal, sodium, tin, columbium, and nickel (including monel).

Supplies of the following metals (in group II) are sufficient to meet war demands, plus essential industrial demands within the limits imposed by existing administrative controlling orders: Beryllium, bismuth, refined copper, lead,

HOWARD COONLEY

platinum, silver, tantalum, zinc, cobalt, ferrochromium, and steel (except items in groups I and III).

Supplies of the following group III metals, except for local shortages, are available for essential uses: Aluminum, antimony, calcium, gold, magnesium, mercury, palladium, ferroboron, ferromanganese, ferrosilicon, ferrotitanium, ferrotungsten, ferrovanadium, molybdenum, silicomanganese, silvery iron, zirconium ferroalloys, forgings (except drop and upset), gray iron castings (except automotive), pig iron, all types of reinforcing steel, and rerolled rail.

Construction Activity Shows Slight Seasonal Increase

Construction activity in the United States during the first half of this year showed the first break in the long monthly series of decreases in evidence since August, 1942, the War Production Board said last week.

The slight upturn of about 3 per cent, which began in April, was due to mild seasonal increases in private construction as public construction continued its long decline. While it is expected that this trend will continue through the early summer, seasonal factors and decreases in public construction will cause the downtrend to be resumed in the fall, WPB said.

Total new construction activity during the first half of 1944 amounted to $1,874,000,000, a decline of 58 per cent from the first half of 1943 and 40 per cent from the second half of 1943. This was due primarily to decreases of 70 per cent and 50 per cent, respectively, in public construction as private construction fell off only 4 per cent and 11 per cent over the same time period.

For 1944 as a whole, total construction activity is expected to be only about $3,500,000,000, or 54 per cent less than in 1943. The steepest decline is expected to fall in public construction activity with a drop of 65 per cent from 1943, while private construction for the year is expected to drop about 10 per cent.

Public construction activity accounted for more than $1,100 million during the first half of this year as compared with $3,770 million during the first half of 1943. Over the same period of time military construction dropped from $1,550 million to $380 million; public industrial fell from $1,309 million to $357 million; public housing from $400 million to $130 million. All other public construction dropped less sharply from $500 million to $300 million.

Copper Division Handling All Components for Wire

All component parts going into copper wire and cable now will be handled by the Copper Division, which has been made a claimant agency, the War Production Board has informed the industry. The supply of components is tight, but additional capacity for some elements may soon be provided and delivery of others may be assured by direction, WPB said. Based on the present order pattern, third-quarter requirements for copper wire and cable will exceed the productive capacity of the industry.

Tight supplies of materials and facilities have necessitated directives to all copper wire mill warehouses and all copper wire mills, establishing a quota limiting the shipments on "V-3" orders to consumers, dealers and repairmen operating under Controlled Materials Plan regulation No. 9.

Appointments-Resignations

Russell J. Greenly of Carnegie-Illinois Steel Corp. has joined the staff of the Steel Division, War Production Board as assistant to Mr. Longfield, assistant director of production.

° ° °

W. S. Murphy has resigned as chief, Gold and Silver Section, Miscellaneous Minerals Division, War Production Board. Plans are being made to merge the Gold and Silver Section with the Rare Metals and Mercury section with Henry E. Stauss, now head of the Rare Metals Section, as the new chief.

° ° °

Lawrence A. Appley has been appointed a member-at-large of the War Manpower Commission's National Management Labor Committee. He resigned in July as deputy chairman.

PRIORITIES–ALLOCATIONS–PRICES

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

INSTRUCTIONS

MRO SUPPLIES: Plants engaged in more an one activity may use the preference rating signed under Controlled Materials Plan regution No. 5 to the principal part of their siness to obtain maintenance, repair and perating supplies for all their activities. Plants at produce one item during entire year and nother for only a part of that year may folw this general rule.

PRESSURE GAGES: Specifications for comound pressure gages which producers are uthorized to manufacture and supply for the lavy have been listed by WPB. Producers are uthorized under direction 1 to schedule IV of rder L-272 to manufacture and supply comound pressure gages in the following ranges hen required by Navy specifications: 30 inch-00 pound; 30 inch-600 pound; 30 inch-800 ound; and 30 inch 1000 pound.

FURNACE REPAIR PARTS: Manufacturers warm-air furnace repair parts will not be quired to publish new price lists for such rts to be able to charge the 9 per cent inease in prices granted June 24, 1944. Manucturers may use the optional method of inreasing prices of repair parts by decreasing iscounts extended to various classes of purasers by an amount resulting in a net crease of not more than 9 per cent of the blished list price in effect on Aug. 3, 1943.

MRO EXPORT SUPPLIES: Persons proing material in foreign countries on conct with or for sale to the United States vernment may use CMP procedures to obn maintenance, repair and operating supes, if they are specifically authorized to do by WPB. Application for authorization ould be filed with the Foreign Economic ministration, Requirements and Supply anch. These rules are not applicable to her petroleum or mine and smelter operaors.

Exporters may buy up to the following nounts of controlled materials forms and apes for export MRO purposes: Carbon eel (including wrought iron), 3 tons; alloy eel, 1200 pounds; copper and copper-base loy, 300 pounds; and aluminum, 500 pounds. o place orders for such MRO supplies, exorters should place on their orders the symol E-2 and the certification described in riorities regulation No. 7.

L Orders

BATTERIES: Restrictions have been removed the use of iron, steel, copper and copperse alloy in the manufacture of dry cell tteries and have been relaxed slightly on the e of aluminum, copper, copper-base alloy, n, steel and zinc in the production of flashhts and other portable electric lights opered by dry cell batteries.

No new portable electric light may be sold manufacturers except to fill orders rated -5 or higher; and may be resold only to orders rated AA-5 or higher or orders rtified under priorities regulation No. 19. rmers may apply an AA-2-X rating for the rchase of flashlights.

Dry cell batteries and portable electric lights produced and delivered in accordance with dividual production quotas, issued quarterly WPB to manufacturers upon application on m WPB-2719 (formerly PD-880).

Aluminum now may be used to make reators while copper and copper-base alloy may used for plating current carrying parts other n cases. Iron and steel (in the form of mill blackplate rejects and wasters only) y be used for any type of portable electric light. Zinc may be used in reflectors as well as in plating and electric contact fittings.

Manufacturers have been authorized to produce specified quantities of flashlight cases to fill orders in the following six categories: Army, Navy, Maritime Commission and War Shipping Administration, export, post exchanges and ships' service stores, and "other orders covered by preference ratings." They must set aside 45 per cent of their production for orders falling in the last classification to fill those bearing a preference rating assigned on form WPB-547. The remainder may be used to fill orders rated AA-5 or higher. Manufacturers who have undelivered flashlight cases on hand on Oct. 15, 1944, may write to WPB for further delivery instructions. (L-71)

INDEX OF ORDER REVISIONS

Price Regulations

GLASS CONTAINERS, CLOSURES: Use of glass containers for the packing of most foods, drugs and health supplies in most instances is now unlimited. Closures, while still under some restrictions when made of prime black plate or tin plate, are expected to be available for the increased quantity of jars and bottles. Aluminum, without regard to quota, and black plate rejects are quota-free when used for glass container closures, whatever the product.

The small users' quota has been increased from $500 worth of glass and an equal number of closures to seal this glass to $2500 worth of glass and caps combined. Of this $2500 not more than $1000 may be used for the purpose of closures. (L-103-b)

HAND TOOLS: Derrick augers, stump augers and multispur machine bits have been added to appendix A of schedule VIII, order L-157, which specifies the types, sizes, grades and styles of bits that may be manufactured. (L-157)

CONSTRUCTION EQUIPMENT: Restrictions have been removed on the sale of 27 types of construction equipment. Carrying and hauling scrapers with more than 15 cubic feet capacity have been removed from schedule D to schedule A of order L-192 and may be sold to war agencies without restrictions and to other purchasers upon specific WPB authorization.

Construction equipment listed in schedule B may be sold now only on orders rated AA-5 or better and production schedules for these items now are filed on a quarterly basis.

Export purchase orders for repair parts amounting to less than $100 for items in schedule A no longer require specific WPB authorization.

All restrictions on the distribution of repair parts for items in schedule B have been removed. (L-192)

M ORDERS

IRIDIUM: Iridium has been released from allocation but conservation provisions of order M-49 have been retained. Reports on form WPB-2679 have been discontinued. Employment of binary platinum-iridium alloys in porcelain dental restorations when the alloys and porcelain are baked together is permitted. The order forbids the sale, delivery, purchase or receipt of iridium except for specified uses and except for sales and deliveries of iridium to persons regularly engaged in the buying and selling of iridium, such as refiners and dealers. (M-49)

PRINTING PLATES: Makers of printing plates now may use 100 per cent, by weight, of the amount of zinc they used for this purpose in the corresponding quarter of 1941. Any platemaker may use up to 250 pounds of zinc in any quarter beginning with the third quarter of 1944.

Use of copper continues to be restricted to 60 per cent, by weight, of the amount of that metal used in the like quarter of 1940. Electrotypers and gravure platemakers now are allowed all of their permitted usage (up to 60 per cent of 1940 usage) in the form of new copper, provided that half of this amount is in the form of new cast anodes received by the platemaker in return for an equal amount of printing industry scrap copper.

Sheet copper in the hands of suppliers on Dec. 31, 1942, has been released for use in making copperplate engravings. Copperplate engravers now must turn in as scrap only one pound of old copperplate engravings for each pound of copper sheet or old engraved plates used by him in making new copperplate engravings.

All zinc, regardless of gage or of date it was finished as photo-engravers' sheet, must be calculated at its actual weight without any allowance for the heavier 16-gage metal as compared with 18-gage metal. Provision that permitted unrestricted use of zinc for plates or printing ordered by a U. S. department or agency has been rescinded. Zinc sheet for use in making printing plates remains under controls of order M-339.

A publisher, printer, or printer's customer may not use his preference rating under CMP regulation No. 5 to purchase processed printing plates. (M-339)

PRICE REGULATIONS

DURABLE GOODS: Several items of industrial machinery, farm equipment and other industrial equipment have been transferred from coverage under the regulation for consumers' durable goods, No. 188. Marine hardware is placed under regulation No. 136, Machines and Parts and Machinery Services. Certain industrial safety equipment that is included in the machinery regulation is excluded from regulation No. 188. (No. 188)

TOOL STEEL SCRAP: Tungsten maximum for type 4 scrap (molybdenum content of 7 per cent or more) has been raised from 2 per cent to 2½ per cent. (No. 379)

AUTOMOTIVE PARTS: Manufacturers of automotive parts who have incentive wage plans approved by the War Labor Board may apply for OPA approval of their use of an adjusted hourly wage rate in computing formula maximum prices. (No. 452)

Small Motor Output Can Be Resumed on 60-day Notice

Members of the Fractional Horsepower Electric Motor Industry Advisory Committee are of the opinion that the industry would be able to resume production of appliance motors within 60 days after military programs are canceled.

Steel Mill Safety Program Aided By Use of Working Model Crane

Edgar Thomson Works of Carnegie-Illinois Steel Corp. finds experiment with small-scale equipment an effective and realistic classroom medium for teaching safe job routines. Expansion of program planned

SAFETY division at the Edgar Thomson Works, Carnegie-Illinois Steel Corp., Pittsburgh, some months ago began a series of experiments to find a more realistic classroom medium for teaching safe job routines than the charts, posters, and movies commonly employed in industrial accident prevention programs.

The experiment resulted in the use of a small-scale working model overhead crane, designed and constructed by Richard V. Milligan, a safety instructor at this subsidiary plant of the United States Steel Corp.

This is how Mr. Milligan explains the safety problem which the plant faced: "While the charts and movies we used in our safety educational program were effective, they lacked personal appeal. We discovered that, to a man, workers looked upon an industrial accident as something which happens to someone else, never to himself. This was, and still is, especially true of new workers, many of whom have never seen an industrial accident, and have no idea of the danger which results from carelessness. We had to find a way to help every worker project himself into a job situation and think of safe operation as it applies directly to himself."

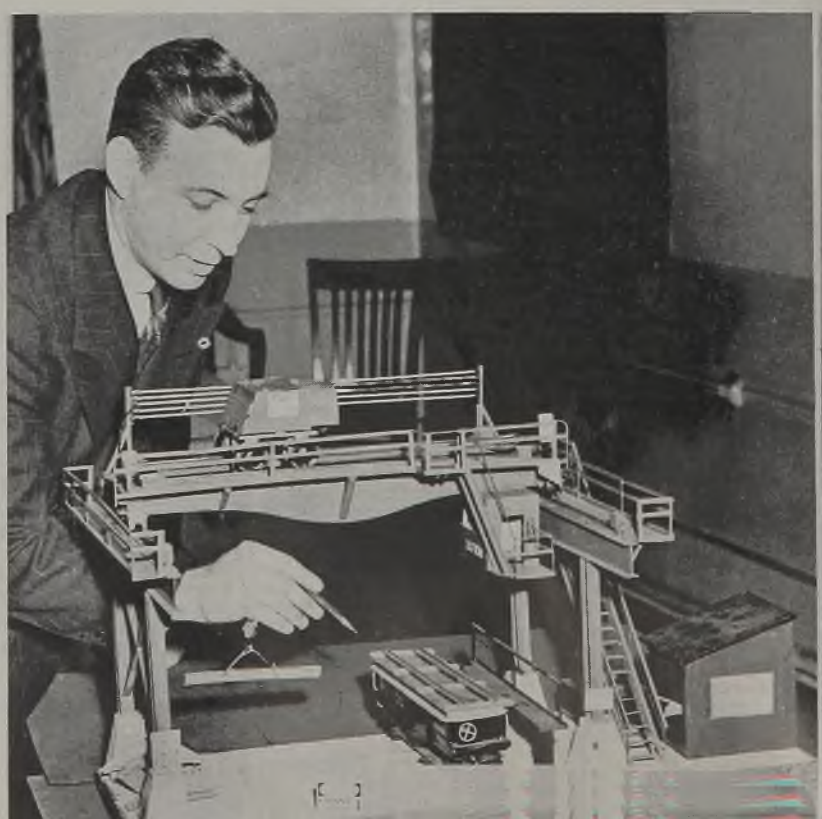
Model Illustrates Hazardous Situation

During early experiments Mr. Milligan decided to build a model which would illustrate the most hazardous working situation he could create. This model is based upon the efforts of a worker to hoist a bucket of scrap metal to the roof of a building by means of a pulley and ladder. Wrapping the free end of the pulley rope around his arm, the misguided worker begins to ascend the ladder and falls heir to a slap-stick assortment of industrial accidents. The heavy bucket pulls the worker to the roof and he hits his head on the sheave wheel, the rope breaks and he falls to the ground. The bottom falls out of the bucket showering its contents on the poor unfortunate, and another worker opens the door, knocking the ladder on top of the already injured worker.

Mr. Milligan took the model out through the mills. "What's wrong with this set-up?" he asked the workers. They would gather around him, making a game out of guessing. Then Mr. Milligan and his associates would operate the model. The men laughed but the safety lesson stuck. Months later men still come to the safety office and tell Milligan how they think of his model every time they use a pulley.

With the approval of the safety division's director, Mr. Milligan then began construction on a more serious model for safety instruction. He selected an overhead crane, because cranes have long been the cause of steel mill accidents. At his home workshop he built the crane model, complete to every moving part, every safety feature.

He began work on the model in April of last year and finished it six months later after devoting more than 300 hours of his leisure time to its construction. First he built a miniature furnace of six bricks and four bunsen burners with which he spent weeks experimenting to find the right alloy metal in which to cast the crane's tiny parts. The casting



With the slapstick model, upper right, workers at the Edgar Thomson Works, Carnegie-Illinois Steel Corp., Pittsburgh, are shown how some injuries occur. Notice the ladder placed by the outswinging door and the free end of the pulley rope wrapped around the worker's arm

Workers at the extreme right are shown attending one of the safety instruction classes in which a scale model crane is used to stress points

At the right, the instructor points out that the use of a model aids in the safety lesson since movement of the machinery involved in the job routine is before the workers' eyes

ok many weeks. Mr. Milligan says the ane was made from a collection of me fifty tin cans, watch parts, wheels om a toy train, flashlight bulbs, locket ains, and nail polish. He made a rail-ad car from tin cans and molded rails. e cast hand rails for the stairs and run-ays, rigged up fire extinguishers, and quipped the crane with safety lights nd a limit switch. A small electric motor rnishes power to operate the crane.

In use at Edgar Thomson Works class-om safety meetings the crane was a ge success. The men were fascinated, ey watched, and they remembered. Ir. Milligan had appealed to the instinct all men which normally is revealed in laying with junior's electric train.

The model's value to the safety train-g program was multiple. Because the odel is three dimensional, it furnishes he perspective essential to the under-tanding of safe operation where mo-on is involved. A sequence of action is ossible, allowing the employe to see every ove and to understand better the hases of the job being illustrated. At ie same time none of the disturbing in-uences of actual working conditions is resent—no distracting noises, no passing hicles to cut the line of vision. And ecause the instructor can point out at n's length any detailed part, the trainee not forced to learn the confusing ter-inology of construction which has rela-ely little bearing on his actual work. A trainee can operate the working odel and in doing so gains a degree of nfidence which will add sureness of uch to his subsequent operations in e shop. According to Mr. Milligan, ew employes who receive their pre-minary instruction by use of the model an be partially trained without risk of injury to other personnel or damage to expensive equipment which sometimes occurs during initial instruction on the shop floors."

Thus the model presents advantages in working out the three major steps of a general safety education program—the training of new employes, follow-up safety instruction, and the analysis of accident trends in order to work out safe job routines.

Portrays Correct Job Procedure

As Mr. Milligan explains, with the use of a model the trainee can be shown the correct job procedure from every angle. He can see, for instance, the difference between the correct and incorrect hooking of a crane load. He can see why one method is safe and the other unsafe. With his own hands he can put a load on the crane hook carelessly, and watch it slip, knocking over the miniature man on the floor of the model shop. He has "killed" only a plastic man, but he won't forget the lesson.

In follow-up instruction the model crane keeps the employes interested in safety meetings. Because the men like to watch the model crane and operate it themselves, they look forward to the classes as pleasure rather than routine.

In the near future Mr. Milligan is planning to expand his model program with other pieces of small-scale equipment. His current project is a model of the human body which will show correct techniques for lifting heavy objects.

A graduate of the University of Pittsburgh, Mr. Milligan began his service with Edgar Thomson Works in 1937 in the open-hearth department. He became safety inspector at this U. S. Steel subsidiary plant in 1941.

H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Many components needed in heavy truck program. Doubt delay caused by shortage of castings. Ford reported preparing to build streamlined version of old model "A" to sell for around $500, in addition to present line of Fords, Mercurys and LIncolns

UE and cry over the critical man-
er situation in respect to automotive
ings, particularly gray iron, now be-
whipped to frenzied proportions by
WPB. WMC, the armed services and
r Washington agencies, is about six
ks late in the opinion of observers
e to the trade here. They believe the
k of the difficulty has passed and
it to the record of gray iron castings
g poured in foundries throughout
country as clear indication that pro-
tion is steadily rising, throwing seri-
doubts on allegations that castings
rtages are holding up the heavy truck
gram.

The difficulties with the heavy truck
gram spring principally from the fact
schedules for their production in the
place were set at a fantastically
level in view of the fact only lim-
facilities were available for build-
these 10-ton monsters. It is not
a matter of castings and forgings,
scores of other components all down
line from axles to air brakes. Gray
foundries are currently shipping
ngs at a rate of over 2,500,000
quarterly, out of which perhaps 15
cent, maybe less, could be classified
uck castings.

itutes Intensive Publicity Campaign

owever, a couple of months ago in
shington it was decided to kick the
ndry manpower problem out into the
n and an intensive campaign of
blicity was drawn up to focus public
ention on foundries and forge shops.
bor, with its powerful voice in the
pital, naturally put its full weight be-
nd the activity, sensing the oppor-
nity to persuade the War Labor Board
raise foundry wage levels. Some
undry operators believed a thorough
ring of their troubles might lead the
PA to allow price increases. So the
undry and forge shop directive was
ued and the local WMC offices began
ating the drum for foundry help.

Here in Detroit a prominent foundry-
an was asked to appear on a special
dio program and read a message cal-
lated to aid the recruitment of more
rkers in foundries. He looked at his
n situation and demurred, taking the
nd that he did not need additional
lp nearly so much as he did better
oduction from the force now at work.
e reports that whereas he used to ob-
in the equivalent of 18,000 man-hours
castings weekly from his working
rce, he now averages around 14,000,
roughly a 20 per cent decline in pro-
uctivity. Right now this plant has
quests filed with the USES for five
en, but these requests have been on
e for six months and not too much
concern is being shown by the plant management whether they are filled or not.

One thing the manpower recruitment drive has accomplished is to put foundries and forge shops in the public eye, which in the long run may prove beneficial to the industry. There has been extensive discussion of the heat and dirt and manual labor involved in this type of work, but there is nothing new about this. At the same time, it may persuade some of the less progressive plants to inaugurate moderization programs and to improve their working conditions.

Output Holds at Record Pace

In any event, it is well to discount about 75 per cent of the wailing and moaning about the dire manpower troubles of foundries and forge shops. The castings and the forgings continue to be turned out in record qunatities and if indeed a 25 per cent boost in present output levels is essential one way to achieve it might be by providing extra incentives, either moral or tangible, to those now on the job. This should not be construed as an effort to deprecate the motives behind the current drive for more manpower; rather it is an attempt to appraise the matter realistically, to weigh the need against current achievements.

Clyde R. Paton, former chief engineer for Packard Motor Car Co., has been named directing engineer of a new developmental project initiated by Packard at its Toledo, O., engine parts plant, and concerned with the long-term betterment of aircraft engine performance by increases in horsepower, speed and endurance and a reduction of weight

Another hardy perennial has cropped up again—the $500 Ford car for the "low-price pure-transportation" group of buyers. At Somerville, Mass., recently Ford officials guardedly confirmed a Washington report the company would build such a postwar vehicle. The projected car would be a streamlined version of the old Model A which Ford built from 1928 until the introduction of the V-8 in 1932, featuring simplicity throughout for buyers who cannot afford $1000 models but who want automobiles. The new Ford would be an addition to the present line of Fords, Mercurys and Lincolns. Stories of such an imminent addition to the Ford family have been repeated around Detroit for at least six years, but always have failed to "jell," one principal reason doubtless being the effect it would have on values of used cars in the hands of Ford dealers. Right now and probably immediately after the war this reason will be of small consequence due to the rapid and steady deterioration of all automobiles and their absorption from dealers' lots. Inventory losses which might normally result from introduction of a new $500 model can be disregarded.

There was no indication from the Fords as to whether the junior model would carry a four or a six-cylinder engine. The elder Ford has been partial throughout his career to a four-cylinder power plant, but the merchandising experts at the Rouge have thought otherwise in recent years. The optional six-cylinder engine available in the regular Ford line might be a logical choice, except that it would probably not furnish the desired economy for a low-price car. In any event, you can be sure that the Ford engineering files are full of suitable engines for a $500 car, any one of which might be placed in production without too much delay.

Official Confirmation of Proposal

On previous occasions there never has been any official confirmation by Ford executives of proposed low-priced models. The fact such confirmation is now forthcoming can be taken in two ways—either as a trial balloon to test public sentiment or as actually indicating such a model is in the works.

The announcement inferentially confirms the prediction made here two weeks ago that Ford could be depended on to make some postwar price moves which would start the rest of the industry biting its nails.

Ford's Somerville plant has been building a universal carrier of the track-laying type for export under lend-lease to the British. Similar to the Bren gun carrier, it is a light armored vehicle used primarily for carrying infantry machine gun and mortar crews into action. The original design was built about ten years ago in England in co-operation with engineers of the Ford plant in

WATER TEST FOR WEASEL: Welded steel body for the M-29 personnel carrier, known as the Weasel, is lowered into water tank at Studebaker Corp.'s South Bend, Ind., plant to test it for possible leaks

Dagenham, and was equipped with standard 85-horsepower V-8 engine, Ford truck transmission and rear axle. Steering was through a conventional wheel and effected by a mechanism which moved the front suspension bogie wheels sidewise. This caused a gradual turn; sharp turns were made by applying a brake to one track.

American-built version resembles the British in general appearance but was redesigned to adapt it better to mass production. Principal change was to a welded steel hull, stronger and more water tight than the first riveted type. Engine was boosted to a 100-horsepower Ford-Mercury type, with special carburetor. Steering was revised by the introduction of a controlled differential which permits both steering and braking to be effected positively by two simple steering levers.

Carriers Are Well Armed

The vehicle has a low silhouette and carries a crew of four, with radio, tools and stowage. Power plant is at the rear, while oil and water radiators are amidships. The carriers are fitted for installation of two Bren guns, two Lee-Enfield rifles and two submachine guns in the rear, a platform for a 2-inch mortar on the left side front, and a rack for an armor-piercing 0.50-caliber rifle. Track links are of short-cycle malleable iron in a special alloy developed by Ford metallurgists.

"Rough surfacing" of certain engine parts, a process introduced several years ago in passenger car engines at Ford, has been carried over into tank and aircraft engines successfully. The idea, not used by Ford alone, is that a chemical or mechanical roughening of steel surfaces subjected to wear would prolong their service life by virtue of the fact such surfaces actually provide reservoirs for lubricating oil. One method to accomplish the roughening is by dipping in the acid phosphate type of solution and etching the surface. This treatment is applied to such parts as aircraft engine flyweights, pinion gear reduction shafts, valve tappets and valve tappet roller pins, pushrod ball sockets, gear pinion reductions shafts, oil pump shafts, etc. All tank engine pushrods are likewise given this chemical roughening. It will be recalled Buick metallurgists used a similar technique several years ago on a few engine parts, the work starting with crankpin journals which were rough machined and then given a light abrasive treatment instead of being finished, machined and polished.

An interesting production innovation has been worked out by Dodge engineers in connection with fabricating the burster tube of rocket shells. Specifications called for the tube to be made of seamless steel tubing, but because of short supplies experiments were started with welded tubing, forming the closed end by using a die and a mandrel. This resulted in upsetting in the length of the tube and a thickening of the wall. So the mandrel was eliminated and the same die used to form the end of the tube which was heated to 1750 degrees in the effort to avoid upsetting the wall. This process closed the tube to within 5/8-inch and the hole was sealed by arc welding, after which the tube was placed over a mandrel, held vertically in a press and restruck to smooth contour.

This method met the specifications, but Army engineers still preferred a seamless tube, so experiments were pushed on drawing the tube out of a flat disk. The first tubes showed thinning of the metal at the spherical end but finally, by changing stock thickness and diameter a series of seven draws was worked out and a perfect tube produced. All this experimental work was completed within ten days and the tube is now in volume production. Practically all the machines used in the work were former automotive equipment.

Recently filed in federal court here was a bill of complaint and petition for temporary injunction restraining engineers Karl Probst and R. N. Harger from disclosing details of three inventions they had developed in connection with automotive vehicles designed for the Henry J. Kaiser interests. Hearings will be held Aug. 7 on the complaint which seeks to have patents and improvements on the "Kaiser Kar" and "Jeep Junior" assigned to the California industrialist.

Chevrolet has received a contract for the manufacture of 105-millimeter howitzer shells in five buildings of the St. Louis ordnance plant, production starting in December and expected to reach a peak rate of about $3,500,000 a month by June, 1945. Chevrolet will have to buy an estimated $12,000,000 worth of machinery and equipment on government account for the new work. Three of the five buildings will be used for manufacturing, two for administrative work. In addition Army engineers will construct a $5,000,000 forge building and alter other structures. Present equipment in the plants is being moved to a warehouse in East St. Louis.

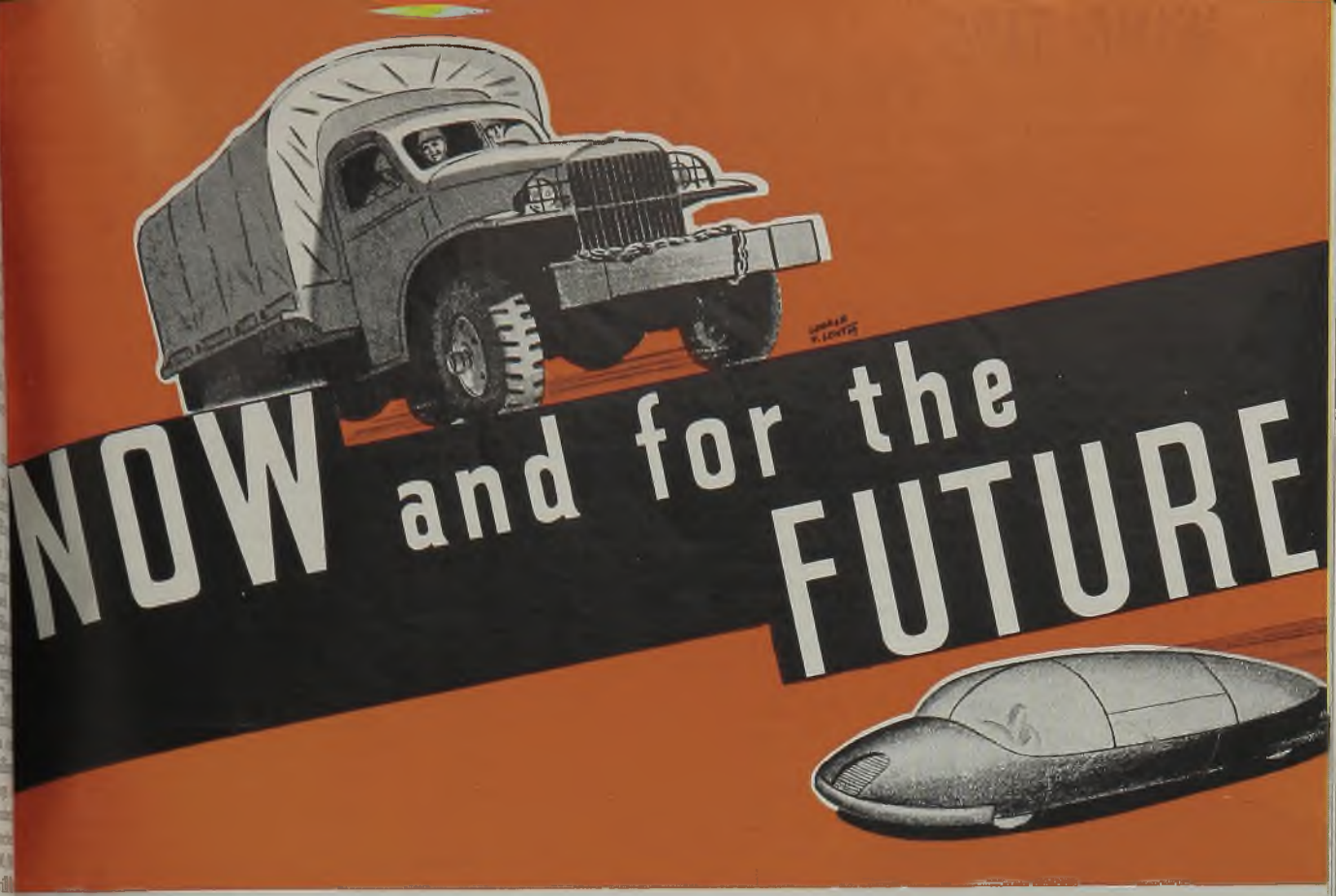
Chevrolet engineers estimate peak operations will consume 12 carloads of steel a day, with daily shipment of shells averaging 16 carloads. Steel billets will be heated to 2200 degrees, pressed in hydraulic piercing presses, shaped on draw benches and roughed on cross rolls after which the shells will be rough turned, heat treated, shot blasted, finish bored and rotating bands installed.

Willys-Overland Receives Capacity Shell Orders

Capacity orders for production of 155-millimeter medium artillery projectiles to meet the unprecedented demand of American fighting forces in Europe have been awarded to Willys-Overland Motors Inc., Toledo, O., it was announced by Ward M. Canaday, chairman of the board, recently.

The company has been producing the 6-inch shells since the fall of 1941 and has turned out more than 2,000,000 155-millimeter high explosive and smoke projectiles.

The Willys executive said facilities for these projectiles have been expanded in past weeks and production is being stepped up to meet the Army's needs.



A Matter of Designing and Applied Experience

Lubricant sealing is an engineering problem. It can only be satisfactorily solved with oil seals designed and engineered to adequately meet the conditions involved. More than ever before, sealing problems require engineering and experimental investigation since higher speeds and higher temperatures have to be considered, and totally effective sealing over longer periods of use is becoming increasingly important.

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Movement of large amounts of materials, overhead and on the level, facilitated in Boeing's Seattle plant by hundreds of wheeled units. Mobility found prime requisite. Many uses found for small and large tractors

BUILDING airplanes, particularly large bombers, requires, among other things, the movement of large amounts of material, parts and subassemblies, over long distances, both on the floor and overhead. Furthermore, many components are bulky and of awkward size and shape for expeditious handling. On top of this has come the need for rapid movement of personnel over the long stretches of aircraft assembly lines and manufacturing areas. All in all, mobility has come to be a prime requisite, and it was only natural to turn to various forms of motive power to help solve this particular problem.

At the Boeing plant in Seattle, now moving into the production of B-29 Superfortresses, the largest combat plane yet to see service, there is a fleet of wheeled equipment numbering in the hundreds and comprising 12 distinct types, each built in several sizes and arrangements.

Bicycles and two-wheeled and three-wheeler scooters are employed primarily for transporting personnel around the plant, the flight apron and Boeing field, as necessity requires. There are various designs of the three-wheeled scooters which carry from one to three passengers besides the driver. Some are equipped to deliver small articles, mail and office supplies.

Many uses are found for small and large tractors. The smaller vehicles haul trailers loaded with materials and dollies holding subassemblies. Some are covered for outdoor duty in inclement weather. The larger tractors haul airplanes from the final assembly station and from the plant to the airport.

Fork trucks are the most numerous of the automotive units, their peculiar function being admirably adapted to the requirement of an airplane plant. Carloads of materials and subassemblies from branch plants are handled by this equipment. The smaller trucks have a lift of about 6 feet, the larger can raise as high as 14 feet.

Flatbed trucks, smaller than those used on the highways, find constant service in hauling work.

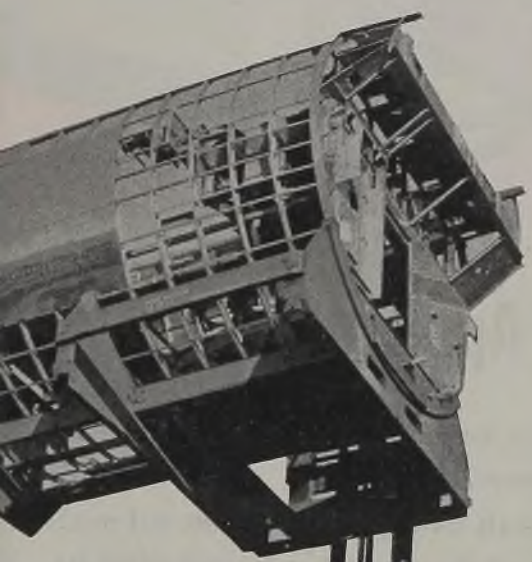
The heaviest lifting is done by the mobile cranes. One which handles cargo weighs 20,000 pounds and has a capacity of 30,000 pounds.

Motorized sweepers are used on floor and outdoor paved areas. The smaller units are hand-guided, the operator walking behind. On the larger sweepers the operator is aboard and the sweeping is done by revolving brushes and debris sucked up by vacuum.

Refrigerated trucks are an unusual and yet important part of Boeing's automotive fleet. They are used to transport rivets from a central cold storage plant to various areas in the plant where riveters are at work. The rivets must be kept cold to avoid age hardening before driving. Each refrigerated truck has a separate gasoline engine mounted beside the driver and driving the cooling unit.

All this equipment is augmented by an elaborate system of overhead cranes which feed subassemblies to the final assembly lines, and an intricate monorail system which moves heavy parts.

Today Boeing is turning out four-engine bombers with one-third the man-hours required at the outbreak of the war. Improved production methods, not the least of which is the full utilization



The girl below brings ice cold rivets directly to riveting teams on this three-wheeled refrigerated scooter. The engine at the right of the driver operates the refrigeration unit. On the left is a fork-lift truck which can pick a load off the ground and raise it 14 feet in the air. The load here is a fuselage section

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Centrifuge Used for Study Of "Blackout" by AAF

Using an ingenious machine called a centrifuge, the Aero-Medical Laboratory of the AAF Materiel Command, Wright Field, O., has long been studying "blackout"—the temporary loss of perception by pilots during violent flight maneuvers.

The centrifuge resembles a large, two-arm merry-go-round with a man-carrying cab or cockpit at the end of each arm. It is spun by a 250-horsepower electric motor. In the center of the revolving structure is a seat for an observer.

The test subject sits in one of the cabs, the observer sits facing him. When the centrifuge is started, the cab swings outward like a pail on the end of a rope, putting the human guinea pig in a position parallel to the plane of the circle his body describes, head toward the center. Thus the motion duplicates exactly the force of an airplane pulling out of a dive —the maneuver which causes blackout. The force can be lessened or increased by varying the speed of the centrifuge.

It has been learned that blackout in flight is caused by the stoppage of blood circulation in the brain, the result of centrifugal force which multiplies the force of gravity or "G". The normal weight of any body is one "G". Under centrifugal force the body is subject to a number of "Gs".

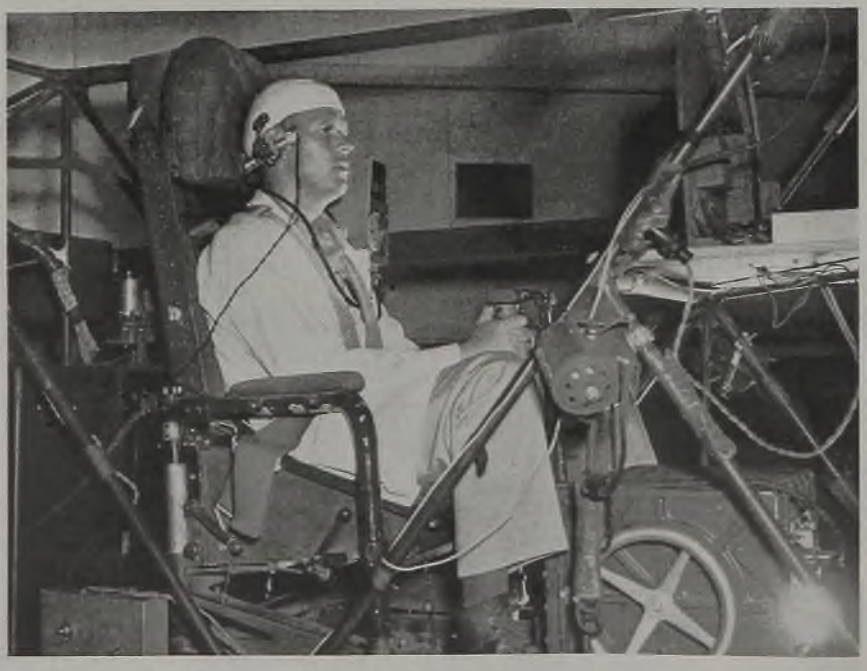
The centrifuge has shown that the average flier can take more plus G than minus. Usually he will blackout at about plus 4 or 5G. But his sight returns to normal almost immediately when the force is removed. At higher G levels consciousness is lost. From this condition, fifteen seconds at least are required for recovery. Maximum tolerance for minus G is about 3. A continued minus G force may lead to serious eye or brain injury.

The first man-carrying centrifuge was built in Germany in 1934. First experiments in this country were conducted in 1936 by Col. Harry Armstrong on a less efficient machine than the present one at Wright Field. In 1942 the present centrifuge was designed by Capt. H. W. Jobes at the Materiel Command. It was later modified by Capt. William Cade. Dr. E. J. Baldes of the Mayo Clinic is consultant on design and operation. The control system was designed and built by General Electric.

Tests Run in Darkness

Tests are run in darkness to avoid the visual distraction of the walls whirling by. A pre-drawn chart fixes the entire operation of the centrifuge. This chart is placed in the control mechanism and gives a scientific stability to the experiment not possible under actual flight conditions. The subject can, of course, cause the test to be stopped at any time for any reason.

Special instruments record the subject's reactions. An electrocardiagraph, a brain wave recorder, a photo-electric eye for measuring blood volume in tissue and to take pulse and respiration, are all attached to the "pilot." His reactions are timed through the use of lights and buzzers on a panel in front of him. These are turned off by the subject and the time necessary for him to throw the switches determines his alertness and state of consciousness.



In the centrifuge cab, this volunteer corporal of the Materiel Command's Aero-Medical Laboratory, prepares for a test blackout run. On his head is a molded brain-wave recorder. He is holding a control stick which is used to simulate the exact position of the hand and arm during actual flight

World's Largest Wind Tunnel Is Completed

Covering eight acres of ground, [the] world's largest wind tunnel for full-[scale] airplane testing has been completed [at] Moffett Field, California, by Pittsburgh Des Moines Steel Co., Pittsburgh.

This giant tunnel was built at a [cost] of $7,000,000. Eight hundred and [sixty] eight feet in length, the structure has a ceiling height of 180 feet. Its width at one end is 399 feet, and at the other 353 feet. Unlike the usual cylindrical-shaped wind tunnel, this new unit is box-shaped, with exterior bracing, leaving the interior unobstructed for air flow.

Six 37-ton 6000-horsepower motors produce the man-made hurricane that sweeps through the tunnel, each motor driving a 6-bladed fan with a diameter approximately the height of the average 4-story building. These huge motors send 24 million cubic feet of air racing through the tunnel's 2150 feet of closed circuit at a rate of more than 200 miles per hour, around 3888 curved vanes at the four corners of the wind tunnel which turn the air at right angles, without turbulence, achieving the greatest velocity at the minimum section of the tunnel, the test section.

The new tunnel is large enough for testing planes with wing spans up to 72 feet, which includes all present pursuit and fighter types, and even medium bombers. This particular tunnel is designed to test aero-dynamic characteristics such as "lift" or "drag." By means of this type of testing, it is stated that the National Advisory Committee for Aeronautics has never failed to add at least 20 additional miles per hour to the speed of an airplane.

Manual Outlines Aircraft Quality Control Standards

A standard quality manual, providing for the first time a uniform set of definitions covering the quality of aircraft parts and materials, has been prepared for all major West Coast airframe companies and their outside production sources.

Master inspectors, technical writers and illustrators from the seven Aircraft War Production Council companies compiled the 188-page manual because of the need for a uniform understanding of objectives in maintaining quality control in war production.

The manual does not prescribe inspection procedures, which may vary between manufacturers, but endeavors to reduce each subject to the clearest and most concise language on which a large number of experienced inspectors can agree. Its purpose is two-fold—to enable all inspectors to work by a uniform set of rules, thus improving co-ordination between inspection and production departments, and to serve as a reference work in training inspectors.

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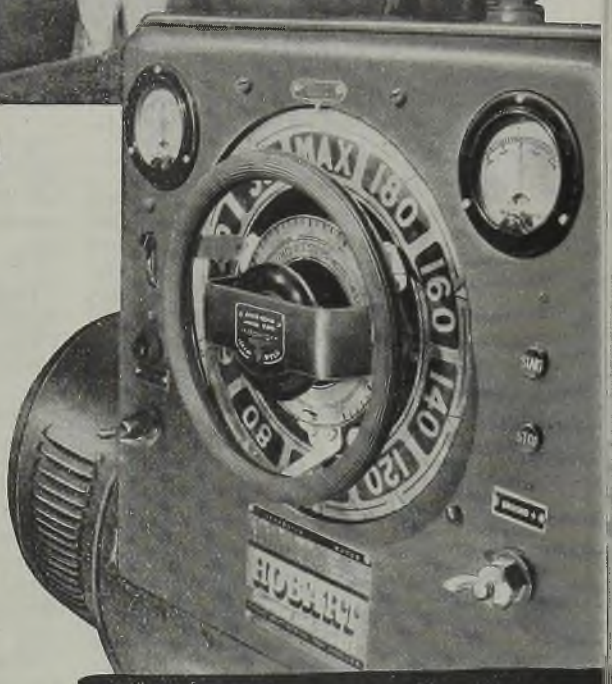

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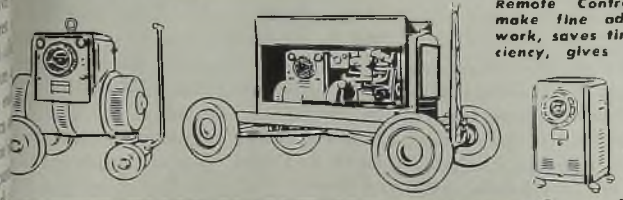

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MEN of INDUSTRY

K. R. VAN TASSEL

R. H. OLSON

FRED H. PFROMMER

H. E. PAPE

K. R. Van Tassel has been named manager of the Industrial Control division of the Industrial divisions, General Electric Co., Schenectady, N. Y. Mr. Van Tassel succeeds **George R. Prout,** recently appointed manager of the company's Air Conditioning & Refrigeration division, Appliance and Merchandise department.

—o—

Howard P. DeVilbiss has been elected president and general manager and **Allen D. Gutchess** has been elected board chairman and active senior executive, The DeVilbiss Co., Toledo, O. President of the company since 1929, Mr. Gutchess succeeds **W. M. Booker,** who continues as a board member. **Frank A. Bailey,** vice president and general manager, is retiring because of poor health. **Roy A. Guyer,** vice president, sales, has become a director and **Don J. Peeps,** of the engineering staff, has been named acting chief engineer.

—o—

Herbert S. Mills, formerly treasurer, Mills Industries Inc., Chicago, has been elected president to succeed his father, Fred L. Mills, who died July 5. **Ralph J. Mills,** formerly executive vice president, was elected chairman, a newly created position. Other officers named were: **Hayden R. Mills,** treasurer; **D. W. Donohue,** executive vice president; **Gordon B. Mills,** vice president, and **George D. Kasten,** secretary-comptroller.

—o—

E. O. Locher, secretary-treasurer, Airplane Mfg. & Supply Corp., Glendale, Calif., has assumed the duties of general manager, relieving the president of that responsibility.

—o—

D. J. Gent, resident manager of sales at Dallas, Tex., for Jones & Laughlin Steel Corp., Pittsburgh, has been transferred to the Detroit district sales office. He is succeeded by **D. M. Griffith. E. A. Toothaker** has been appointed resident manager of the corporation's Denver sub-office.

—o—

Walter F. Morton, formerly factory manager and chief metallurgist, Anstice Co. Inc., New York, has been appointed works manager of both the foundry and factory divisions. He is succeeded as chief metallurgist by **Harold King. Frank M. Miller** has been named head of the company's newly developed centrifugal casting department.

—o—

R. H. Olson, since 1930 district manager in New York for Electric Machinery Mfg. Co., Minneapolis, has been appointed vice president in charge of sales. He is succeeded by **A. P. Burris.**

—o—

Fred H. Pfrommer has been appointed local auditor of the Buffington plant of Universal Atlas Cement Co., Chicago, succeeding the late W. C. Ramsay.

—o—

Harold L. Wilson has been appointed assistant to the general superintendent in charge of personnel relations, Lukens Steel Co., Coatesville, Pa.

—o—

Ronald James Sweeney, formerly industrial engineer for Stover Lock Nut & Machinery Corp., Easton, Pa., has been appointed director of research.

—o—

Milo G. Spaich, general manager of American Forge Co., Berkeley, Calif., has been named to the OPA open die forgings industry advisory committee.

—o—

A. Winkler Prins has been appointed New York district manager for American Machine & Metals Inc., East Moline, Ill. Previously, he was eastern sales manager for Wellman Engineering Co., Cleveland.

—o—

W. G. Lewellen has been named assistant to **E. F. Johnson,** vice president of General Motors Corp., Detroit, in charge of the Eastern Aircraft division and of the Dayton divisions.

—o—

J. R. Nurney has been elected executive vice president, S. K. Wellman Co., Cleveland. Other new appointments by the Wellman company include: **Raymond LaFrance,** vice president in charge of plant operation; **W. E. Canfield,** vice president, sales; **F. E. White,** treasurer; **W. H. Faber,** assistant treasurer, and **C. T. Cox,** assistant secretary. Mr. La France and **J. M. Killpack,** vice president, Central National Bank, Cleveland, were elected directors.

—o—

H. E. Pape, who from 1919 to 194[illegible] was in charge of purchases for American Tube & Stamping Co., a division of the Stanley Works, New Britain, Conn., has been appointed director of purchases of the parent company.

—o—

Walter E. Haase has been appointed sales promotion manager, L. J. Mueller Furnace Co., Milwaukee.

—o—

Robert N. Piper, advertising manager, Cincinnati Bickford Tool Co., Cincinnati, has been elected president of the Cincinnati Industrial Advertisers' Association, succeeding **William D. Shannon,** Allis-Chalmers Mfg. Co. **A. J. Kohn,** Schauer Machine Co., and **Walter Rybolt,** R. K. LeBlond Machine Tool Co., were elected vice presidents.

—o—

Charles A. Higgins, president, Hercules Powder Co., Wilmington, Del., has been elected board chairman, succeeding **Russell H. Dunham,** resigned. Mr. Dunham will remain as a director and chairman of the finance committee.

—o—

William E. Kress has been named sales manager in the Middle West for Philco Corp., Philadelphia, and will make his headquarters in Chicago.

—o—

Lt. Col. Robert L. Jordan has been named chief of the propeller laboratory, Army Air Forces' Materiel Command, Wright Field, O., succeeding Col. **Howard M. McCoy,** who has been assigned an overseas mission.

—o—

Eight men who have received the Westinghouse Electric & Mfg. Co.'s Order of Merit for distinguished service in their fields are: **Erling Frisch,** designer of propulsion equipment for the Navy; **James DeKiep,** engineer on naval work; **Peter R. Drylie,** veteran employment interviewer; **Walter S. Risser,** machine tool buyer; **Wallace D. Bish,** purchasing

CARL I. COLLINS

M. W. FIELD

JAMES R. LONGWELL

nt; Everett McCandless, test engineer power station apparatus; Enoch H. rnock Jr., engineer on welding elec- le development, and Edward I. Reed, nufacturing engineer. All of these n are with the Westinghouse East sburgh, Pa. plant.

—o—

arl I. Collins, who recently joined erior Steel Corp., Pittsburgh, as ex- ive vice president and a director, been elected president, succeeding late Frank R. Frost. Prior to join- Superior Steel, Mr. Collins had executive vice president of Wick- Spencer Steel Co., New York.

—o—

iff Dunham has been appointed nnel manager, Hyster Co., Port- Oreg., succeeding W. B. Morrow, has been named to head a new de- ment of confidential nature. Don- Foster succeeds Mr. Dunham as ager of the Chicago office.

—o—

lbert W. Genske, for the past ten rs sales manager of Buffalo Tank p., Buffalo, has been named general nager of the company's Lackawanna, Y., plant, succeeding Ralph J. John-

CHARLES A. POWEL

has been elected president of the Ameri- Institute of Electrical Engineers, as re- ported in STEEL, July 3, p. 76.

son, vice president, who has been transferred to Dunellen, N. J., where he becomes general production manager for the company's two plants there.

—o—

M. W. Field has been appointed comptroller, American Steel & Wire Co., Cleveland. For the past three years he was procedure supervisor of the parent company, United States Steel Corp., Pittsburgh.

—o—

Robert A. Campbell, sales manager, Steel Tube division, Talon Inc., Oil City, Pa., has been appointed general manager of the division. John Farrimond has been named superintendent of finishing departments.

—o—

Guy Berghoff has been appointed director of public relations, Pittsburgh Plate Glass Co., Pittsburgh, and Bryan England has been named assistant director. Mr. England continues to edit company publications.

—o—

Willard B. Dunham has become assistant western sales manager, Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

—o—

F. T. Turner has been named assistant sales manager, Brush division, Osborn Mfg. Co., Cleveland.

—o—

Clarence L. Wanamaker has been named general manager, Munitions division, United States Rubber Co., New York.

—o—

R. E. Henderson has been appointed Eastern sales representative, Wickman Corp., Detroit. His office is in Newark, N. J.

—o—

Charles A. Koch, who recently resigned as production engineer at the Willow Run plant of Ford Motor Co., Dearborn, Mich., has become a sales engineer for Pollak Mfg. Co., Arlington, N. J.

—o—

Three appointments in the Switchgear and Control division of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., are: Maurice H. Hobbs, manager of the engineering department of that division; Charles P. West, manager of switchboard engineering; and Wilbur C. Fulton, section engineer in switchboard engineering.

—o—

James R. Longwell, previously factory manager, Carboloy Co. Inc., Detroit, has been named director of engineering and research.

—o—

J. R. Meany has been appointed Chicago district sales manager, Mercer Tube & Mfg. Co., Sharon, Pa. The Chicago office, which was opened July 1, is located in Suite 2904, Carbide & Carbon building, 230 N. Michigan avenue.

—o—

Russell M. Allen, vice president and general manager of sales, Allegheny Ludlum Steel Corp., Pittsburgh, has announced appointment of the following assistants: W. J. Adamson, magnetic and carbon steel sales; C. B. Boyne, stainless, pluramelt and alloy steels; P. E. Floyd, cutting and tool steels, and Coolidge Sherman, warehouse and jobber sales and valve steels.

—o—

P. T. Keebler has been appointed plant manager, Industrial Car division, Phillips Mine & Mill Supply Co., Pittsburgh, succeeding R. R. Phillips, who recently was commissioned a lieutenant (j.g.) in the Navy.

—o—

W. B. Herzog has been named resident manager of sales in the office which Jones & Laughlin Steel Corp., Pittsburgh, has opened in the State Tower building, Syracuse, N. Y.

—o—

Dr. L. W. Eastwood, formerly vice president, Maryland Sanitary Mfg. Co., Baltimore, has been named to the staff of Battelle Memorial Institute, Columbus, O., where he will be engaged in metallurgical research.

—o—

Briggs Clarifier Co., Washington, has announced appointment of the following zone managers: Thomas W. McKinley, Southeastern zone, headquarters in At-

lanta, Ga.; **Donn Murphy,** Southwestern zone, Dallas, Tex.; and **A. H. Martin,** Western zone, San Francisco.

—o—

Wallace C. Husted, since 1935 manager of the Waterbury Mfg. Co., division of Chase Brass & Copper Co. Inc., Waterbury, Conn., has been elected vice president in charge of all Cleveland operations of the company. **Thomas H. Chamberlain,** assistant manager of the Waterbury Mfg. Co. division, will be in charge of operations at that plant.

—o—

Dr. I. A. Oehler has been appointed chief process engineer, American Welding & Mfg. Co., Warren, O., and **Thomas J. Wood** has been named supervisor of arc welding.

—o—

B. J. Trautman has been appointed manager of works at the Hammond, Ind., plant of Pullman-Standard Car Mfg. Co., Chicago.

—o—

Wallace E. Wing has been elected president, Marblehead Lime Co., Chicago, to succeed Bernard L. McNulty, who died March 3. Mr. Wing has served the company in technical and executive capacities for the past 21 years, having been vice president since last February.

FLOYD T. HAGUE

Who has been appointed assistant to the vice president, Steam division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., as announced in STEEL, July 24, p. 70.

—o—

B. F. Lease, previously sales manager, Athey Truss Wheel Co., Chicago, has been elected vice president in charge of sales, advertising and service.

—o—

Jesse J. Baum, until recently process engineer and metallurgist with the Allison Engineering division, General Motors Corp., Detroit, has joined the Duraloy Co., Scottdale, Pa., as plant superintendent.

—o—

C. B. Miller has been elected vice president in charge of installation, Automatic Sprinkler Corp. of America, Youngstown, O. **C. B. Miller Jr.** was appointed general superintendent, Installation division.

—o—

Lieut. Col. Boyd Bullock has returned to General Electric Co., Schenectady, N. Y., as advertising manager of the Appliance & Merchandise department, the post held by him before entering the Army in February, 1942.

—o—

William Balderston, formerly vice president in charge of the Commercial division, Philco Corp., Philadelphia, has been elected vice president in charge of operations and a member of the executive committee.

OBITUARIES . . .

Commander W. Griswold Hurlburt Jr., 54, president, Bostwick Steel Lath Co., Niles, O., died recently at a United States naval base in southern England. He entered the Navy on Jan. 1, 1942, and had been overseas for more than a year.

—o—

Philip H. Nowitz, 64, identified with the metal industry for many years, died July 18. He was a member of Whipple & Choate Co., Bridgeport, Conn., and prior to becoming associated with that company, had been connected with the Bridgeport Iron & Metal Co., Bridgeport.

—o—

George E. Cox, 73, for 32 years works manager of the Niagara Falls, Ont., plant of American Cyanamid Co., New York, died July 19 in Niagara Falls.

—o—

Frank C. Davern, 57, sales engineer in Cleveland for General Electric Co., Schenectady, N. Y., died July 20 in Lakewood, O.

—o—

John H. Burns, 58, for 31 years president,, Adam Hope Co., Detroit, nonferrous metal broker, died in Detroit July 19.

—o—

Edmund H. Lunken, 83, chairman, Lunkenheimer Co., Cincinnati, died July 19 at his summer home near Onekama, Mich. Son of Frederick Lunkenheimer, founder of the company, Mr. Lunken had entered the business at the age of 16, and assumed leadership of the company after the death of his father in 1889.

—o—

T. Nevin Booth, vice president, J. B. Booth & Co., Pittsburgh steel warehouse, died July 15 at his home near Pittsburgh.

—o—

James B. Cummings, 59, district purchasing agent for Bethlehem Steel Co. shipyards at Los Angeles harbor, died July 17 in San Pedro, Calif.

—o—

Harold N. Richardson, 64, secretary and treasurer, Dobbie Foundry & Machine Co., Niagara Falls, N. Y., died July 20 in Orillia, Ont.

—o—

Henry Hind, vice president, Hind Steel Co. Inc., Union, N. J., died July 20 in Orange, N. J.

—o—

Gilbert G. Stein, 45, director of purchasing, Cleaver-Brooks Co., Milwaukee, died July 17 in that city.

—o—

George A. Gahles, 61, assistant control manager of the Grasselli Chemical department, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., died July 23 in Beaver Falls, Pa.

—o—

Munson H. Treadwell, founder of M. H. Treadwell Co. Inc., New York, Treadwell Engineering Co., Easton, Pa., and Treadwell Construction Co., Midland, Pa., died July 9 in New York. Mr. Treadwell had retired from active business some years ago.

—o—

John O. Ambler, 61, a supervising engineer of the Metals Reserve Co., and a former foreign consultant of the Phelps-Dodge Corp., New York, and superintendent of the Copper Queen smelter in Douglas, Ariz., died July 18 in Galveston, Tex.

—o—

Percy R. Blackmer, 56, secretary and sales manager, Blackmer & Post Pipe Co., St. Louis, died July 15 in Webster Groves, Mo. He had been associated with his three brothers in the pipe company for more than 30 years.

—o—

Henry J. Weber, 58, president, H. J. Weber Co., Chicago, machine tool dealer, died July 22 in that city.

—o—

James W. Wagstaff, 80, for many years superintendent of masonry and construction for Youngstown Sheet & Tube Co., Youngstown, O., died recently. Mr. Wagstaff retired ten years ago.

—o—

Eugene C. Schwarzenbeck, 60, New Jersey district manager for E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., died July 24 in Nutley, N. J.

—o—

Edgar H. Bristol, 73, president and one of the founders of Foxboro Co., Foxboro, Mass., died July 24 in Falmouth, Mass. He was a leader in the perfection of automatic control by industrial instruments and had more than 40 patents to his credit.

—o—

Frank Graper, president and general manager, Acklin Stamping Co., Toledo, O., and at one time plant manager of Motor Wheel Corp., Lansing, Mich., died in Toledo July 21.

abor Shortage Still Retards roduction in Pacific Northwest

Rolling mills, machine shops, aircraft plants and shipyards pressing drive for more labor. Report 16,000 additional workers are required to complete government ship contracts in the Portland area

SEATTLE

LABOR shortages in Washington and egon are retarding full production al- ugh every effort is being made to re- it additional workers. Local machine nts are crying for more help while the ling mills report an unusual turnover th crews under numerical require- nts. Boeing Aircraft is seeking addi- nal mechanical personnel.

Insufficient labor priorities on Seattle's ss dam, a city power Skagit river oject, may cause stoppage of the job of sing the dam and the possible loss of ,000,000 kilowatt hours, according to officials who have asked government cials to relieve the situation.

While in Portland recently, Admiral L. Vickery, vice chairman, Maritime mmission, stated that 16,000 more kers, including 4500 replacements, immediately needed to complete gov- nment ship contracts in the Portland . Kaiser's Swan Island yard is re- ed 20 days behind schedule because labor shortages. Additional workers be recruited in the Middle West East.

acific Shipyards, which has for two rs been engaged in naval construction, ly in July dedicated its $8,250,000 air division coincident with the launch- of a net tender. The plant has dry- ck facilities for ships up to 10,500 s and plans specializing in ship repair rk.

By the end of the year, a joint war- e venture of the Puget Sound Bridge Dredging Co. and the Lake Union Dry- ck & Machine Works, both of Seattle, own as Associated Shipbuilders, will terminated. This joint firm has nched 53 vessels for the navy, deliv- es to be completed during the current r.

Tacoma officials are considering bids furnishing 12,290 feet of 52-inch steel concrete water supply line. Steel Tank Pipe Co., Portland, is low at $217,874 steel pipe and American Pipe & Con- action Co., Tacoma, low for concrete, 79,816.

Navy plans call for immediate con- action of a $2,420,000 advance base ot at Tacoma on a 400-acre tide flats The utility will involve all modern lities.

Maritime Commission has announced ding sale of $2,000,000 worth of sur- s shipbuilding materials and supplies he three Kaiser shipyards in the Port- d area. Equipment includes tractors, graders and other heavy items.

Dr. R. F. Dean, director, Bureau of Mines, is investigating the potential resources of Pacific Northwest raw materials for the steel and aluminum industries.

Postwar Planning Pushed In San Francisco Area

Spurred by the accelerated tempo of the world's battlefronts, businessmen, industrialists and civic leaders in the San Francisco Bay area are devoting increased attention to postwar problems and planning.

In San Francisco, in addition to active steps being undertaken by the Chamber of Commerce, the Downtown Association is urging the California State Reconstruction and Re-employment Commission to establish a regional office here for the purpose of stimulating and coordinating postwar plans in the San Francisco area.

Among broad-scale problems seen uppermost in need of solution after V-day are those of employment, housing, transportation, industrial conversions and expansions, promotion of foreign and domestic commerce, public construction and public welfare and relief.

The Downtown Association also has proposed an immediate survey be made of all postwar construction projects in San Francisco. Seventeen specific items in work-to-be-done categories already have been outlined. They include street and highway construction and rehabilitation, airport development, new municipal buildings, new sewers, a new railway terminal, expansion and improvement of parks, playgrounds, schools etc.

Planning for the postwar period is active too, in Oakland and the East Bay communities. The Oakland Chamber of Commerce has set up the Oakland Postwar Planning Committee, which in turn has been divided into 30 sub-committees.

Maverick Proposes Postwar Plan For Small Industry in California

LOS ANGELES

STATING that small business in this area is in a position to be harder hit by postwar reconversion than in any other section of the nation, Maury Maverick, chief, Smaller War Plants Corp., recently outlined a plan for postwar aid in the district.

Under this plan, which he called a multiple rental plan, the vast spaces of the local shipyards and airplane factories would be leased by the government to individuals or corporations, which would in turn sub-lease to smaller industries.

It is within the shipyard industry which has expanded locally from a labor force of 6000 men before the war to 500,000 and the aircraft industry with a wartime expansion from 24,000 to 400,000 where most difficult reconversion problems lie.

In these industries are many thousands who must be provided with jobs when war contracts are terminated and, in the opinion of Mr. Maverick, this can best be accompished by the maintenance of many small plants running at full capacity rather than with a few big plants only partially active.

Immediate steps are being taken, according to Robert S. Breyer, chief, SWPC in Los Angeles, to favor small plants employing less than 500 with more war contracts. Under new agreements between the Smaller War Plants Corp. and eight technical branches of Army Procurement as well as the Treasury Department, War Department and Maritime Commission, the lesser plants in this area are to receive 200 per cent more orders.

With reference to the Maritime Commission, an office has been opened in Oakland, Calif., for the purpose of referring contracts to the smaller plants in this area and in Seattle.

During June, California shipyards constructed 31 of 49 ships completed on the Pacific Coast. Since June, 1940, the total value of ship contracts placed in the Los Angeles and San Diego county shipyards has exceeded $1,350,000,000.

Since the beginning of the war, Western Pipe & Steel Co. has completed five tankers, 10 ammunition lighters, seven destroyer escorts and three ice-breakers.

Since July 10, Todd Shipyard Corp., which has operated the San Pedro yard of the Los Angeles Shipbuilding & Dry Dock Corp. for the Navy Department, has acted as an independent operator of this yard on a cost-plus-fixed-fee basis.

Construction projects approved by WPB recently will cost $3,576,737. Included in these approved projects are installations of eight new switchboards by the Southern California Telephone Co., improvements at the El Toro Marine Corps air station, and harbor improvements at Morro Bay Navy Base.

War Output In Cleveland District Climbs

Second quarter production in Cleveland Ordnance District totals more than $900,000,000 worth of finished materiel

CLEVELAND Ordnance District, Cleveland, produced more than $900,000,000 worth of finished ordnance material during the second quarter of 1944, of which over $750,000,000 represented material inspected and delivered under inspection requisitions from other ordnance districts and approximately $163,000,000 represented disbursements to contractors for accepted material, according to Col. E. A. Lynn, district chief.

Total value of production for the second quarter shows an increase of more than 100 per cent over the first quarter of 1944 and is more than 80 per cent greater than the quarterly average for the entire year 1943.

Over $2,000,000 in lend-lease items and raw materials such as steel, in the forms of bars, billets, ingots and plates, valued at $160,000,000, were procured.

Between Jan. 1 and June 30, 1944, the district placed 529 new prime contracts of more than $10,000 each with a dollar value of more than $276,000,000. Figures also show an increase of 27 per cent in the value of contracts placed.

Indicating the spread of ordnance contracts to smaller companies, the report reveals that of the 529 contracts placed during the first six months, 249, or 47 per cent, with a dollar value of over $49,000,000, were placed with companies employing less than 500 people. As of June 30, there were 2738 prime contracts and purchase orders with a value of $2,320,000,000 under the Cleveland Ordnance District's administration.

Publishes Booklet To Aid Marketing Executives

As an aid to advertising managers, sales promotion managers and sales managers with their marketing problems, the postwar planning committee of the Industrial Marketers of Cleveland, Cleveland, chapter of the National Industrial Advertisers Association, has published a booklet titled, *How to Find Markets and Influential Buyers.*

The booklet contains a breakdown of industries by size, concentration of buying power, census sources of information, a graphic market identification, location of manufacturing industries, a visual presentation of marketing problems, and a number of other features of interest to marketing executives.

PASS 160,000,000 MARK: Number of wartime aircraft fittings produced by the Weatherhead Co., Cleveland, recently passed the 160,000,000 mark, averaging better than 1,000,000 fittings a week since Pearl Harbor. A. J. Weatherhead Jr., president of the company, center, examines hose fitting assemblies for warplanes as H. Church, right, aviation sales manager, and H. C. Ferguson, New York sales manager, look on

BRIEFS . . . .

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

Brown Instrument Co., Philadelphia, announces release of an electronic circular chart electric controller for manufacture of either war or civilian goods. This type of electronic recorder is being used in the metallurgical and chemical industries.

—o—

War Manpower Commission, Washington, announces that its Apprentice-Training Service has published a booklet on evaluating apprentices.

—o—

Sol H. Friedman Co., Cleveland, announces opening of an office in the C. P. A. building, Detroit.

—o—

John S. Barnes Corp., Rockford, Ill., has moved its eastern sales office from the Fisk building, New York, to the Industrial Office building, 1060 Broad street, Newark, N. J.

—o—

Wolverine Steel Products Co. has opened a new steel warehouse at 6550 Avalon boulevard, Los Angeles.

—o—

Department of Interior, Washington, has prepared a report on deposits of scheelite in the Nome area, Seward Peninsula, Alaska.

—o—

Sam Tour & Co. Inc., New York, has prepared a handbook, containing complete data on the quality and uniformity of tool steel. Steels from many suppliers were investigated and those which met specifications were approved. As new sources are considered, they are put through the same routine.

—o—

American-Terry Derrick Co., South Kearny, N. J., has changed its name to American Hoist & Derrick Co.

—o—

Federal Electric Products Co., Newark, N. J., recently purchased the Electrical division of Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.

—o—

Crosley Corp., Cincinnati, announces appointment of the Southeastern Electrical Appliance Co., Amarillo, Tex., as its distributor in northwestern Texas.

—o—

Sprague Electric Co., Resistor division, North Adams, Mass., has issued a 28-page catalog presenting specifications and engineering data on its line of wire wound resistors.

—o—

Bound Brook Oil-Less Bearing Co. Bound Brook, N. J., announces appointment of the Dominion Bearings Ltd. Toronto, Ontario, as its Canadian representative for three of its products.

—o—

Timken Roller Bearing Co., Canton O., announces appointment of Bruce Mueller-Huntley as sales representative for its electric furnace alloy steels, alloy steel tubing and stainless steels.

presentative has warehouses located Buffalo, Syracuse and Rochester, Y., and at Montreal and Toronto, nada.

—o—

Clover Mfg. Co., Norwalk, Conn., and rats Mfg. Co., Westfield, Mass., announce an inter-company agreement hereby each company will also handle e products of the other.

—o—

American Machine & Metals Inc., ew York, formerly located at 100 Sixth enue, announces removal of its metpolitan headquarters to the Woolworth ilding, 233 Broadway.

—o—

Pacific Railway Equipment Co., Los ngeles, has changed its name to Preco c., effective July 1.

—o—

Kinney Aluminum Co., Los Angeles, ports that its plant in Huntington rk, Calif., is nearing completion. The mpany's former plant at 2019 Bay reet. Los Angeles, has been converted another Kinney enterprise.

—o—

Philco Corp., Trenton, N. J., reports t shipments of its Storage Battery dion were 34 per cent greater in the six months of 1944 than in the corponding period last year.

nverted Plant To Build Propulsion Turbines

eneral Electric Co., Schenectady, ., reports that its second largest war- plant, built two years ago for the ufacture of war equipment and no er required by the armed forces, is g converted for the production of propulsion aircraft turbines.

hough the entire plant's 600,000 are feet of floor space will be devoted the manufacture of the jet propulsion raft turbines, the company's output l not be sufficient to meet the governnt's needs. So General Electric has ned over the jet propulsion drawings l specifications, prepared by its engirs, to another large corporation formerengaged in manufacture of airplane gines.

rpedo Plant To Produce ns in Postwar Period

ostwar plans of the American Can Co., v York, call for establishment of one the company's largest manufacturing s in St. Louis, Mo., D. W. Figgis, ident of company, announced re- ly.

he new plant, originally intended for manufacture but made available to government for torpedo production ng the war, will have more than 000 square feet of floor space and employ about 750 workers. Peaceproduction at this plant is expected upply the needs of the Ozark area ers and also the requirements of the oil industry in the Tulsa district.

An older plant at St. Louis, now in operation but which has only about one-sixth of the new plant's capacity, will be abandoned after the war, and the production and personnel absorbed by the new plant, it is expected.

The new plant is counted on for the postwar production of beer cans, fruit and vegetable cans, oil cans, anti-freeze cans, paint cans, coffee cans, tobacco cans, and cans for wall paper cleaner in addition to lines now made at the old plant.

Fisher Company Acquires Monarch Furnace Business

The industrial furnace business of the Monarch Engineering & Mfg. Co., Baltimore, has been purchased by the Fisher Furnace Co., Chicago.

Future plans provide for the continued manufacture of certain specialized Monarch furnaces and the continuation of a complete parts service for Monarch furnaces now in operation. Combined headquarters and manufacturing facilities will be located in the two existing Fisher plants in Chicago for the present.

The Fisher Furnace Co. has engineered and manufactured a broad line of melting furnaces, blowers, refractories and allied equipment since 1906.

Plans To Expand Electro-Motive Division

General Motors Corp. to construct two new buildings at La Grange, Ill., to meet increased war demands upon it

GENERAL Motors Corp., Detroit, announces plans to expand its Electro-Motive division, La Grange, Ill., by constructing two new buildings, one to house service repair and parts and the other to house the Transmission division, machine shop, locker room, cafeteria, and receiving and inspection warehouse.

These facilities are required by the enormous growth of the spare parts and service repair demands upon the company. In 1941, spare parts shipments averaged 790,000 pounds monthly but during March of this year they rose to 3,140,000 pounds. Completion of the building program is scheduled next spring.

The expansion plans will separate the spare parts and engine and locomotive production programs. The new building will include the most modern facilities.

TAMPA SHIPBUILDING CO. AWARDED "E"

TAMPA Shipbuilding Co., Tampa, Fla., first shipyard in Florida to receive contracts for large ships in this war and the first Florida yard awarded contracts to construct large Navy ships, has been awarded the Army-Navy "E" for excellence in production.

George B. Howell, president of the company, received the award from Admiral Cochrane, chief, Bureau of Ships, recently at an impressive presentation ceremony in th company's yard. On the first anniversary of Pearl Harbor, Dec. 7, 1942, the company launched seven ships at 30-minute intervals for one of the largest mass-launchings ever made by a single yard in the history of shipbuilding. On that day, the company launched one destroyer tender and six minesweepers. In recognition of the company's production record, the Navy awarded the company contracts for vessels of five different types: Destroyer tenders, ammunition carriers, destroyer escorts, minesweepers and barracks ships.

The company has completed considerable repair and conversion work in its dry dock department. It has one of the largest floating dry docks in the South. The company expanded from 1200 employes in 1939 to 15,000 within a period of less than three years.

GEORGE B. HOWELL

Mr. Howell was vice president and trust officer, Exchange National Bank, Tampa, at the time he assumed the presidency of the shipbuilding company at the request of the Maritime Commission. P. B. Brill is vice president and general manager and J. Wally Gray is secretary and treasurer.

Upturn in New Orders Spurs Industrial Output

INDUSTRIAL activity recorded further gains during the latest period. Key indicators such as the national steel rate, bituminous coal output, petroleum production, truck assemblies, freight carloadings and electric power consumption advanced slightly.

Influx of new war orders in recent weeks has materially stimulated output in some lines which had been showing signs of tapering. Current new order volume is more nearly in balance with production, and less disruption to production schedules is noted.

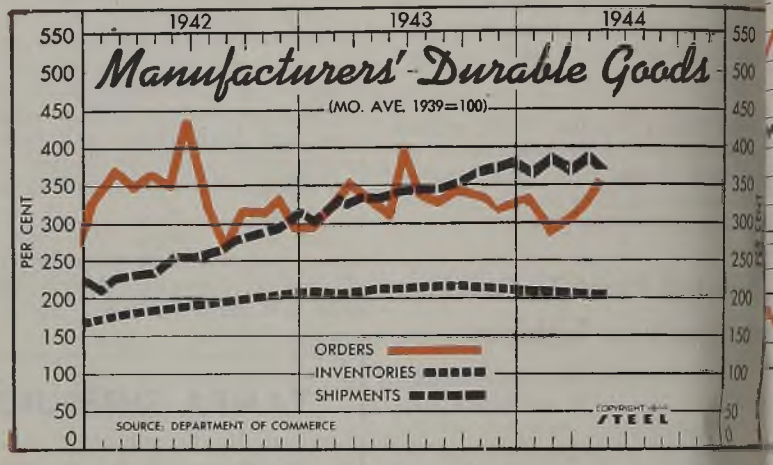
INVENTORIES—In contrast to the stability in output the past six months, manufacturers have steadily reduced their inventories since the peak reached in November, 1943. During the past five months value of inventories held by all manufacturing firms was reduced by about $500 million and at the end of May stocks were lower than at any time since the middle of 1942. Of particular significance is the fact that this liquidation occurred entirely in the raw materials and goods in process stocks. Recent inventory liquidation has gone a long way toward bringing inventories into better balance with actual needs. Trend in overall inventories is expected to continue downward in the next few months although shifts in the war production program will result in greater inventory requirements in some lines and liquidation of stocks in others.

FREIGHT MOVEMENT—Freight traffic, measured in ton-miles, amounted to about 63,000,000,000 ton-miles during June. This is off slightly from the May total, but was 8.5 per cent over that recorded in June, 1943. In the first half class I railroads performed nearly 5½ per cent more revenue ton-miles of service than in the same period last year.

Railroad operating revenues for June were estimated to have increased 5.6 per cent over the like 1943 month.

CONSTRUCTION—Building activity in the United States during the first half recorded the first break in the long monthly series of decreases in evidence since August, 1942. The slight upturn of about 3 per cent, which began in April, was due to mild seasonal increases in private construction. While this trend is expected to continue through the early summer, seasonal factors and further decreases in public construction are likely to cause the downtrend to be resumed in the fall. WPB reports total new construction in the first half amounted to $1,874,000,000, a decline of 58 per cent from the like 1943 period and 40 per cent from the second half of 1943.

SCRAP—Iron and steel scrap stocks at consumers', suppliers', and producers' plants increased one per cent during May to 5,966,000 gross tons. With the exception of the slight gain recorded in December last, this is the first increase in scrap stocks since June, 1943. Major portion of the latest increase was a gain of 42,000 tons in stocks of "home" scrap. Consumers' stocks of purchased scrap declined 16,000 tons.



Index of Manufacturers Durable Goods

	Orders		Shipments		Inventories	
	1944	1943	1944	1943	1944	1943
January	331.5	293.5	365	208	212.0	211.3
February	294.4	326.6	384	337	208.6	209.8
March	309.7	349.2	369	330	207.2	210.7
April	325.0	329.8	387	338	204.9	213.5
May	354.8	313.0	370	338	203.8	213.1
June	.....	392.7	...	343	.....	212.4
July	.....	338.7	...	346	.....	211.2
August	.....	325.0	...	354	.....	213.6
September	.....	339.5	...	356	.....	214.5
October	.....	339.5	...	371	.....	214.1
November	.....	316.1	...	373	.....	213.1
December	.....	324.2	...	380	.....	212.1
Average	.....	332.3	...	339	.....	212.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	97	96.5	97.5	98
Electric Power Distributed (million kilowatt hours)	4,381	4,377	4,325	4,196
Bituminous Coal Production (daily av.—1000 tons)	2,053	1,443	2,047	1,952
Petroleum Production (daily av.—1000 bbls.)	4,615	4,692	4,583	4,119
Construction Volume (ENR—unit $1,000,000)	$36.1	$62.5	$28.0	$49.0
Automobile and Truck Output (Ward's—number units)	19,545	19,420	19,385	20,130

*Dates on request.

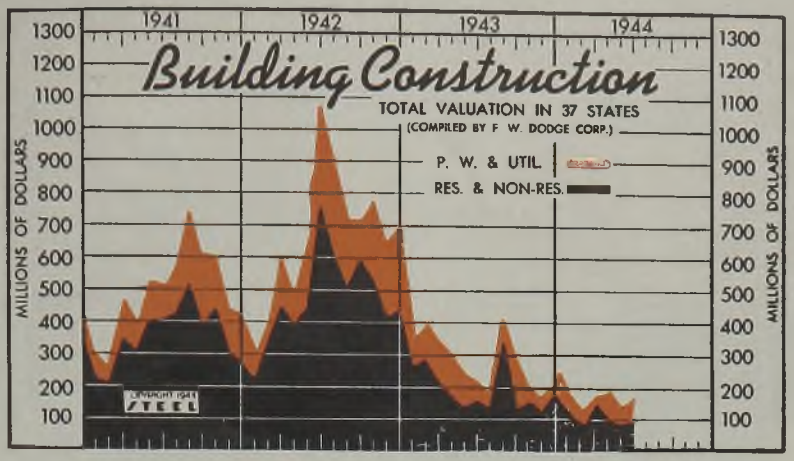
TRADE				
Freight Carloadings (unit—1000 cars)	915†	905	881	884
Business Failures (Dun & Bradstreet, number)	29	15	25	50
Money in Circulation (in millions of dollars)‡	$22,531	$22,561	$22,293	$17,706
Department Store Sales (change from like week a year ago)‡	+2%	+11%	+2%	−1%

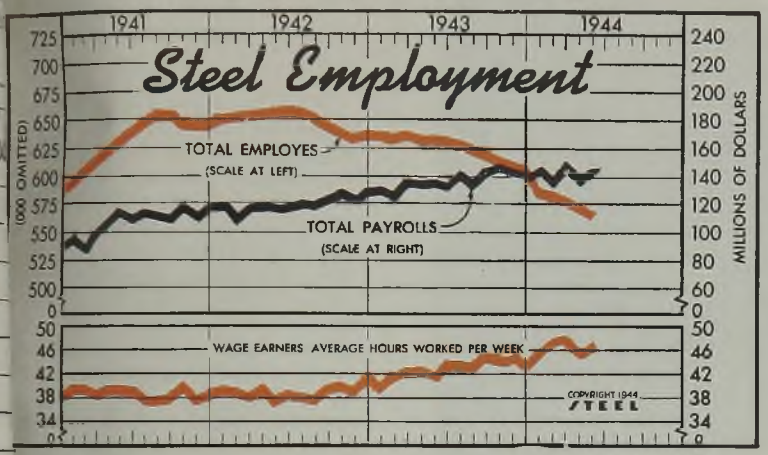
†Preliminary. ‡Federal Reserve Board.

Construction Valuation In 37 States

(Unit—$1,000,000)

	Total	Public Works-Utilities 1944	Public Works-Utilities 1943	Residential-Non-Res. 1944	Residential-Non-Res. 1943
Jan.	159.2	50.3	85.8	108.9	264.3
Feb.	137.2	55.1	112.9	82.1	280.5
Mar.	176.4	61.8	123.0	115.1	216.7
April	179.3	72.0	127.7	107.3	175.6
May	144.2	55.8	95.8	88.4	138.6
June	163.9	70.7	73.3	93.1	156.8
July	.....	.....	50.0	.....	133.7
Aug.	.....	.....	73.4	.....	340.8
Sept.	.....	.....	175.1	.....	125.0
Oct.	.....	.....	63.5	.....	150.0
Nov.	.....	.....	59.0	.....	125.4
Dec.	.....	.....	67.4	.....	184.9
Total	.....	.....	1,106.9	.....	2,106.4





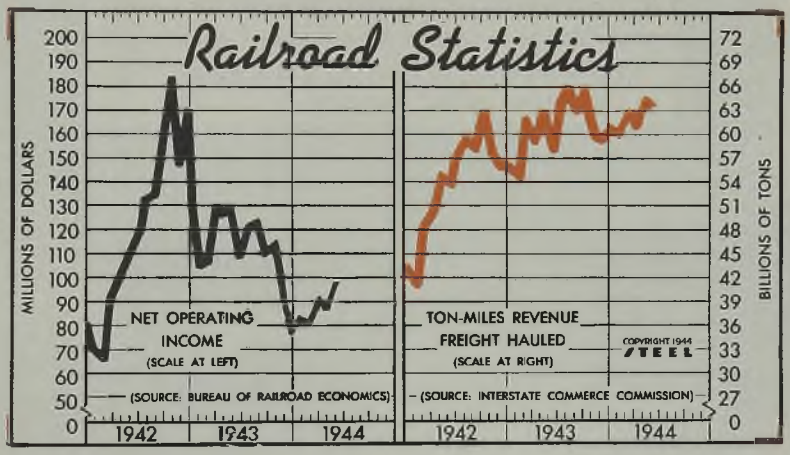
Steel Employment†

	Employes (000 omitted) 1944†	1943	1942	Total Payrolls (Unit—$1,000,000) 1944	1943	1942
Jan.	583	637	651	$141.8	$129.7	$118.8
Feb.	583	635	651	137.6	122.8	108.5
March	578	637	653	145.3	136.8	117.0
April	573	634	654	138.9	133.3	118.5
May	569	632	656	145.4	137.4	117.4
June	...	631	659	.....	136.2	118.0
July	...	627	655	.....	142.8	120.7
Aug.	....	625	647	.....	139.9	118.7
Sept.	...	620	641	.....	143.8	124.8
Oct.	...	615	635	.....	144.9	126.6
Nov.	...	611	632	.....	141.5	122.8
Dec.	..:	605	633	.....	140.2	129.3

†Monthly average; previous reports showed total number regardless of whether they worked one day or full month.

Statistics of Class I Railroads

	Net Operating Income 1944	1943	1942	Ton-Miles Revenue Freight 1944	1943	1942
	(millions)			(billions)		
Jan.	$82.8	$105.3	$66.8	60.5	55.1	43.0
Feb.	84.5	105.8	64.4	59.3	54.4	40.8
Mar.	92.5	129.7	90.6	63.0	61.2	48.3
Apr.	87.7	128.7	101.6	60.4	59.1	50.0
May	98.5	129.5	109.7	64.0	62.1	54.2
June	...	109.7	118.7	63.0	58.0	53.9
July	...	120.6	133.6	....	63.7	57.0
Aug.	....	124.6	135.9	....	65.1	58.6
Sept.	...	110.2	154.6	....	62.5	58.2
Oct.	...	113.1	184.7	....	65.0	62.2
Nov.	...	96.4	148.9	....	59.6	57.0
Dec.	...	76.9	170.9	...	59.4	55.0
Ave.	...	$113.5	$122.9	...	60.5	53.2



NANCE

	Latest Period[a]	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,664	$9,832	$11,362	$8,607
Federal Gross Debt (billions)	$208.6	$207.8	$190.5	$144.4
Bond Volume, NYSE (millions)	$52.4	$55.5	$53.4	$61.8
Stocks Sales, NYSE (thousands)	7,511	7,486	8,644	4,714
Loans and Investments (millions)†	$57,211	$56,262	$50,405	$46,822
United States Government Obligations Held (millions)†	$41,917	$41,048	$37,259	$34,165

†Member banks, Federal Reserve System.

ICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	248.8	248.3	249.8	244.2
Industrial Raw Materials (Bureau of Labor index)‡	113.9	113.8	113.1	113.4
Manufactured Products (Bureau of Labor index)‡	101.0	101.0	101.0	99.6

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

Improved PRODUCTION EFFICIENCY

in meeting unprecedented demand for valves and fittings is attained by Crane Co. through better utilization of existing space rather than by extensive plant expansion

By E. F. ROSS
Chicago Editor, STEEL

WAR has created unprecedented demands for cast steel valves, flanges and fittings, to meet the requirements of new construction programs in shipbuilding, petroleum refining, synthetic rubber and chemicals manufacture, steelmaking, power generation, and other industries. Aside from being required in previously unheard of quantities, the castings must meet rigid specifications for service involving high pressures, high temperatures, or unusual conditions. Accordingly, production facilities of valve makers have been taxed to the limit since early in the war program.

In the main, however, manufacturers have accommodated themselves superbly to the load imposed upon them, and, after the first few months of general confusion following Pearl Harbor, few serious delays in war construction and production have been attributed to a short-

(Extreme left)—Tapping a heat of steel from one of the 6-ton capacity electric furnaces after test specimens have been sent to the laboratory by pneumatic tube and analysis has been approved by telautograph

(Center)—Molds for steel valves and fittings are made and poured in this highly-mechanized section of the molding floor. Molding stations are shown at the left rear. Molds are poured on the stationary roller conveyors, then pushed off on to the power-driven mold conveyor shown in the foreground. The two workmen are returning empty flasks to the molding stations

(Directly above)—Close-up of pouring a mold, using a bottom-pour ladle

By E. F. Ro...

...re in valves and fittings. For the most ...rt, the required high output has been ...hieved by maximum utilization of exist...g capacity rather than by extensive ...ant expansion.

One of the country's large valve man...acturers which found itself in a posi...n to make a notable contribution to ...e war effort was the Crane Co., Chi...go. Long committed to the policy of ...intaining its facilities up-to-date ...rough adoption of improved produc...n methods and installation of more ...icient equipment, this company has ...npleted an extensive modernization of ... steel foundry and castings cleaning ...artment to provide progressive or ...ight-line output. This undertaking ...ced major emphasis on maximum ...hanical handling of materials and ...duct.

Factory Uses Its Own Scrap

...y speeding up completion of this pro...m, full productivity was soon at...ed. In the meantime, however, war ...mand for valves required that capac... be increased further and quickly. ...is was accomplished partly by in...lling some additional equipment, part... through more ingenious utilization of ...isting floor space, and to some extent ... improving overall efficiency. A sig...ficant point is that by avoiding con...uction of new buildings the company ...ded the war effort by conserving crit...l materials and labor.

Steel for castings is made in electric ... furnaces operating on basic melting ...ctice. Considerable advantage is de...ed through basic melting because it ...mits the factory to utilize all its own ...ap, consisting of turnings, borings and ...shings, many tons of which are pro...ced daily. This scrap does not have ... be shipped out of the plant, nor is it ...essary to purchase large tonnages of ...cial grades, all of which would in...ve much handling labor, storage space, ... railroad transportation.

(Left)—Steel for castings is melted in this bank of swinging-roof, top-charge, electric arc furnaces. Elevator which lifts buggies of scrap from basement is shown between the two right-hand furnaces

To provide precise metallurgical control in melting and to obtain high recovery of alloying elements contained in scrap produced in the plant, proper identification and segregation of scrap is a requisite. To this end, turnings and chips are gathered from machines systematically and placed in boxes or other containers bearing color designations identical with those borne on the original stock, whether this be steel bars, forgings or castings. Like most manufacturers, Crane Co. has a standard system of contrasting color paint markings to denote steel compositions.

Chips Graded by Alloy Content

Sprues and gates are kept within the confines of the foundry and therefore remain under the eyes of melting department personnel. Forge scrap, such as flashings, and bar ends from the machining of bar stock, also properly identified, are loaded into steel hoppers and transported by industrial truck to the melting department. The turnings and chips are transported in a similar manner to the chip crusher. Here the stringy turnings are crushed and the chips shoveled into perforated baskets of centrifuges in which they are spun at high speed and the oil is thrown out. Each month thousands of gallons of oil are recovered in this manner.

Different compositions of turnings are crushed separately, moved to the melting department and used in the electric furnaces according to their alloy contents. This permits their being utilized in heats of the same composition, or of similar composition with lesser alloy content.

Two of the four direct-arc furnaces are 6-ton capacity, the others are 3-ton and 1-ton, respectively. This range in capacity provides adequate flexibility for economical production runs on castings of varying compositions. The units are of the swinging-roof top-charge type which eliminates hand charging. The charges are dropped into the open furnaces from buckets handled by an overhead crane. Separate buckets for the 6-ton and 3-ton furnaces are kept in a pit close-by, each bucket holding a complete charge. Scrap is accumulated in the basement beneath the charging floor, where it is loaded into buggies which are lifted on an elevator, rolled on a short track and turntable to the proper bucket and dumped by a specially-designed air-operated buggy tipper.

To charge a furnace, the roof is raised 6 to 8 inches and swung horizontally sidewise. The loaded bucket is carried by the crane into position over the furnace where the rope holding together the hinged segments of the bottom quickly burns off, dropping the charge into the furnace. This operation requires about 3 minutes, compared with a former average of 40 minutes for hand charging, a significant saving of time as well as manpower.

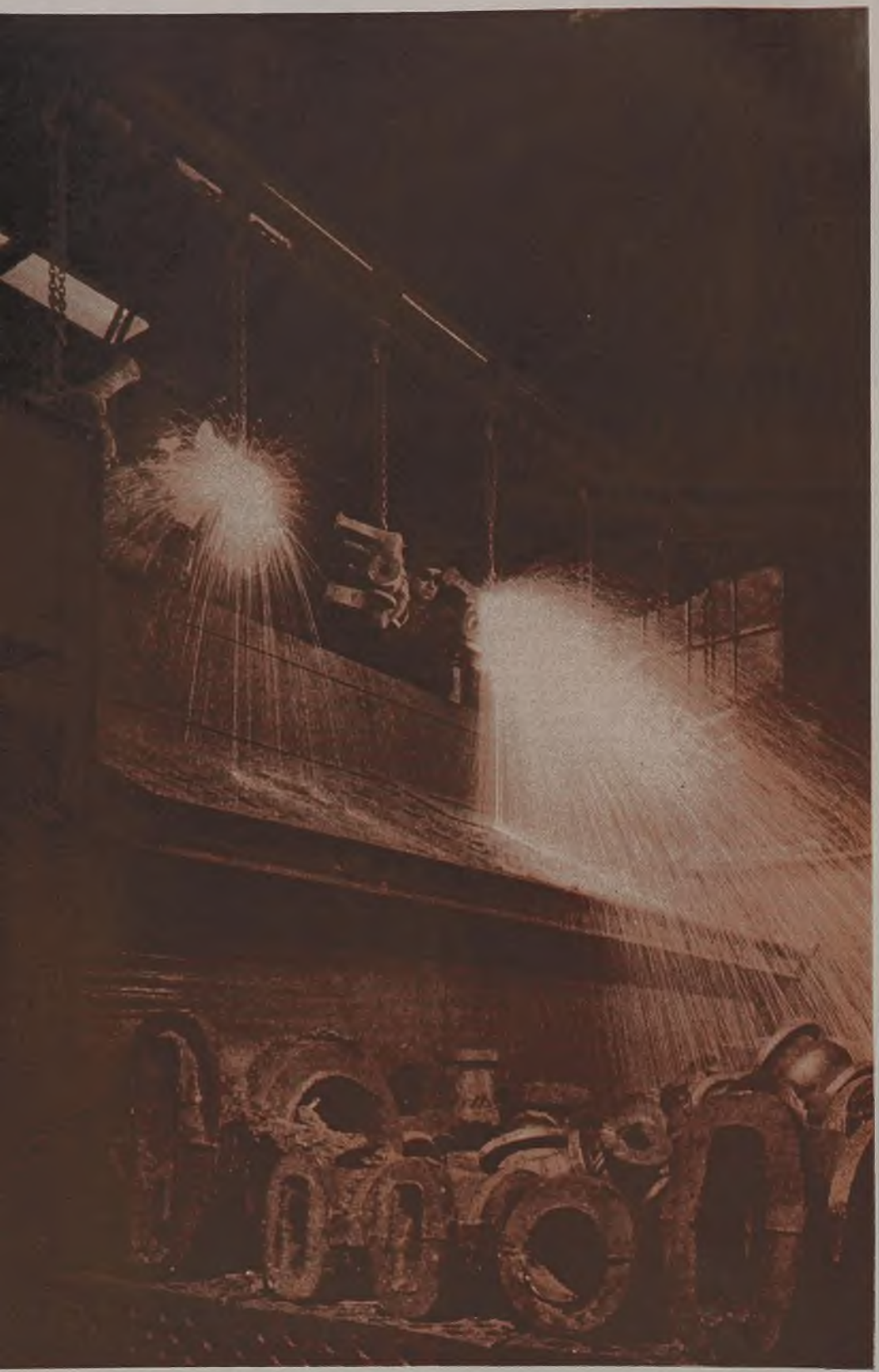
Water-Cooled Skimmers Economical

Two features of furnace practice are worthy of note. One is the use of water-cooled slag skimmers to reduce the hardship of this disagreeable task of steelmaking. Aside from making skimming less trying, water-cooled skimmers last longer and are more economical than plain ones from the standpoint of replacement. The other feature is use of a pneumatic tube system for delivering test specimens of furnace heats to the laboratory which is some distance away from the melting department.

Foot delivery of specimens formerly required 5 to 7 minutes, a period which

(*Left*)—*Castings suspended from the conveyor in chain slings pass balcony stations where they are cut free from gates and risers by torch. Gates and risers remain in the slings, the castings drop down onto the annealing car shown below*

(*Below*)—*Sand is cleaned from castings by means of high-pressure water spray, the pressure being* 1200 *pounds per square inch. Castings are supported in chain slings from a monorail conveyor*



(*Top, opposite page*)—*This view in the cleaning department shows the chipping operation. Castings are brought from the foundry to the cleaning room in steel baskets by the main conveyor. This conveyor is of such length that* 8 *hours is required for a round trip*

(*Bottom, opposite page*)—*Heat treating of steel valve castings is accomplished in this battery of gas-fired, car-bottom type furnaces, each having a capacity of approximately* 15 *tons*

elayed running of chemical analysis nd phoning instructions back to melters. he tube system dispatches the speci- ens to the laboratory in a matter of econds. Analysis of carbon steel for arbon, manganese and sulphur, can be ade in 7 minutes; of carbon-molyb- enum steel for carbon, manganese, olybdenum and sulphur, in 15 min- tes; and of chrome-molybdenum steel r carbon, manganese, chromium, molyb- enum and sulphur, in 20 minutes. Since elephoning instructions to the furnaces as subject to the hazard of misunder- anding, a 1-way telautograph was in- alled. which eliminated possible error transmission.

Molds Made Near Furnaces

Molds are made and poured in a bay djacent to the electric furnaces. Brief- the facilities include a power-driven old conveyor operating in a rounded rner rectangle approximately 68 feet ide and 162 feet long surrounding four roups of stationary roller conveyors, ch group serving two molding ma- ines. The eight molding machines, ur being jolt strip units and four jolt queeze strip units, are lined up close one side of the mold conveyor.

About 50 per cent of the time the ractice is to make up green sand cores om facing sand, and for the balance f the time to use dry cores brought ver from the coreroom in another part f the foundry. Each two molders have ehind them two transfer cars with roller onveyor top. When the drag is made, is placed on a car by an overhead rolley hoist, hand operated. Next, the ore is set, after which the cope is rought from the molding machines and placed on the drag. The transfer car is then rolled to a point in front of any one of four stationary pouring conveyors and the mold pushed off on to the rollers of the conveyor.

Attention may be called to the fact that the pairs of molding machines are so placed that when it is desirable to operate in duplex, that is, making the drag on one and cope on the other, this may be done by using one of the two transfer cars.

Steel for pouring the molds is tapped from one of the electric furnaces into a ladle—the largest being 5-tons—and handled by overhead cran eto a ladle transfer car. The car and ladle are moved a distance of 25 to 30 feet into the foundry bay where the ladle is again picked up by the overhead crane and the metal poured into the molds on the stationary roller conveyors previously described.

After partial cooling on the stationary conveyors, the molds are pushed off onto the surrounding mold conveyor which consists of a series of roller-top cars tied together in an endless chain. The molds travel around this in clockwise direction until they reach a point where they are picked up by bails suspended from an overhead trolley conveyor and carried to the shakeout. Speed of the overhead trolley conveyor is controlled so that each pair of pick-up bails is synchronized to a car on the mold conveyor. A manual means of adjusting synchronism is provided should the two conveyors get out of step. The mold conveyor speed is 10 to 30 feet per minute and the complete circuit about 400 feet, which allows additional time for cooling molds.

In passing over the shakeout, the flasks are held by the bails and merely brought in contact with the top of the shakeout machine screen. After the sand and castings fall out, empty flasks continue to be held in the bails and are carried back over the center of the mold conveyors where they are deposited. Traveling around the conveyor to the opposite side adjacent to the molding machines, the flasks are pushed off on to any one of eight stationary roller conveyors to return to the molders.

Crane Co.'s sand preparation and handling system is modern and complete in every respect. Through mechanization, important labor saving is derived. Adequate supplies of sand are available at all times from a three-compartment storage bin, two compartments for backing sand and one for facing sand. From the shakeout sand is taken by underground 20-inch crossbelt conveyor to a 30-inch underground magnetic belt, and from it by a sand elevator breaker screen overhead. Hence the sand goes to a 36-inch bin belt which distributes to a three-compartment storage bin.

Sand Handling All-Mechanical

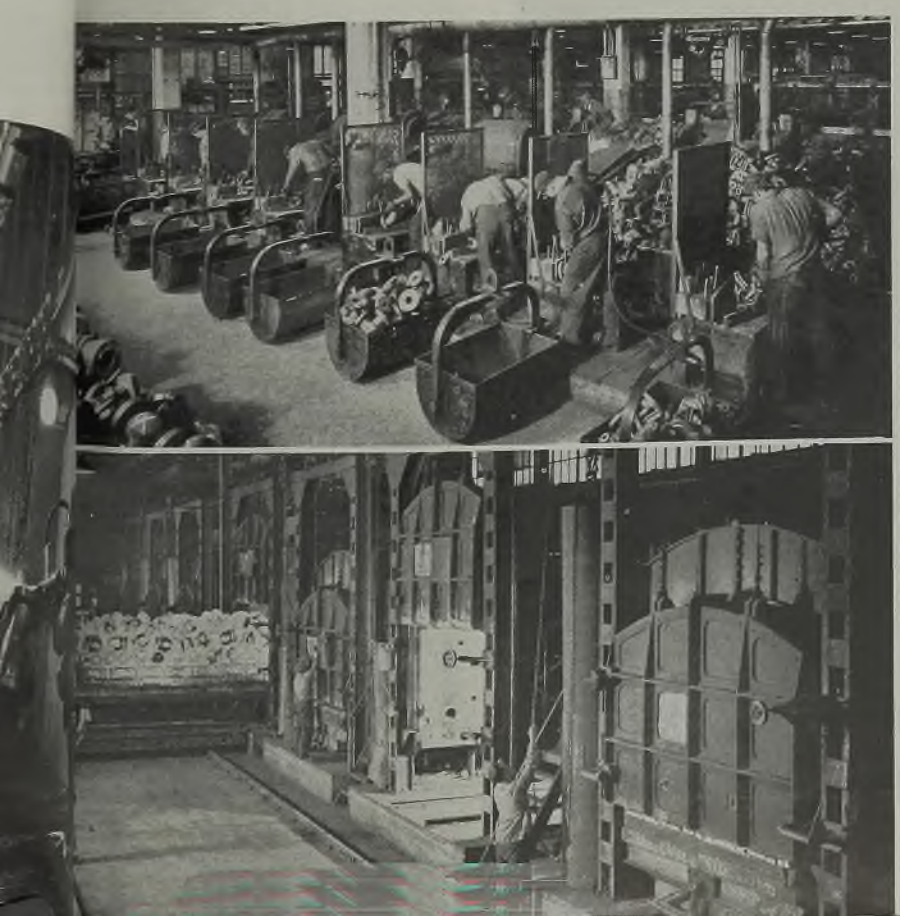
Under the storage bin are two apron feeders. Movement from here is to a 30-inch tempered sand crossbelt to the aerator. From the aerator it passes to a 24-inch tempered sand crossbelt, then to a distributing conveyor at the end of which is a surplus sand chute. Sand beyond that needed for the eight backing sand hoppers at the molding stations discharges through the chute to a surplus belt and travels back on it approximately in line with the shakeout. Here it drops through the floor to an underground surplus sand belt which discharges onto the 30-inch magnetic belt mentioned previously.

Facing sand is made up of part reclaimed sand and part new sand with necessary binders. In its preparation, feeders can dump sand into the traveling weigh hopper from either the bin containing old sand or that containing new sand. Sacks of binder are added into the weigh hopper. This hopper discharges into one of two mixers or mullers which in turn discharge on to a 24-inch milled sand belt to an 18-inch milled sand crossbelt feeding the facing sand elevator.

This elevator drops sand through an aerator which discharges on to an 18-inch facing and crossbelt. From here the sand is discharged onto an 18-inch facing sand distributing conveyor which feeds eight facing sand hoppers located adjacent to the aforementioned backing sand hoppers at the molding stations. Surplus facing sand is discharged onto the same surplus sandbelts that handle excess backing sand. These belts, which are below both distributing conveyors, return the surplus to the main three-compartment storage bin previously described.

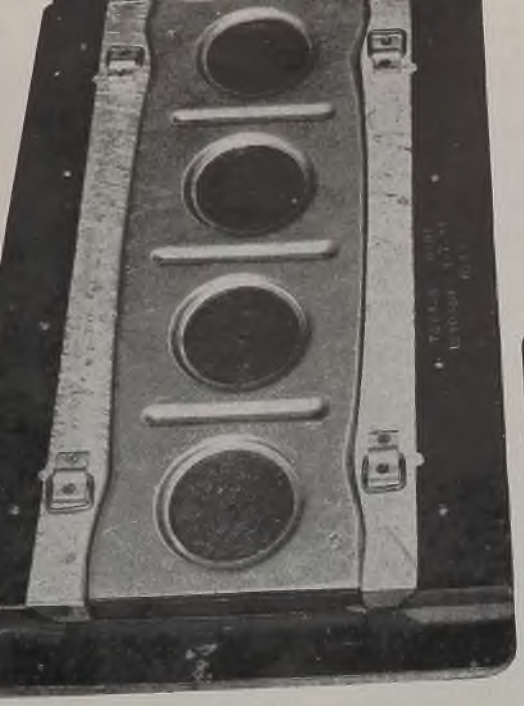
From the shakeout, castings slide down a chute from which they are removed by placing a chain sling around the gate or riser, and hooking the chain onto a trol-

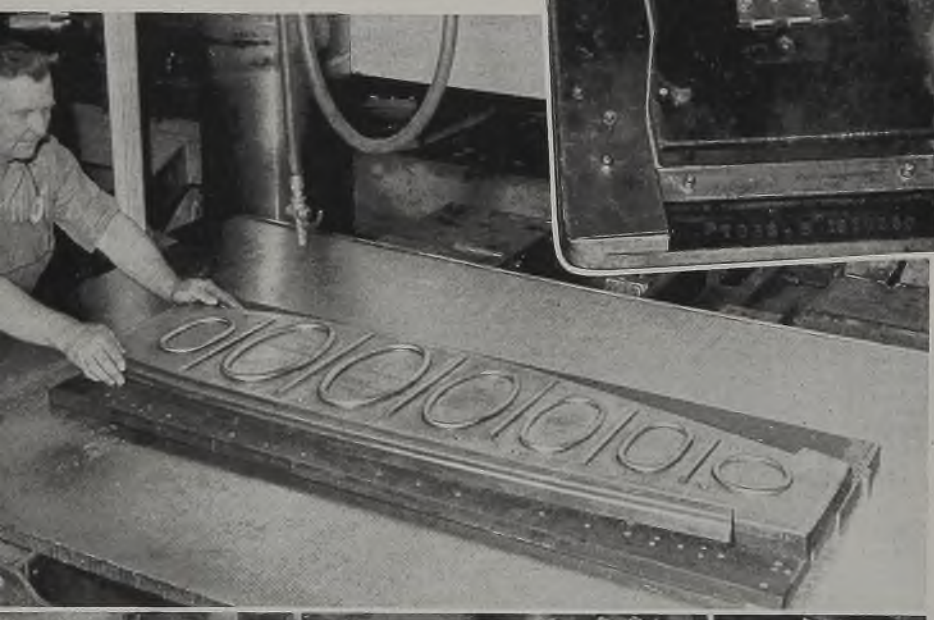
(*Please turn to Page* 110)



Sheet-Metal

By G. ELDRIDGE STEDMAN





NIGHT AND DAY at the Texas Division plants of North American Aviation, Inc., Dallas, Texas, long assembly lines inexorably conduct three types of military aircraft through progressive stages of production—the Texan combat trainer, the 4-engined B-24 Liberator weighing 20½ tons, and the Mustang P-51, designed from actual combat to be the highest flying, fastest fighter in the world.

These three ships are basically different, yet over 95 per cent of their parts, with the exception of motors and forgings, are fabricated in the company's plants, involving a diversity of sheet-metal forming, pressing, stretching.

The atmosphere of these plants is one of "short cuts" made necessary by the urgency of war, and in accord with recognized company policy. Just as aircraft design tolerates no square corners, neither does methods engineering in these Texas plants. The evolutionary process of eliminating parts, operations, outside vendors; reduction in materials handling, storage, man-hours and an "eagle" alertness in taking advantage of each square foot of plant area have all created a compact, fluid, streamlined accomplishment that one marvels at, only to return the next day and find some further overnight improvement.

"Many flexible and inexpensive metal

(Top to bottom)

Two-stage form die for stabilizer bulkhead for B-24 Liberator eliminates handwork

Wing bulkhead form die for 5000-ton hydraulic press forms. Cam action forms return flange on each side, eliminating separate flanging operation and handworking

Typical loading of one of the four shuffle tables for 5000-ton press. Dies are designed to finish parts. Two at extreme right blank lightening holes as well as form in one operation

Shortcuts

. . . . feature aircraft manufacturer's ingenious use of new forming methods and equipment

rming tools are used," J. H. Kindelerger, president has stated. "With the d of contour blocks averaging $15 and x man hours, the radial router, for ample, can perform almost any conuring job on aluminum alloy, magnesium alloy, phenolic, or steel sheets. rop hammer dies of Kirksite or lead sting $150 and 60 man hours, probably ne-tenth the cost of conventional dies, n form upward of 1000 complex aluminum parts before replacements, in operaons absurdly simple in comparison with e complex presses of former automotive dy forming.

"Given a rush order on a B-24 engineering change arising from combat conditions, a new die actually can be built overnight and have finished parts on the assembly line the following day."

Spirit Pervade's Plant

This spirit is everywhere in evidence. he process of reproducing templates by ffset; simultaneously contouring from 9 38 sheets in a single cut on a special adial router; the drilling of 69 holes at he same time in the three sides of a nding gear support base flange having meet a perpendicular to contour on vo sides; the acetylene burning of cutr bodies upon which to mount negativeke hardened insert tips; the stationing numerous power, light and air connecons through the B-24 as it moves rough final assembly to affect the elimation of a clutter of hose and an econny of worker motion; these and 37 other bservations of my plant tour proved he application of the policy that has iven North American Aviation its recrd in production per man hour and per quare foot of factory space.

The company even makes its own rivets nd has its own pressure molding departent where phenol-furfural resins are sed in pressure, positive, flash and inction molds to form a considerable numer of electrical parts and panels. This pirit is nowhere better illustrated than its methods of forming and stretching me of which this article details.

Texas Division plants have gone further in metal forming on hydraulic esses than others so far visited. Die sign and development are outstanding. he reader knows that this aircraft adaption of the hydraulic press employs a bber blanket on the upper platen as a niversal female die to form metal cut size and placed over form blocks of asonite, aluminum, steel or Kirksite on e lower platen. This technique has ade possible an unusual degree of flexility in metal forming possible, and is one of the great reasons for the swiftly accelerating mass production records of military aircraft. Here 25 SO aluminum having thicknesses of 0.020, 0.064, 0.081 and 0.125-inch is formed by this method to complex shapes, sizes, contours, blankings, and even return flanges never before thought possible.

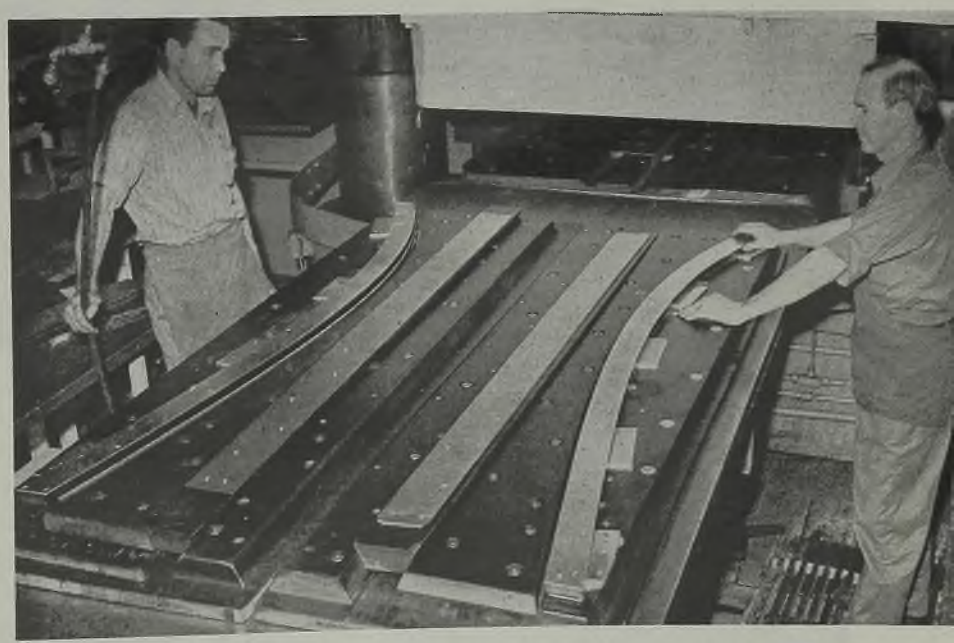
Hydraulic-press equipment here consists of one Birdsboro 5000-ton automatic, two Williams & White 3000-ton 40 x 96-inch automatics, two W. & W. 600-ton, 24 x 36-inch units with straight-in feed and one W. & W. 300-ton 18 x 14-inch press with a diamond-shaped bed. Since the principle of all is the same, the operation in the 5000-ton press will be detailed.

This machine weighs 800,000 pounds, sets on a 16-foot concrete foundation, is actuated by a pressure ram 60 inches in diameter, employs two 400-horsepower motors, requires 1800 gallons of oil for its hydraulic operation, uses 500 gallons of chilled water per minute. This is recirculated and chilled from the plant's central air conditioning system (the entire plant is a fine architectural example of blackout, windowless, air-conditioned design). The press is entirely automatic, once the operator has set the pressures, cooling valves and movement controls.

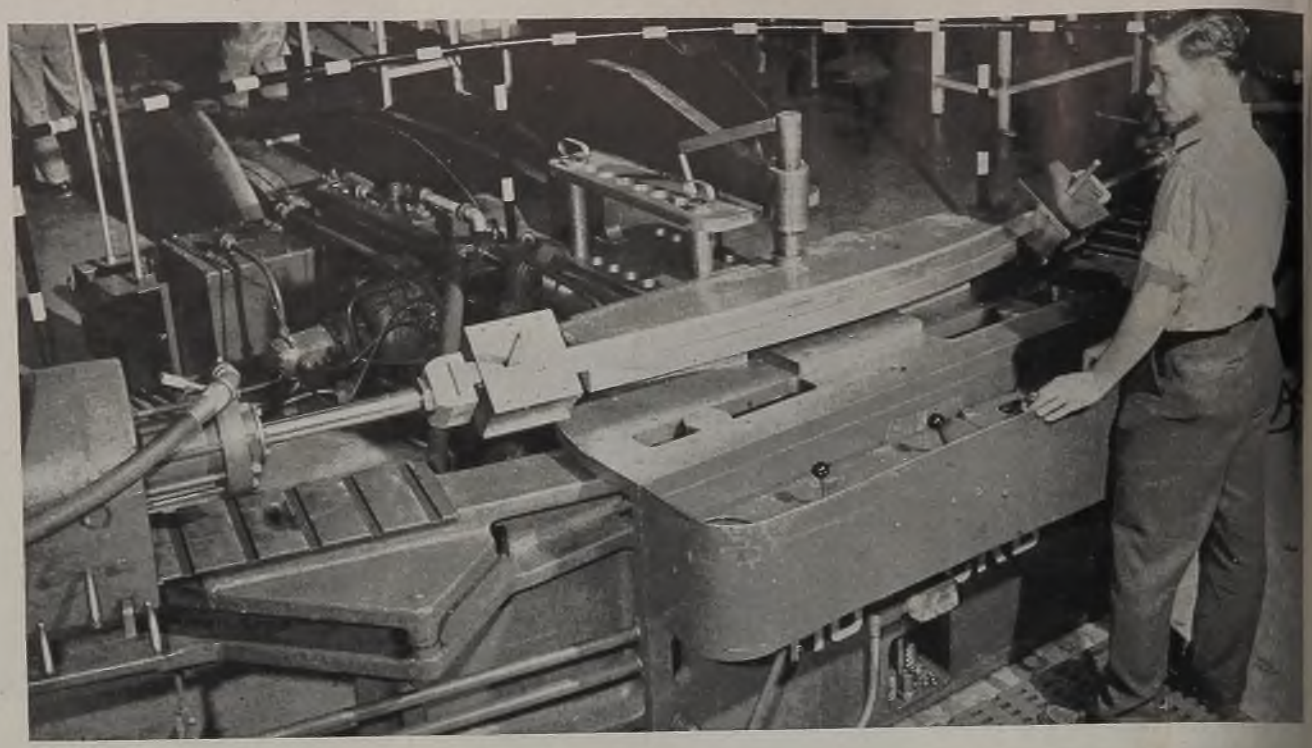
This press is of shuffle design, four tables of platen size feeding into the press in a shuffle sequence. This is preferred to the circular rotating type of feed, in that it saves time and materials handling when sequence of operation is disturbed. The shuffle tables are of 1-inch steel, 60 x 130 inches to match the die bed. The work is organized on them for forming, a starter at each individual table controlling automatic feeding to the 8-inch thick die bed where tables are held by stops at the edge of the die.

Individual male dies are a maximum of 6 inches high. Better than 85 per cent of them are of Masonite for main and down pressure, Kirksite being used only on dies involving side pressures. The universal rubber female die, of 60 to 70 shore hardness and either natural or synthetic, weighs 1500 pounds and lasts six months. It accommodates this huge bed, provides the squeeze at any controlled pressure up to 5000 tons to the individual diework arranged on the platen and fed into the die bed; the maximum distance of squeeze being between the 8-inch bed and the top of the die.

The starter at each individual table can stop any table, though he can start only his own. Thus, in observing the operation, when a pressed form was picked up in the upstroke from shuffle one, and unnoticed by the operator occupied in removing the forms from the



Unique dies completely form in one operation the chord angles for wing center section bulkheads for B-24's. Note wedge action embodied in dies



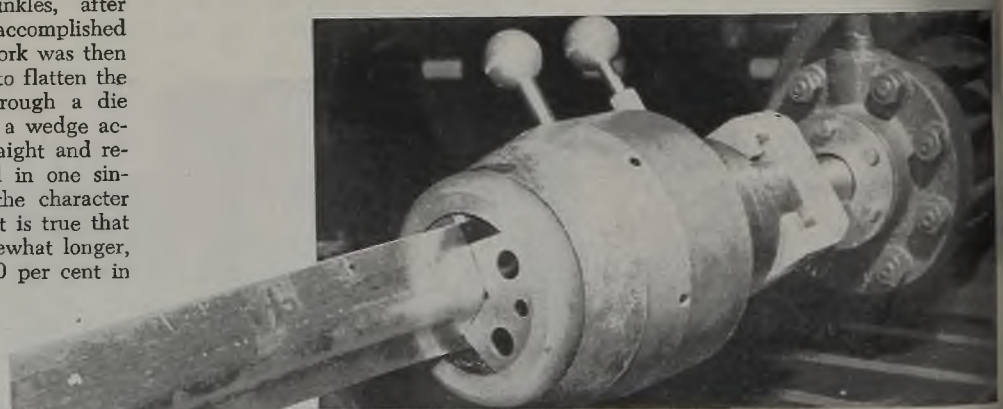
North American-designed bending machine made by Hufford stretches material around irregularly shaped form blocks. Material is stretched straight, then machine arms operated to "wrap" work around form block, illustration below

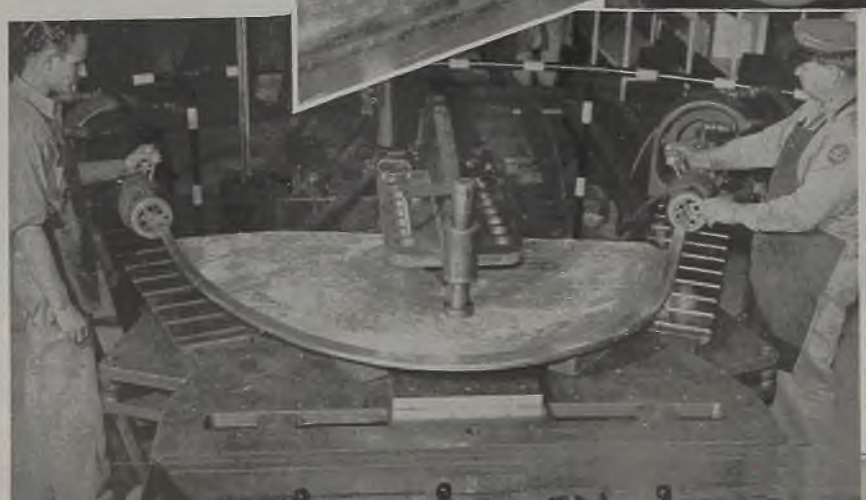
returned platen, shuffle two, about to enter the press, was stopped by shuffle three operator to adjust the fault.

It would be impossible, short of a volume, to detail the hundreds of dies held in active storage for instant forming use, most of which have individual design features worthy of study. One of the techniques observed makes wide use of the return flange principle, accomplishing a progressive forming of a double flange at one stroke. Under the old system, the return flange involved a sequence of operations in which the part was formed in a straight flange, then bench work removed wrinkles, after which a flanging machine accomplished the return flange and the work was then removed to a surface table to flatten the warp and twist. Now, through a die design principle which uses a wedge action, flat forming of the straight and return flange is accomplished in one single operation, because of the character of the bite and pressure. It is true that the work is on the die somewhat longer, but there is a saving of 100 per cent in bench work. This return flanging wedge is applicable to cord angles, bulkheads, small ribs or any part requiring a return flange as long as one surface is flat.

Other examples of fine die design are the wing bulkheads for stations 2, 4, and 6 on the B-24. These are 3 x 6 inches, of 0.081-inch 24 SO. The old operation involved blanking, flanging, flattening on a surface plate by hammer. The new method on the big press blanks the holes, accomplishes the return flange all at once, and sends the work to heat treat as a finished part.

Another example is the center section bulkhead that has lightening holes and beads. The original design required channel strips to be riveted in place of beads, of which there are from 30 to 40 in lengths varying from 2 to 12 inches.





(Above)—Closeup of jaw of "Hufford" bending machine shows air cylinder that actuates interchangeable inserts in jaw to handle any shape of material up to a 3-inch flange

(Left)—Here the work has been "wrapped" around a form block, starting from a straight stretch

BLAZING TRAILS IN THE SKY

ROCKET SHOWN HERE AS SECRECY IS ENDED

50-Pound Projectile Was Used Effectively in Invasion

Details of an artillery type rocket projectile, classified heretofore as secret, and used effectively in the invasion of France and on other fronts, were made public yesterday.

It was described by C. Donald Dallas, president of the Revere Copper and Brass, Inc., who announced that the projectiles produced at the Rome Manufacturing Company Division of Revere at its plant in Rome, N. Y., were being delivered in tremendous quantities.

The rocket projectile is comparable in potency to the famous Army 105-mm. artillery projectile, Mr. Dallas declared. He pointed out that the principle of manipulation and firing of the rocket projectile was similar to that of the "bazooka," except that the rocket gun used a light mount. He said the range and destructive force of the new projectile were far greater than those of the "bazooka."

"Rockets fired from landing craft and 'ducks' can lay down devastating barrages against hostile beaches in landing operations," he said. "They can be fired in salvos from airplanes and water craft whose previous fire power has been limited to smaller sizes of ammunition. They can be loaded with high explosives or chemicals and they may be used effectively to lay down a smoke screen to conceal military operations from the enemy."

Electric Welded Steel Tube by REVERE

tillery-type Rocket Projectiles, which are being ed with deadly effect against ground troops, ships, d even submarines, were developed by Revere at e request of and in cooperation with the U. S. Army dnance Department. The manufacture of these ojectiles involved difficult research, the develop- nt of new principles of design, the application of w techniques and materials to withstand the terrific at and pressure of the propelling charge. These ts have a real bearing upon your post-war plans. We have been making electrically welded steel e for 25 years. When war demands slacken, it will once again be freely available for mechanical uses, boilers, condensers, heat exchangers, water and steam lines, and similar purposes. When planning to use steel tube, remember Revere's outstanding success with the electric welding process.

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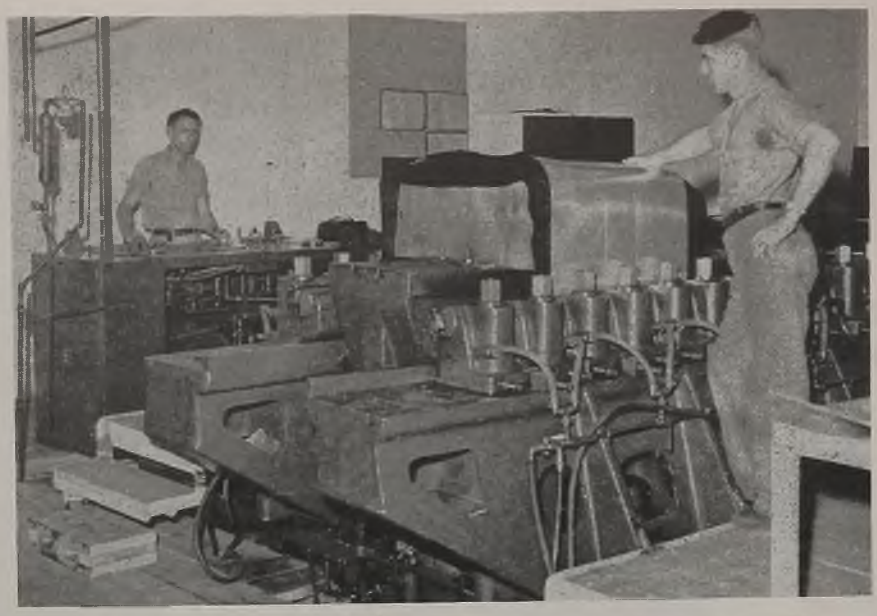


This view of the "Erco" stretcher shows a new development in use of stretchers—use of a thin rubber sheet between die and work to eliminate greasing and cleaning, thus cutting man-hours and increasing production. Stretcher control panel in rear

With 1-inch rivet spacing, this represented plenty of operations. A die design was employed which forms the beads to eliminate all channel strips and riveting; a company policy being to do away with such rivet "build up" or lamination of parts when possible. Now a blank, forming, return flange combination die was achieved for this bulkhead center section which further eliminates the cutting of the lightener holes, formerly accomplished by punch, radial router or hand router. This new method blanks the lightening holes by means of a small circular steel ring inserted into the master die. The blanking is accomplished by the flow of the material in the forming operation of the beads meeting the pressure of the hole against the steel insert, the latter being fortified by a buffer block that throws the flow back against the punching action of the steel insert to accomplish perfect blanking. Now, holes, beads and return flange are all produced in one operation by these blanking-forming-wedge-acting-flanging features of the master die.

A unique forming operation on the flap rib involves a slight contouring of 0.020-inch on one side. This was once accomplished in a hydraulic press by use of a straight side die, but it created small wrinkles which were removed by bench-work. Six forms of this part are now carried on one die which uses buffer blocks to create more pressure against the side of contour, eliminating all wrinkles.

A final example is that of elevator ribs which are now formed over a 3-part die equipped with dowel pins. The rubber forms the part down a straight flange and a progressive operation of the same die forces the pressure of a wedge block to accomplish a return flange; removal of the part being effected by the two sides of the die on dowel pins being taken up with the part to be taken off.

There is practically no limit to what can be formed in this manner. Improvements on ideas are in experimental stages all the while. Today, less than 50 bench workers are required to supplement the work of "The Big Press", whereas formerly it took from 150 to 200.

(Above)—Completed cowling part for P-51 Mustang fighter formed on Sheridan stretcher here shown atop die used to produce it

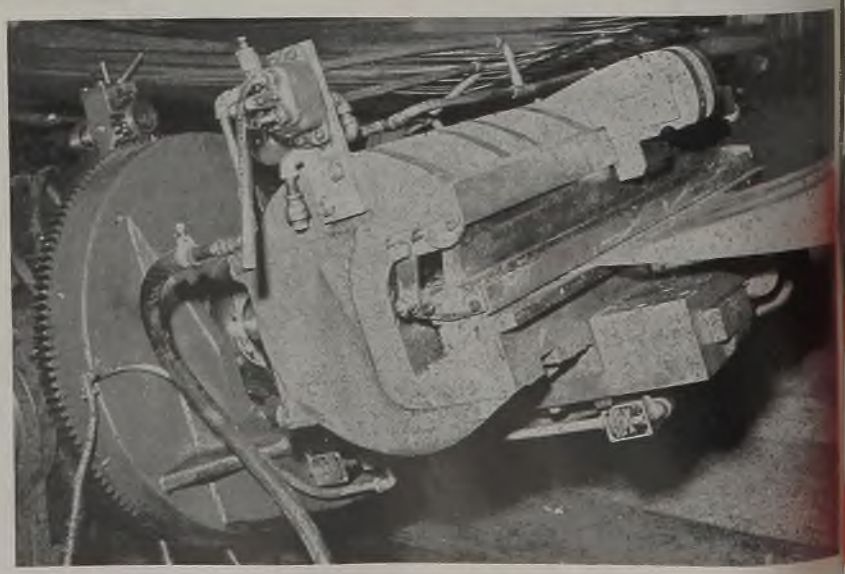
(Below)—Closeup of air-operated jaws of Sheridan stretcher

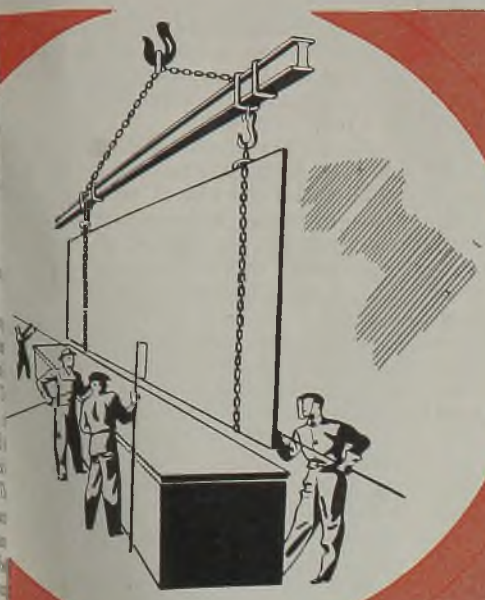
The company makes major use of the formed and extruded section stretcher, a still very new development of a group within the Inglewood plant. The action of this stretcher is that two arms pull initial tension in the work and then form the part around any form block with contours up to 180 degrees. The tension can be set to values to accommodate various thicknesses of extrusion or sheet. The hydraulic bending and beveling pull is 25 tons. The 10-foot arms can be manipulated individually or in tandem.

The stretcher can be set at a different degree all around the part, providing an open angle at one point and closed at another. Dies are of Masonite (about 500 parts to the die) until perfected, and then permanently molded into Kirksite which is practically everlasting in such operations. The tooling is cheap and no further bench work is required after stretching, except to cut off the ends of the part.

The jaws are air operated with interchangeable inserts to handle anything up to 3-inch flanges by replacement. The "open-close" operation is automatic from a remote control panel, requiring an operator for each cylinder with which each arm is equipped at its end. These cylinders have knock off levers. The part stretches as it bends and the final stress sets the degrees and the shape of the part. This forming eliminates all springback and the work doesn't have to go to a degree table as with the method employing rolls and form bending machine which required that the work be placed on a degree table to flatten and set to find shape desired.

An example is the wing tip bow which





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required three pieces in the old method of extra-wide blank to be done on the drop hammer, double trimmed and a rivet splicing operation to complete. Now these are stretched in one piece on a Hufford machine, eliminating all trim and riveting operations.

The Texas Division makes large use, too, of the Erco and Sheridan stretch forming machines. The Erco stretch forms over dies of hardwood, Kirksite or Masonite, handling parts from 2 to 10 feet wide, 1 inch to 8 feet long. Its two 8-inch jaws extend the complete width of the machine, segmented into four sections each, which can be turned 10 degrees horizontally for adjustment to individual dies. Setting is by electric screw to accommodate varied length of dies. A good understanding of metal forming characteristics is required.

Width, pressure, cutting size per jaw per part is recorded by part numbers to facilitate return setup without experimentation, saving over 50 per cent of setup time. The pressure type Erco jaw sections, under individual hydraulic control, can be manipulated separately or in unison. This machine stretches the material over the die, accomplishing elongation over the complete surface, eliminating springback and producing parts to finished dimensions.

Metal in the 24 ST, 24 SW or 24 SO conditions can be formed by change of jaw types. Most satisfactory technique is to heat treat 24 SO material and quench in chilled water, placing the parts thus treated directly into sub-zero refrigeration to keep it in soft condition, subsequently removing the parts one at a time for immediate forming. After forming, the parts age to 24 ST condition requiring no final heat treat or hand working. This is a great advantage since no two parts can be handworked exactly the same.

The Sheridan stretcher is similar to the Erco. It handles parts up to 22 feet in length and up to 48 inches in width. Between the two machines, a completeness of range exists that satisfies all requirements. The Erco holds the work stationary while the die bed is forced into the metal by hydraulic ram pressure under the bed plate. The Sheridan operates the bed similarly, but moves the jaws simultaneously.

Setup Procedure for Sheridan

Make-ready of the Sheridan involves setting the dies on the bedplate, adjusting them to height, and setting the jaws. Material is then placed over the dies and locked into the jaws on both ends. The actual forming is done by moving the two jaws downward pulling the work over the die which is held stationary. This can stretch stringers or extrusions into different forms. The jaws can be set to any angle from direct horizontal facing of each other to a 45-degree angle, compensating for the different angles of varied dies.

Petroleum jelly is used generally as a lubricant in the stretching process, there being a metal-to-metal friction in the elongation. Some experimental work is being done using a thin rubber blanket between the die and the work, eliminating several operations. As usually done without the rubber blanket, it is necessary to lubricate the die and part preparatory to forming, followed by degreasing the part after stretching with a cleanup of die and machine following at the end of a run.

The rubber blanket technique avoids all this as it requires no lubrication. Work comes out free of wrinkles. The principle is that in stretching the metal over the die, one surface of the work is in friction with the nonstretching surface of the die to the degree of elongation which can be as much as 5 per cent. However, with rubber, this differential can be accommodated, the rubber surface in contact with the metal forming surface stretching to accommodate the elongation while the rubber surface in contact with the die clings stationary, the friction otherwise caused being dissipated by the elasticity of the rubber between its surfaces. This is an entirely original adaptation.

Both stretchers have remote control tables equipped with regulators and gages for recording setups, such controls being individual to each hydraulic jaw ram and individual rams accommodating each die table. The jaw pressure is approximately 60 tons on each machine, providing a pull of 120,000 pounds, which is sufficient for any type of sheet metal stretching of this nature.

There are many applications of this forming technique in postwar designs, such as in kitchen ranges, metal furniture and cabinet forming where many joints can be eliminated. Bothersome springback, both from the standpoint of original assembly and maintenance, can be eliminated.

Manual for Mechanics In Aircraft Industry

Aircraft Mechanics Handbook, by Paul Van Winkle; cloth, 400 pages, 5 x 7¼ inches; published by Manual Arts Press, Peoria, Ill., for $2.75.

A guide and reference for apprentices, students, repair mechanics, factory workers and engineers, this manual contains specifications on aircraft materials, technical data and information on replacement and identification of parts and repair of aircraft structural surfaces and accessories. It is based on latest Army, Navy and commercial specifications.

It contains 16 sections, covering aluminum alloys, riveting, bending, AN parts, special fasteners, aircraft nomenclature, key mathematics, drafting terms and symbols, welding, metalwork, steels, woodwork, cable and cable splicing, fabrics, plastics and coatings. It is illustrated by more than 280 drawings showing each detail and characteristics of the subject involved.

Data on Soda Briquettes

Data covering the use of soda briquettes for reducing the percentage of sulphur in iron are now available from the Pittsburgh Plate Glass Co., Pittsburgh. The material added in the runner near the ladle is used in the proportion of 10 to 14 pounds per ton of iron where a sulphur reduction of 40 to 50 per cent is required. The resultant alkaline slag is skimmed off before the metal is poured into the steelworks mixer in order to reduce erosion of mixer refractories. In case of low manganese iron, the slag is removed in a short period to prevent sulphur reversion. A clean skim is assured by the addition of a few shovels of hydrated lime which serves to keep the slag in a fluid condition.

Electrical Unit Extends Tank Life at Low Cost

An electrical method for preventing corrosion on the inner surface of the steel water-storage tank at Cleveland Crane & Engineering Co. is praised by company spokesmen as a constant protection at low operating cost. Tank and piping are in excellent condition after one year of service.

The method, entirely automatic, is based on maintenance of an electrical potential between the steel tank shell and the water in contact with its surface. Potential applied is opposite in direction and slightly in excess of the electrolytic solution pressure of the metal. To insure this excess of potential, a current of about 5 amperes is passed through the tank shell, water and ¾-inch diameter, stainless steel anodes properly located in tank. This is sufficient to maintain ionized hydrogen film on the inside surface of shell. It acts as an insulator, protecting the iron from contact with the water and the dissolving action.

Rectifier which provides power is housed in a weatherproof steel enclosure and its potential is 24 volts. Periodical inspection guarantees continuity of protection and proper current flow. Installation was made without draining tank or interrupting service.

Refrigeration and Air-Conditioning Catalog

A new catalog of accessories and supplies for refrigeration and air-conditioning plants has been announced by York Corp., York, Pa. Of loose-leaf type, divided into sections and tabbed for ready reference, the bok is designed to give quick, complete finger-tip information under the following headings: Accessories and Supplies, Ice Cans and Air Fittings, Valves and Fittings, Oil, Cold Storage Doors, Renewal Parts, Tables and Data. Under the latter sizes, weights, performance data, net prices, photographs, mechanical drawings, descriptions and so forth have been included.

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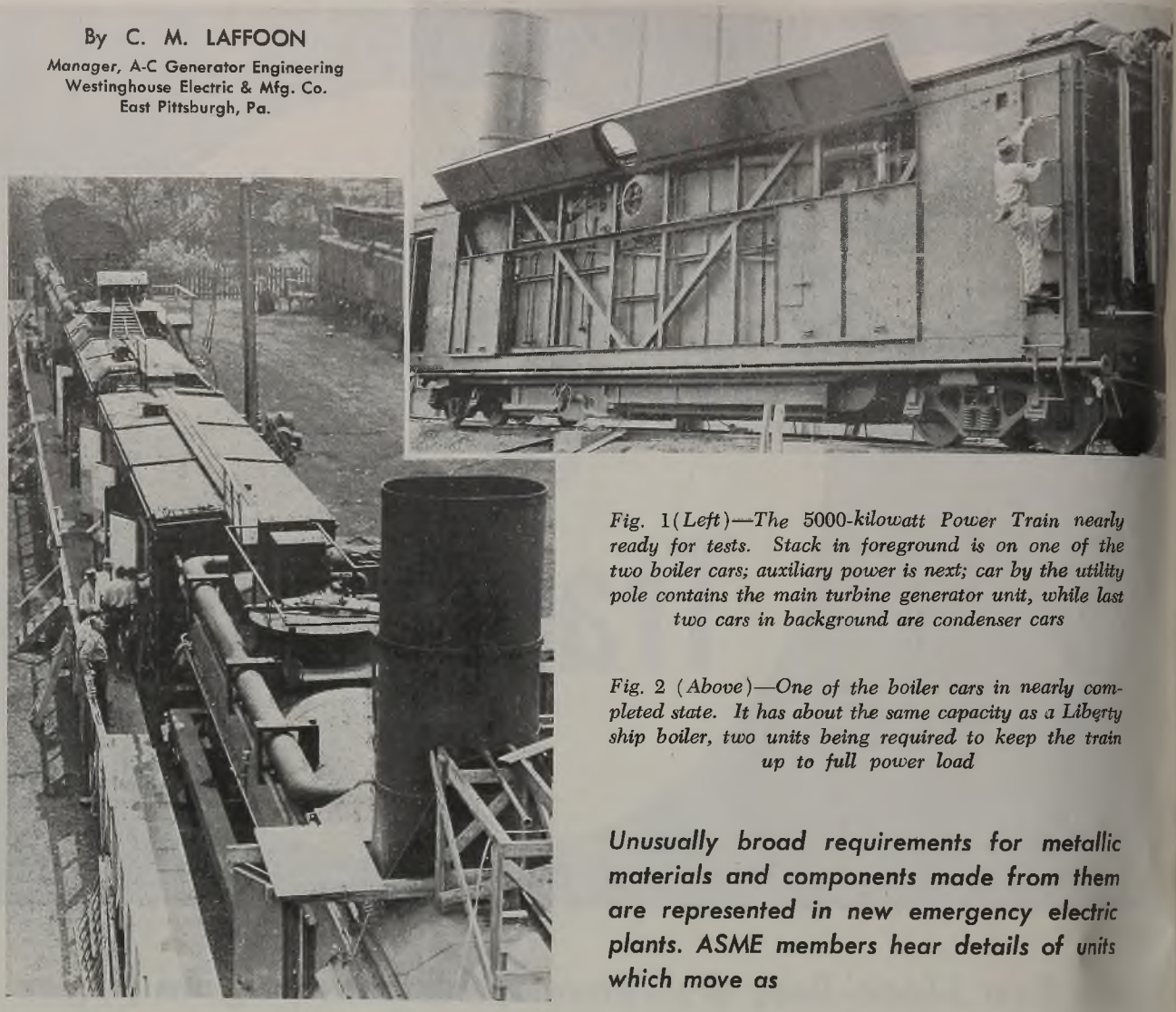

Fig. 1 (Left)—The 5000-kilowatt Power Train nearly ready for tests. Stack in foreground is on one of the two boiler cars; auxiliary power is next; car by the utility pole contains the main turbine generator unit, while last two cars in background are condenser cars

Fig. 2 (Above)—One of the boiler cars in nearly completed state. It has about the same capacity as a Liberty ship boiler, two units being required to keep the train up to full power load

Unusually broad requirements for metallic materials and components made from them are represented in new emergency electric plants. ASME members hear details of units which move as

Self-Contained Power Trains

AT THE PRESENT stage of the war, there is a pressing and growing need by the United Nations for mobile electric power generating plants in war zone areas where there has been widespread devastation and destruction of vital materials and property.

In those countries where the electric power plants have been destroyed or put out of commission, a certain amount of power is required by the occupying army or navy over and above their normal power supply needed for primary military operations. Similarly, a minimum amount of electric power is required by the civilian population.

It is felt by some authorities that the total amount of mobile power plant capacity required for a particular area should be on the order of 2 to 3 per cent of the generating capacity existing in the area previous to the devastation. Present electric power needs of the particular countries in question are being taken care of in a large measure by using relatively small steam and diesel-driven generating plants which can be transported readily and easily installed.

Westinghouse Electric & Mfg. Co. is now building for our allies both 1000-kilowatt and 5000-kilowatt portable, self-contained steam-electric power plants (24 of the former and 10 of the latter) called "Power-Trains". These are assembled in specially designed railway cars which, with suitable trucks, can be transported over most American and some foreign railroads and can be operated to generate electric power when located on satisfactory railway sidings and provided with necessary supplementary foundation supports. The specification requirement that the generating plant be capable of being transported over railroads in a practically complete assembled condition necessitates that cars normally be arranged in tandem. Design is further restricted by the following limitations and operation requirements:

1. Height and width clearance limitations of the railroads over which the Power-Trains are to be transported
2. Weight limitation per axle of the trucks and total car weight limitation on the rails
3. Full output rating is to be produced when using low-grade lignite fuel with approximately 7300 B.t.u., 22 per cent ash, and 24 per cent moisture
4. Plants are to be capable of being placed in operation without the use of an external source of power supply
5. Full-rated output of the generating plant is to be obtained over an ambient temperature range of 40 degrees Fahr. below zero to 95 degrees Fahr.
6. Only a limited amount of water is

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We can extend no guilt-edged invitation to the ladies on this 75th Anniversary occasion. For it is no pink tea we invite them to, no celebration—just work, long hours, day after day making Chain Uncle Sam needs to fight a world war. But these women are not looking for a soft snap. They are filling the places of men who have gone to war. Side by side with veteran Chain makers, they work with a determined will that is helping maintain top production of Cleveland Chain. That is why we are proud to have them with us in this critical 75th year in the history of our organization.

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available for make-up and cooling purposes.

Design of a conventional 5000-kilowatt steam turbine-driven power plant for normal conditions usually does not offer any serious difficulties. However, many problems are introduced when the plant is required to be assembled on railway cars. In meeting these conditions with the present limitations in the use of critical materials, it has been necessary to make readjustments in power plant design standards and make rational compromises in many instances in order to obtain the desired result. It was necessary at all times to keep in mind two elementary criteria in designing the generating plant: (a) Will it work and is it reliable? and (b) is it simple to operate and maintain?

Eight railway cars of the freight type, each approximately 50 feet long, are required to house and support the main and auxiliary power plant equipment. Framework of each car is designed to meet the loadings of the equipment located in the particular car. All cars have double walls for all exposed surfaces, with thermal insulation placed in the interwall space. Cars were designed and built by the General American Transportation Corp. at East Chicago, Ill.

Designation and arrangement of the cars in the Power-Train, shown in part by Fig. I, are as follows:

Cars No. 1 and No. 2 are for the main steam condenser; car No. 3 is for the main turbine-generator unit and switchboard; car No. 4 is for the air compressors and boiler feed water pump; car No. 5 is for the boiler feed water; cars No. 6 and No. 7 are for the main steam generating equipment; and car No. 8 contains workshop and living quarters for the operating crew.

Air Used To Cool Condensers

Each Power-Train will be supplied with the essential coal and ash-handling equipment required to operate the power plant. Since the plant must operate with a minimum loss of water, it became necessary to use a closed steam cycle and air-cooled condensers. Space and weight limitations and reliability were important factors in determining steam conditions for the 5000-kilowatt, 3000-revolutions-per-minute prime mover to be 600 pounds per square inch gage and 750 degrees Fahr. at the throttle, and exhausting at 2 pounds per square inch gage. Under these conditions, the turbine generator will require 80,000 pounds of steam per hour to produce a gross generator output of 5000 kilowatts. Space limitations, steam production requirements and the low-grade fuel for the furnaces fixed the type and number of boilers, superheaters, economizers and other auxiliaries.

Main steam condensers are novel in that air is used as the cooling medium. (Two condenser units which are installed in cars No. 7 and No. 8 of the Power-Train are to be seen in background in Fig. 1.) These condensers are designed to condense the exhaust from the 5000-kilowatt turbine at a maximum pressure of 2 pounds per square inch gage, when cooled by air at temperatures from 40 degrees Fahr. below zero to 95 degrees Fahr.

Eight condensing sections are installed on each of two cars, with four blowers per car to draw air from the outside through the condenser to a plenum chamber at the center and then discharge it upward. Each air discharge stack is provided with a hinged cover which is normally opened when its respective blower is in operation and can be closed when blower is inactive. (Note open covers on last two cars in Fig. 1). This is to prevent recirculation when blowers are removed from service.

Each condenser car is equipped with a single-stage ejector and an air-cooled after condenser, chief function of the ejector being to keep air from collecting in the condenser sections. In each individual section there are 10 rows of tubes divided into five groups of two rows each, an adaptation of principles developed in surface condenser practice to compensate for the varying condensing capacity as air temperature rises during its progress through the condenser. By dividing tubes into groups and putting an orifice in series with each group, a small oversupply of steam to each group will put the controlling pressure drop at the orifice rather than across the tubes, and the tendency toward poor steam distribution is damped out. Excess steam passing through the orifices of the first four groups of tubes is condensed in the fifth group which serves as an "air cooler". The usual practice of putting the air cooler at the coldest part of the condenser is reversed here to prevent freezing. The condensate dropping from the tubes is reheated and deaerated by the incoming steam before it is picked up by the condensate pumps and returned to the boiler.

These Power-Train condensers have total fin surface of 90,000 square feet; total tube surface of 10,500 square feet. Cooling air passing through the condenser reaches a volume of 800,000 cubic feet per minute; steam is condensed at the rate of 80,000 pounds per hour, while temperature rise of air through the condenser at full load is 90 degrees Fahr. Tube material is galvanized steel.

Turbine Generator Car

The turbine generator car contains the main turbine generator unit, an auxiliary diesel generator unit, a service transformer, and switchgear equipment. Main turbine, as previously described, is rated at 5000 kilowatts. Generator delivers power at 6300/19,900 volts, 50 cycles, 80 per cent power factor, 3000 revolutions per minute and 6250 kilovolt amperes. It is equipped with air filters to aid in maintaining cleanliness.

Power for the train auxiliaries is supplied by the 750-kilovolt-ampere, air-cooled transformer at 380/220 volts, 3-phase, 50-cycle, 4-wire. It is connected to the 5000-kilowatt generator through fuses and is provided with low voltage-breaker assembly for motor and lighting service. Breaker assembly is mounted within the transformer housing. For use in starting the Power-Train, a 93.8 kilovolt-ampere, 75-kilowatt, 380/220-volt, 4-wire, 50-cycle diesel-engine-driven generator set is provided.

The totally enclosed metal-clad switchgear contains oil circuit breakers for control of the main generator, the four high-voltage feeder circuits, and high-voltage fuses for the train service transformer. Circuit breakers are electrically operated, mechanically trip-free, and are rated at 600 amperes, 15,000 volts, with 150,000 kilovolt-ampere interrupting capacity.

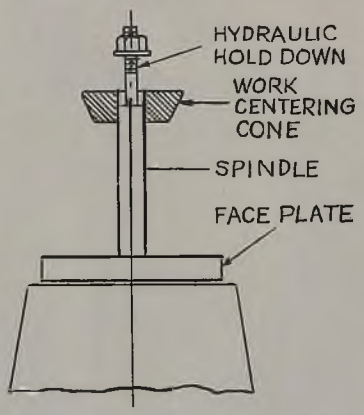
Auxiliaries Carried by Car No. 4

Power-Train's car No. 4 contains two 3600-revolutions-per-minute boiler feed water pumps driven by Westinghouse steam turbines, one evaporator unit of sufficient capacity to provide the required makeup of 2400 pounds per hour of 32-degree Fahr. water, one set of water-treating equipment, three 400-cubic-foot-per-minute air compressors, an air storage tank, water cooling water tower and pump.

Each boiler feed water pump will be capable of supplying 208 gallons per minute of 200-degree-Fahr. water

(*Please turn to page* 114)

Time savings of approximately 100 hours per year per machine are anticipated by Williamette Hyster Co., Portland, Oreg., through replacement of some 50 to 60 bushings required to align gear blanks on a spindle for gear tooth rounding by three work centering



cones of graduated size. One of these cones, positioned on spindle, is shown in above diagram.

The work being done was on a gear tooth rounder and, formerly, the method was to have a bushing for each different size bore of gear on which teeth were to be machined. By the new method, suggestion for which earned a worker a citation from Production Drive Headquarters, there is a saving of time formerly spent in search of the proper bushing and of material for making them as well.

Some Differences That'll Help You WIN THE BATTLE OF COSTS

Whatever controls the rate of production, and the quality, of a part is certain to be a vital factor in the coming battle of costs, to meet postwar competitive conditions. The cost of a part begins with the metal from which it is fabricated. There is an important *difference* between *knowing about* alloys for aluminum permanent-mold-castings and *actually knowing, on the basis of their behavior,* which alloys, whether from virgin or remelt sources, provide the essential physical properties at lowest cost to meet a specified service condition. That's one *difference:* here is another. It is not only the metal of which a permanent-mold-casting is made, but ideas and experience relating to design requirements of such castings, which permits the employment of the correct permanent-mold-casting technique required to obtain, at lowest cost, the specified physical properties. *Different* permanent-mold-casting techniques result in tangible and measurable *differences* in the quality of the castings obtained. Correct techniques result in minimum scrap loss developed during machining or other processing. Such *differences* reduce material and machining time losses to a minimum. It is the presence of a correct combination of these *differences* in Permold aluminum castings that should lead to both a marked improvement in your product and a lower assembly cost. Throughout 23 years of venturesome technical and foundry practice, Permold metallurgists and foundry technicians have acquired a practical knowledge of the *possible differences* obtainable with various alloys for aluminum permanent-mold-castings. Ask a Permold engineer or metallurgist, or both, to identify and explain some of *these differences* that will help you win the coming battle of costs.

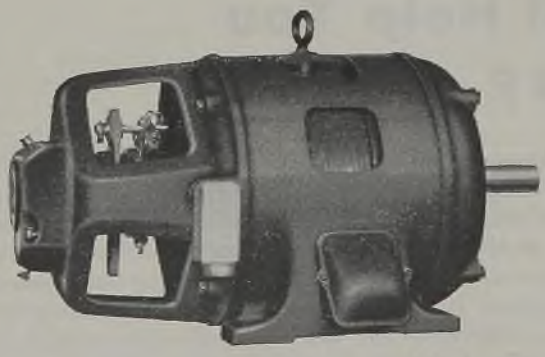
permold

THE PERMOLD COMPANY

830 West Liberty Street • MEDINA, OHIO

In the Cleveland Industrial Area

CENTURY SLIP RING MOTORS Meet Varying Power Demands In Heavy Plate Forming Operations



Two Century Slip Ring motors operate this plate forming machine. One 30 horsepower Century Slip Ring motor operates the adjustable roll that controls the curvature of the plate. The other, a 75 horsepower Century Slip Ring motor, operates the rolls that force the steel plate through the machine.

Steel plates in varying thicknesses, up to 1⅞", are formed on this machine. Century Slip Ring motors provide the variable speeds and torques to meet these unusual demands.

Century application engineers may be of assistance in solving your problem. Call him in.

Century motors are built in sizes up to 600 horsepower.

Century C MOTORS

CENTURY ELECTRIC COMPANY, 1806 Pine Street, St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

orrect Lubrication Proves ey to Successful

Draw-Press Work

By EUGENE D. VIERS

President
Kondor Products Corp.
Cleveland

EXPERIENCE leads us to believe at fully 90 per cent of the troubles countered in draw-press work are due ther to lack of lubrication or to im-oper lubrication. Most draw-press en get dies and metal flow sequences ell worked out, as those factors re-ive the attention they deserve. Often, wever, proper lubrication as an im-rtant contributing factor to the suc-ss of the operation appears to be over-ked.

For example, not long ago I visited plant that was having trouble badly oring the outside of a fairly simple p-shaped part, Fig. 1. This com-y did not have much experience with wing work. As a result they were ricating the top or inside surface of cup which contacted the punch as punch moved down into the die—ricating, not to facilitate drawing simply to prevent the work from king onto the punch. And while only ew parts had been run off, enough al had already been picked up by dies to score the work badly.

ubricating both sides of the work vented further pickup and use of the per lubricant resulted in polishing off "bugs" or particles of picked-up met-on the dies so that after about 300 es had been run through, the parts e out with a nice polish, completely from scratching and scarfing.

his illustrates an important factor in wing. Due to the "feather" edges drawn metal parts, small pieces of al are almost sure to sooner or later between the work and the dies to me attached to the die surface. This rs regardless of how hard the die ace may be. It happens even with ide dies.

nmediately this "bug" of metal pro-es a scratch as the work is forced over it during the draw. And if not lubricated properly to prevent additional pickup, the bug grows and so does the scratch it produces. But when lubricated with a material that maintains a film between bug and work, the bug gradually wears down due to the pressure on it. Then there is no further scratching of the work.

No mechanical method of finishing die surfaces can produce the smoothness developed by actual use and proper lubrication. Of course it is always desirable to have die surfaces honed as smooth as possible. But this alone does not assure a highly polished appearance of the drawn work.

If the dies do not have to be rehoned, the work itself will produce an extremely high polish on the dies which in turn will be reflected upon the work. *Rehoning can then be done away with almost entirely by the use of correct lubrication methods.* Even where appearance of drawn parts is not important, the reduced die wear obtained is extremely valuable in eliminating "down" time of press, cutting die repair, breakage and power consumed.

A well-known manufacturer who had contracted to draw a shell 3½ inches deep by 1 inch in diameter from 20-gage strip stock decided to complete the part with three redraws from the blank and cup. The dies were completed and tryouts started. The first piece that was tried galled very badly, although a lubricant had been applied. The dies were removed from the press, polished, and again tried, using a different lubricant with the same result. Various compounds and mixtures were applied, different speeds of the press itself were tried, with no improvement in result. However when the correct lubricant was recommended for this design, uninter-

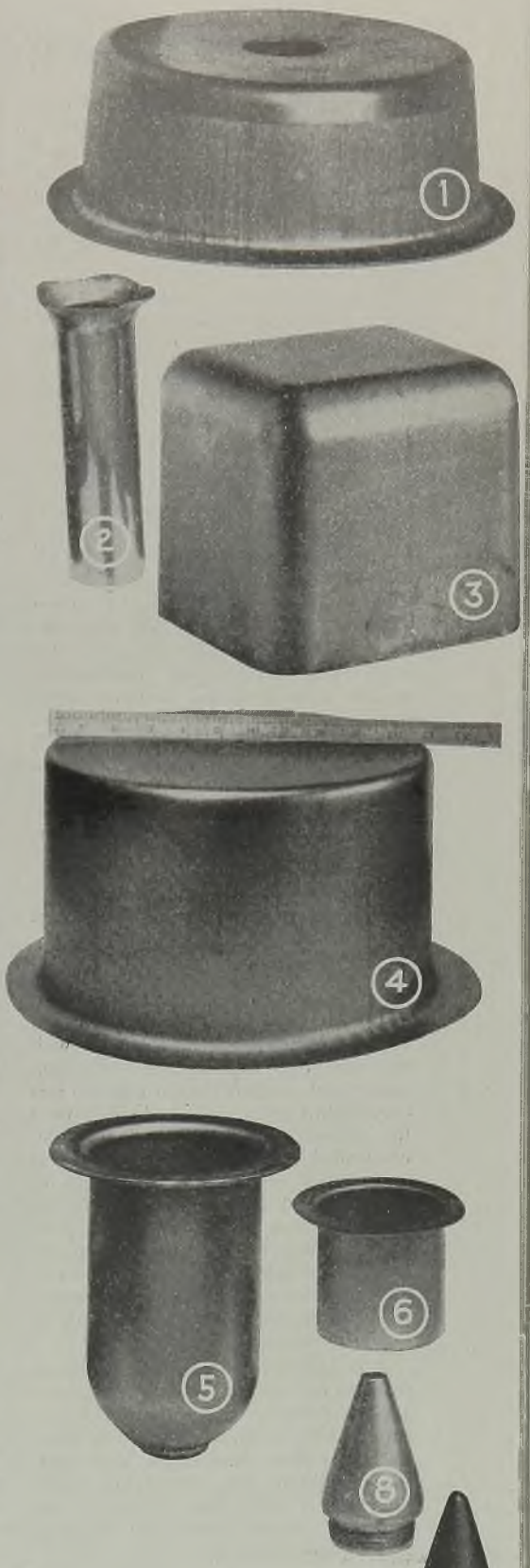


Fig. 1—Simple shallow cup-shaped draw, yet it is badly scratched due to improper lubrication

Fig. 2—Shell drawn 3½ inches deep by 1-inch diameter from 20-gage stock. Note beautiful smooth, highly polished surface resulting from correct lubrication of draw dies

Fig. 3—A rectangular cover case 4½ x 5½ x 4½ inches deep—blanked, drawn and trimmed in ONE operation

Fig. 4—A 63 per cent draw with 23-gage steel in one operation—only possible with correct lubrication

Fig. 5—A deep draw with round radius at bottom—a difficult job until correct lubricant was found

Fig. 6—Again correct lubricant solved the problem of how to draw this sharp-radius cup from light-gage metal

Fig. 7—Shell windshield difficulties were eliminated by proper lubricant

Fig. 8—Dummy fuse—originally a 2-piece welded design—developed into a 1-piece draw

rupted production continued through the completion of several contracts.

It is not always fully appreciated that correct lubrication during the drawing operation can cut the power consumed as much as 20 per cent. This is made possible by preventing metal-to-metal contact, thus reducing friction loads in excess of that necessary for getting the metal flow wanted.

There are many different kinds and types of drawing lubricants. Perhaps of all these, there is only one that will do the particular job at hand.

The field metallurgist of a prominent steel company has stated, "Where poor steel is blamed for unsuccessful draw-press operations, fully 90 per cent of the cases are actually the result of insufficient or improper lubrication." That should definitely establish the importance of lubrication and correct lubrication in all draw-press operations.

A company manufacturing a square cover case 4½ inches by 5¼ inches by 4½ inches deep from 20-gage strip stock was experiencing considerable trouble with breakage, at times rejections running around 20 to 25 per cent. This was admittedly a very difficult job since they were performing three operations in one, namely blanking, drawing and pinch trimming in one operation. See Fig. 3. However, poor steel was thought to be the cause of the trouble and the steel mill was notified.

Correct Lubrication—Reduced Pressures

Different heats of steel were tried, with deep drawing quality of first importance, with no improvement in the result. It was apparent that this was an extremely critical operation since with the very best quality steel, wrinkling immediately occurred when pressure was only slightly reduced. Nevertheless when the correct drawing lubricant was recommended and applied, breakage was immediately reduced to an average of 0.25 per cent for several contracts because they were able to reduce the pressure approximately 20 per cent without resulting in any wrinkling whatsoever. Further, warehouse steel and "seconds" was used on many of these runs with no regard to deep-drawing quality.

A considerable reduction in pressures required has been experienced when the job is correctly lubricated. For example, "blitz" cans, deep drawn oil pans, aircraft sections, land mines, shell shipping containers, etc., are being drawn satisfactorily with from 10 to 15 per cent less pressure simply by changing to the proper lubricant.

When many small manufacturers took on war work, they got into jobs a little too large for their press equipment. As a result, presses were frequently overloaded seriously. Correct lubrication, as reported in many instances, has made it possible to reduce pressure on blank holders upward of 10 tons, with the result that the presses operate freely.

A rather small manufacturer with a battery of limited capacity presses received a contract to fabricate the anti-tank mine for the War Department. After getting into production, experiencing the usual amount of pickup and scarfing with its attendent honing and stoning, they realized that their presses were considerably overloaded because they gradually slowed down and finally cut off the overload relay after every few pieces. When the correct lubrication was recommended and applied, this battery of presses continued to operate uinterruptedly, eliminating the scarfing and scratching. The manufacturer reports a reduction of 10 tons loading on the presses.

Wrinkling is a frequent difficulty, often overcome by a well placed bead design. But the increased pressures required by the bead design may cause breakage or tearing of the work, especially when the sheet does not happen to have the very best of deep-drawing qualities. Yet proper lubrication has solved wrinkling troubles in more than one case, and without need for beads.

A large stamping company was required to draw a certain part from 23-gage steel 11 inches in diameter, by 7 inches deep. See Fig. 4. Dies were designed and built to complete this draw in one operation from a disk blank. The steel had been purchased in blank form, blanks having been delivered for the entire run. The dies were set into a double action press of the hydraulic blankholder type and tryouts started, using a lubricant that was being employed on the other work in the press room.

The first few pieces wrinkled until pressure was increased sufficiently to hold the blank, at which point the pieces broke. Other compounds and lubricants were tried with no better results. After the correct lubricant was recommended, this entire contract was completed without any further difficulty and without the use of pressure pads or holding beads, notwithstanding the fact that this was a 63 per cent reduction.

Under the best conditions with a draw-press job in operation with a minimum of rejections, changing the lubricant has resulted in lowering the pressures as much as 20 per cent—with no wrinkling.

When this occurs, it indicates that a sheet with lower deep-drawing properties may be employed satisfactorily—and such has been the case. In one instance an entire heat of steel had been rejected by the mill's own metallurgists as being unsatisfactory for deep drawing. Yet when 600 pieces were tried under an ideal lubrication setup, no breakage was encountered. As a result, the entire heat was rolled and drawn with total breakage less than 1 per cent.

Larger Runs from Soft Metal Dies

A further advantage obtained by proper lubrication is less wear on the dies themselves. This is especially important when using the softer and less expensive die materials. Aircraft manufacturers find correct lubrication enables them to get larger runs from the soft metal dies such as those made of Kirksite. Even when drawn on drop-hammer dies, wrinkling can be prevented by correct lubrication.

A large aircraft-manufacturer was experiencing excessive die wear when production requirements were increased above the expected life for Kirksite dies. A different lubricant was recommended. It resulted in increased die life far beyond the most optimistic expectations.

Mineral oils are usually used on drop-hammer operations for forming certain shapes and shallow draws. However, in addition to wrinkling, the last hammer blow caused an ignition and explosion of the oil on the surface of the part, discoloring the upper surface. A change in lubricant for this application minimized the wrinkling and eliminated entirely

(*Please turn to Page* 111)

Fig. 9—*Shell shipping container cap, drawn with only one reduction*

Fig. 10—*Guide ring—a difficult draw made simple by correct lubrication*

Fig. 11—*Annealing and tumbling this primer tube was eliminated when correctly lubricated*

Thaws Frozen Iron Ore in Special Furnace Building

FORESHADOWING a process likely to be widely adopted by steelmakers, an ore car thawing plant constructed by Rust Furnace Co., Pittsburgh, for Carnegie-Illinois Steel Corp. successfully completed its test period during the latter part of the past winter. The purpose of the plant is to overcome the winter-time condition in which ore from the Lakes becomes soaked with moisture and freezes in the cars so that it will not run out when dumped.

This condition has been met by crude and inefficient methods, in the past, which have included holding gas jets against the cars, building wood fires under them, and placing them in sheds under steam for hours—all wasteful of time and labor, and incidentally not contributing to the life of the cars.

Accordingly, an automatically-operated plant for the specific purpose of surface thawing ore cars, so as to permit the ore to fall free of the car when unloaded by a dumper, was planned by Carnegie-Illinois. Erected and put in operation in the latter part of the winter, this plant consists of a building with a capacity of two 90-ton ore cars on a track which runs through it. An additional track is provided for an electrically-operated pusher locomotive. Housed on a second floor are combustion units for producing hot gas for recirculation and application against the cars.

The arrangement includes thaw chamber, where the cars stand; two double-chamber furnaces with rated capacity of 10,000,000 B.t.u.'s per hour each; two fuel-oil-fired burners, combustion air fan, fuel supply line, steam supply line for fuel atomizing, and motor-driven air recirculating fan, and the necessary ducts, passages and controls.

The thawing operation consists of circulating air and gases from the combustion chamber through a closed air circuit, comprising the thaw chamber, furnace, fan and interconnecting ducts, the air being alternately heated and cooled in its passage.

In operation, two loaded cars are positioned in the thaw chamber, either being drawn in by locomotive if first in line, or moved by the pusher locomotive. After the pusher locomotive withdraws, its operator, who has complete charge of the thaw chamber electric control, automatically sets derailing devices on the rails, and also a red light signal, blocking traffic in and out of the chamber. The impulse from the same control sets up a circuit to close the doors.

The closing of the doors automatically puts in operation the furnaces and air recirculating fans. An adjustable cycle timer regulates the thawing cycle in two periods gaged by the operator according to the hardness of freeze. The periods are approximately: (1) ten minutes flash heating in excess of 500 degrees Fahr. (2) cutback to between 200 and 250 degrees Fahr. for five to 10 minutes of base heating or soaking. At the end of this cycle, the operator opens the doors, this electrically-controlled action causing the fuel shut-off valve to close and stop the air recirculating fan. A pilot flame is left burning to initiate the next combustion cycle.

The two thawed cars are then drawn out by the dinkey and spotted on the car dumper platen. Here their surface-thawed ore is dumped into electrically-drawn transfer cars which take it away to stockpile or furnace.

The experience with this plant, although rather mild weather did not make the normally expected demands on it, was sufficient to show the plant provides an efficient solution for the problem of frozen ore cars, with savings in time and labor.

Ore car thawing house with capacity for two 90-ton hopper cars

High-Frequency Generator for Fusion of Tin Plate

Erection, adjustment and maintenance of high-frequency heating generators serving electrotinning lines differ from that of the usual industrial electrical equipment. Stability of generator operation is a vital factor. Maintenance department considers vacuum tube generators and associated apparatus a part of their watch-care

By H. G. FROSTICK
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East Pittsburgh, Pa.

ELECTROPLATING affords the means for regulating the weight of tin applied to the surface of sheet steel to produce tinplate, so that in this use of the critical material a balance has been achieved between the curtailed supply and the increased demand. Electrolytic tinplate can be produced with any weight of tin, but the deposition requires fusion, and as a result, tinplate manufacturers now operate vacuum-tube generators able to produce some 9000 kilowatts of radio-frequency energy more than twice the radio-frequency energy used in all the commercial broadcasting stations in the entire nation.

Heat for fusing the electrolytic tin deposition is utilized in power blocks of 100 to 1200 kilowatts. Individual generators have capacities up to 400 kilowatts, and since at radio frequencies, electrical energy is not an entirely compliant medium, the erection, adjustment and maintenance of high-frequency heating units of this order of magnitude require the closest co-operation among electrical engineers engaged in radio equipment design, transmitter operation, and industrial control.

The pilot high-frequency induction heating unit was installed, adjusted, and maintained through its initial operating stage by radio transmitter engineers. It was made entirely of salvaged equipment, the 50-kilowatt power amplifier and rectifier which had powered the WBZ transmitter at Millis, Mass., and oscillator tubes which had served KDKA at Saxonburg, Pa. Transmitter engineers altered the apparatus, added a transmission line, improvised induction heater coil, shielded the unit, and produced 200 kilowatts of energy at 200 kilocycles.

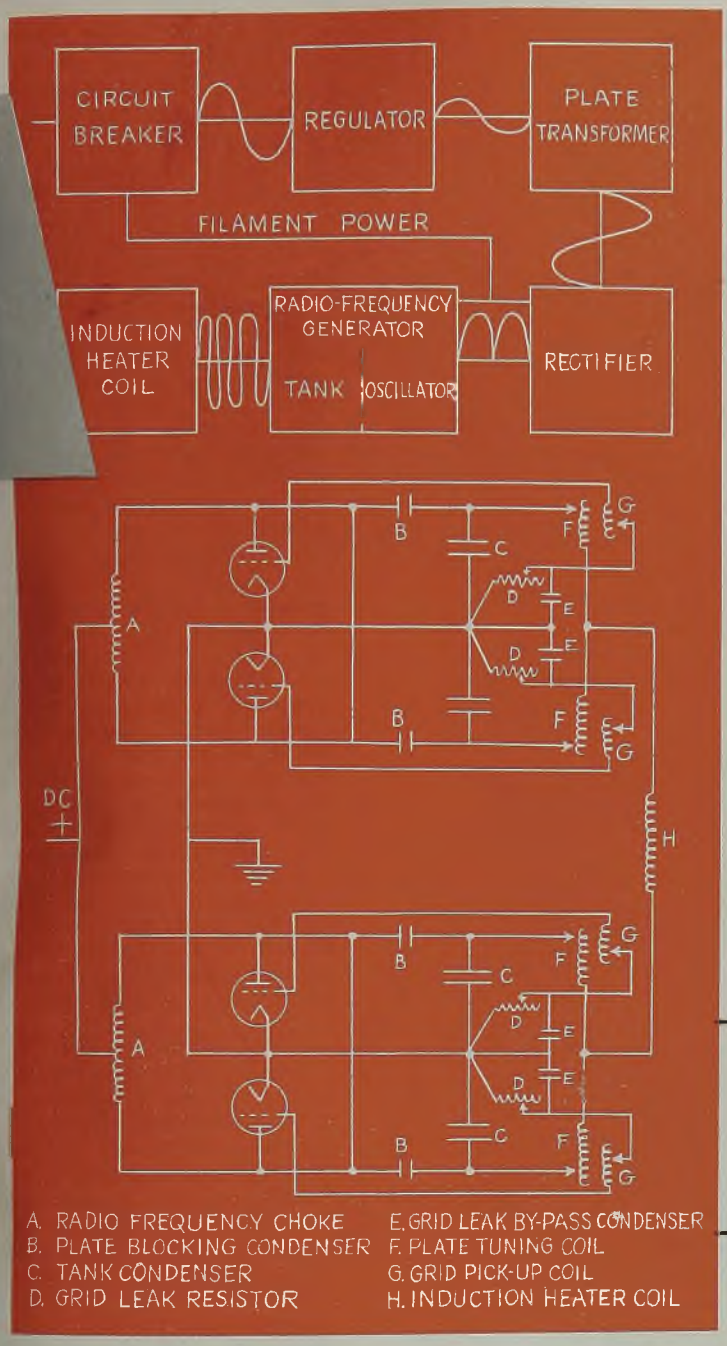
As in radio communication, energy is transferred in the form of electromagnetic waves. An induction heater coil passes radio-frequency power to the tin-coated steel. Suitable mechanical and electrical barriers protect the coil proper from the moving steel strip. A typical coil is 44 inches wide to accommodate the widest steel strip and has a slot 10 inches deep through which the steel passes. The coil turns are as close to the steel as is practical. The strip thus is subjected to an intense magnetic field enclosing an area somewhat over 10 x 44 inches and may be considered the core and short-circuited single turn secondary of a transformer, the primary winding of which is the induction heater coil. The induction heater coils of a 1200-kilowatt unit are placed in tandem along the steel strip and can raise the strip temperature to the melting point of tin in approximately one-half second.

Selection of Site Important

The induction heater coil is connected to form an integral part of the oscillatory circuit. Water-cooled copper conductors encased in a grounded copper sheath connect the heater coil to a cubicle containing the "tank circuit." The inductance coils and condensers together with the grid coupling coil and diode rectifier to indicate heater coil current are housed adjacent to the cubicle containing the oscillator tubes and associated equipment such as filament transformer, grid leak resistor, blocking condenser, radio-frequency choke coil, meter coils, flow meters, and a disconnect switch through which the direct current is supplied to the oscillator. An electronic rectifier, able to supply direct current at 17,000 volts, provides power to the oscillator tube plate. Suitable power control is achieved before rectification by induction regulators or saturable core reactors. Each 600 kilowatts of radio frequency power is regulated independently through one rectifier, usually connected to serve three 200-kilowatt units.

Erection procedure for electronic apparatus differs to some extent from that followed for the usual industrial electrical equipment. The technique of factory fabrication so that component parts require only interconnection to complete an installation does not lend itself to apparatus, a large part of which may be damaged by improper handling or storage. It is necessary that delicate equipment be shipped with more mechanical protection than their mounting devices may afford. The result is, therefore, that a good part of the equipment in the oscillator and tank cubicles must be assembled in the field. The water coils which insulate the oscillator tubes from ground, the tank circuit inductance, all vacuum tubes and such glass and porcelain insulators as are needed for cubicle interconnection are mounted after the cubicles are placed in position.

Selecting a site for the apparatus must be given careful consideration. Because the induction heater coil is in effect a projection of the inductance of the oscillatory circuit, the tuning range of the oscillator is increased as the length of the heater coil transmission line is decreased. The rectifier, oscillator and tank cubicles, therefore, are placed as close to the induction heater coil as possible. Where the cubicles are located adjacent to the mill on either the mill structure proper or on a detached platform, structural vibrations must be minimized and cushioned and corrosive plater fumes baffled or eliminated. Where a basement or adjoining building is utilized, due regard must be given usual factors affecting the placement of electrical equipment. Since air is passed through the cubicles as a cooling medium, in any location where the ambient air is to be so used, its temperature range must not exceed



Above—Component parts of a typical high-frequency heating unit

Below—Schematic diagram of 400-kilowatt heating unit

e operating limits of the rectifier tubes d the various condensers, and its dust id gaseous matter content must be exined for potential harmful effects. operly established environmental conions will pay dividends in decreased intenance costs.

After the cubicles are placed and asmbled, the instruments and relays librated, the protective interlocks operng properly, the heater coil-strip adstment checked with the strip in motion d under tension, and the starting and pping sequence tested, the unit is ready r its preliminary adjustments. With the ament supply voltages properly estabhed, the cathode voltage of the rectifier bes should be set at the mid-point operng valve and the cathode voltage of e oscillator tube should be set at the inimum value. Both the rectifier and cillator tube cathodes should be energized one hour before power is applied to the anode. The adjustable settings of grid-leak resistor, the plate tuning coil and the grid pickup coil should be placed at the mid-points. The power regulation should be adjusted to supply minimum anode voltage. Disconnect switches and grounding chains should be fixed so that only that generator connected to the last heater coil may be energized.

Frequency is the first factor to be fixed. The frequency is regulated by adjusting the number of turns in the tank or plate tuning coil. A tap is provided with a suitable connection so that fractional turn adjustments may be made. After the frequency has been established on the generator supplying the last heater coil, each coil in turn should be energized and its respective generator frequency fixed. The frequency of each generator should be adjusted to be from 1 to 5 kilocycles apart. The induction heater coil structure is such that a frequency differential of this order will prevent synchronization of generators supplying adjacent coils.

Coupled to the plate tuning coil is the grid pickup coil. Grid drive will determine the oscillator tube plate current. With all radio-frequency generators supplying power to the steel the plate currents of the oscillator tubes now may be equalized. Three variables are available for this purpose; the number of turns in the grid pickup coil is adjustable, the ohmic value of the grid leak resistor may be varied, and the number of tank coil turns of two oscillator tubes in push-pull may be redistributed between the tubes. These variables are complementary and interdependent so that in making adjustments due regard must be given to reciprocal effects.

As the power output of the generators is raised, the apparatus should be scrutinized carefully for signs of localized heating. Loose bondings on the shielding will be revealed as hot spots and leaks in the shielding may be found by probing and scanning with a fluorescent tube. Errors in erection or layout which cause stray heating of the structural steel of the mill, the cubicles, or the buildings should be sought and eliminated. Increasing plate voltage may cause gas flashes in the oscillator tube, in which case the plate voltage should be maintained slightly below that value at which the flash occurred for a 10 or 15 minute interval. Improvements in tube manufacture, however, have largely eliminated the need for tube hardening. But one other factor may give trouble as the power output is increased and that is the development of parasitic oscillations.

Parasitic oscillations will be disclosed by various manifestations. They may be revealed as a vicious arcing in some part of the oscillatory or filament circuits, as a standing wave in a convenient coil or resistor, or as sectionalized heating in a dielectric. Their elimination may be achieved by physically rearranging the circuits, such as shortening ground paths, removing half-loops or symmetrizing circuit layout. They may be suppressed by tuning or semituning of the grid circuit, or by connecting various sized and shaped coils in the oscillator tube plate connection; or, they may be removed by changing the fundamental frequency of the generator. Parasitic oscillations may prove troublesome and there is no substitute for experience in their detection and elimination.

Before power output has been raised

MAINTENANCE DEPARTMENT

ELECTRO-TINNING LINE BRIGHTENER INSPECTION

INSPECTOR_____ TURN_____ DATE_____

TIME								
Rect. Cubicle C. (AMBIENT TEMPERATURE)								
Rect. K. V. (PLATE VOLTAGE)								
Rect. Amps. LEFT / RIGHT								
#1 Osc. Plate A / B								
#1 Osc. Grid A / B								
#2 Osc. P— A / B								
#2 Osc. Grid A / B								
#3 Osc. P— A / B								
#3 Osc. Grid A / B								
S. A. T. Rect. Exciter SATURATING GENERATOR VOLTAGE FOR SATURABLE CORE REACTORS								
R. F. Current #1								
R. F. Current #2								
R. F. Current #3								
60 Cycle Volts FILAMENT PRIMARY								
Cubicle Hours								
K. V. Metal Clad INPUT								
Amps. Metal Clad "								
K. W. Metal Clad "								
Water Temperature OSCILLATOR TUBE AND TANK COIL COOLING WATER								
Water Conductivity								
Water Level Gallons "								
Strip Speed F. P. M.								
Strip Thickness								
Strip Width								
K. V. Brightener (PRIMARY PLATE VOLTS								
Temperature Final Tinning COMPARATIVE TEMPERATURE OF STRIP ENTERING HEATER COIL								
O. L. Trips GRID AND PLATE CURRENT RELAYS								
Precipitrons AIR SUPPLY TO CUBICLES								
Anode Hours								
Induction Coils CONDITION - VISUAL INSPECTION								
Reversed Eng. Relay Switch								
R. F. By Wave Meter #1								
R. F. By Wave Meter #2								
R. F. By Wave Meter #3								
Water Supply To Heat Exchanger								
Tinning Level Rheostat & Transformer								
Temperature Rheostat & Transformer								
Remarks								

Fig. 3—Turn log for 600-kilowatt unit regulated with saturable core reactors. All readings taken hourly except those for Water Conductivity and last six items in list, taken each turn

to the one-half level, the oscillator tube filament voltages should be reset to the medium value. It may be necessary to make further adjustments to the balance of load among oscillator tubes. The final loading adjustment will be determined largely by the mean size of tin plate to be heated.

Economics of mill operation indicate that one size of heater coil with the generator adjusted for loading over the range of commercial strip sizes provides better overall service than various sized coils for various sized strip. Strip may range in width from 22 inches to 35 inches and in thickness from 0.0066-inch to 0.0126-inch. If the generators are adjusted on the average commercial size, assumed to be 30 inches in length and 0.0100-inch wide, satisfactory loading will be attained over all steel sizes with an efficiency loss of 4 per cent or less in extremes in sizes. This means that for the final adjustment of tube loading, plate voltage, plate current and heater-coil current should reach medium values simultaneously on 30 x 0.0100-inch strip.

The automatic heat control now may be adjusted. A photoelectric scanner is mounted at that depth in the heater coil where it is determined the temperature of the strip shall fuse the electrolytic deposition. This device is essentially a photoelectric tube sensitive to the difference in light diffused from the matte and bright surfaces of the plate. Suitable control regulates power output of the generator so that the line of fusion is maintained within limits as established by the scanner. The power output of the generator thus is automatically adjusted to mill speed, plate gage and width, plate temperature and all other variables affecting power required for fusion.

The final generator adjustment is made to obtain maximum oscillator tube life. Minimum filament voltage to maintain maximum power output is the most favorable operating condition. This is attained after all loading and balance adjustments have been completed, by determining the filament voltage at which grid current begins to fall off and by resetting the filament voltage slightly above that value. In time, as the tubes age, it will be necessary to increase filament voltage to maintain power output.

Radio communication and broadcasting have engineered the vacuum tube generator to a high state of dependability. Power failures are rare, and in the manufacture of tin plate, it is similarly imperative continuous operation of electrical equipment be maintained. It must be appreciated that the induction heating generators are a segment of a closely coordinated manufacturing process. The affinity of steel for oxygen makes mandatory continuous production schedules. Any interruption might destroy the product, the cost of which is largely in its processing. Tin plate, passing through the induction heater coils, is practically a finished product. Stability of generator operation, therefore, is a vital factor but largely a matter of maintenance.

Maintenance Must Be Preventive

Maintenance necessarily must be preventive. All circuit elements are metered so that the problem reduces itself to observation, analysis, and housekeeping.

A chart has been developed for the recording of meter readings and inspection observations. Readings on which stability of operation depend, as well as those which are a function of operational conditions are taken hourly while elements which are less susceptible to change are noted once each turn. Fig. 3 is a typical log sheet with sequence of items, grouped for convenience of observation. In addition to the foregoing, the oscillator and rectifier filament voltages are checked during weekly shutdowns and the electrolysis targets in the water coils are inspected trimonthly. Mechanical inspections are made weekly of cubicle water connections, induction heater coils, and all parts inaccessible during operations. Relay and meter calibrations are checked in accordance with local plant practice.

The oscillator tube aging effect may be gaged by a simple graph developed from the hourly observations. Using the most frequently occurring mill load at which strip size, mill speed and incoming strip temperature are constant, a curve of individual heater coil current plotted against time will indicate relative power output of each generator. Since the total power consumed is constant and

oscillator plate voltage common, the division of load among generators will be a measure of relative aging. Filament voltages then may be adjusted as needed. The aging of individual tubes in each generator, for which a running graph also may be kept, will be indicated by changes in load balance between tubes under comparable operating conditions.

Housekeeping is simply the maintenance of the structure and its contents in a condition suitable for instantaneous and continuous usage. It requires unending cleaning, inspection and standard of comparison. Practically, the apparatus must be cleaned at every opportunity, dust removed from insulators, water coils, resistors, terminal blocks, and induction heater coils; contactors and interlocks dressed and aligned; and cubicle interiors kept free of impediments. It is less costly to maintain apparatus in a state of cleanliness than to permit contamination of creepage surfaces with subsequent loss of service when damaged equipment must be replaced.

Air Used as Dielectric Where Possible

When a failure of some circuit element does occur, the arrangement of equipment is such that defective parts are perceived readily. Heat is the infallible indication of trouble and with radio-frequency power concentrated as it is in this application, the statement of one maintenance man that the trouble reaches out and shakes your hand is literally true. Design engineers have utilized air for a dielectric as much as possible, which makes for visibility and accessibility of circuit components. Failures originating within the oscillator tubes may be determined quickly by checking filament voltages and the grid-filament circuit. The targets of the oscillator tube plate and grid overload relays and of the rectifier alternating and direct-current overload relays will segregate the failure so that an experienced operator will have little difficulty clearing trouble.

The operation of vacuum-tube generator and associated apparatus has been undertaken by steel mill maintenance departments. Simplicity of design has minimized their problem as well as that of the erection engineer. Because the radio engineer appreciated the industrial point of view and the industrial engineer the complexity of the new power medium, an application has been created which holds promise of considerable development. The enthusiastic acceptance of the application by its present operators constitutes a hurdle cleared which electronics generally have as yet to emulate.

—o—

Where finished steel is to have carbon contents under 1 per cent, no recovery of boron is possible from the scrap in melting since it is entirely oxidized in the process of melting.

—o—

Where resistance to abrasion and high compressive strength in cast iron are required, the addition of boron to the metal is beneficial and widely used.

British meet specification requirements through

Detailed Testing Procedure

By ERIC N. SIMONS

MOST materials widely used in British industries today, whether steel, wire, rope, rubber and cotton belting, files, twist drills, lathe tools and so forth, must conform to definite standard specifications. Therefore, some provision has to be made to ensure that materials actually do comply with these specifications.

Although most large steel works possess their own testing appliances for determining tensile strength, reduction of area, elongation, impact resistance, bending strain, abrasion and hardness, there are of course other tests relating to steel which Great Britain's steel producers are not prepared to make for themselves. To overcome this specific difficulty and to provide as well for research on products of other industries, the Sheffield Testing Works, Sheffield, England, came into being and grew through more than 50 years of service to a position of importance.

The work carried out at Sheffield Testing Works falls under three main headings: Chemical laboratory, physical laboratory and metallurgical laboratory. The chemical section deals with organic and inorganic materials, analyzing not only steels, but all materials used in engineering and allied trades. The physical unit deals with every type of test for which these materials call, such as abrasion, absorption, crushing, attrition, and so on. The metallurgical laboratory investigates failure of cranks, gears, etc., in fact, the failure of every type of mechanical apparatus, in addition to carrying out photomicrography and general microinvestigation.

Some of the tests are briefly described in following paragraphs.

Ball Bearing Test: Steel balls for ball bearings have their hardness measured by a small machine which accommodates three balls, placed one on top of the other. Top and bottom balls are part of the test equipment; center ball is the specimen. Pressure is applied until the specimen splits through the center. Load at which this takes place expresses strength of the ball under test.

Abrasion of Metals: A portion of the metallic material to be tested for abrasion is fixed in a metal holder, lowered under a definite weight and held against a track of revolving emery which turns a specific number of revolutions per minute. Rate of wear is measured and expressed in grams per square millimeter.

—Steel locomotive tires are tested for wear by placing a portion of the tire in a jig which holds it against a rotating wheel made of rail bent to a circle. Depth and amount of wear in a given period then are measured to find a figure indicative of the tire's wear resistance.

—Cast steel knuckles likewise are tested by the abrasion method, one knuckle being rotated and another, of the same steel, held against it.

—Files, saws, tools and similar articles are tested mechanically for wear. The file testing machine, for example, subjects a stock file to an ordeal of mechanically filing a piece of standard metal of uniform and predetermined size, while a graph registers the number of strokes required to remove a given length of the material.

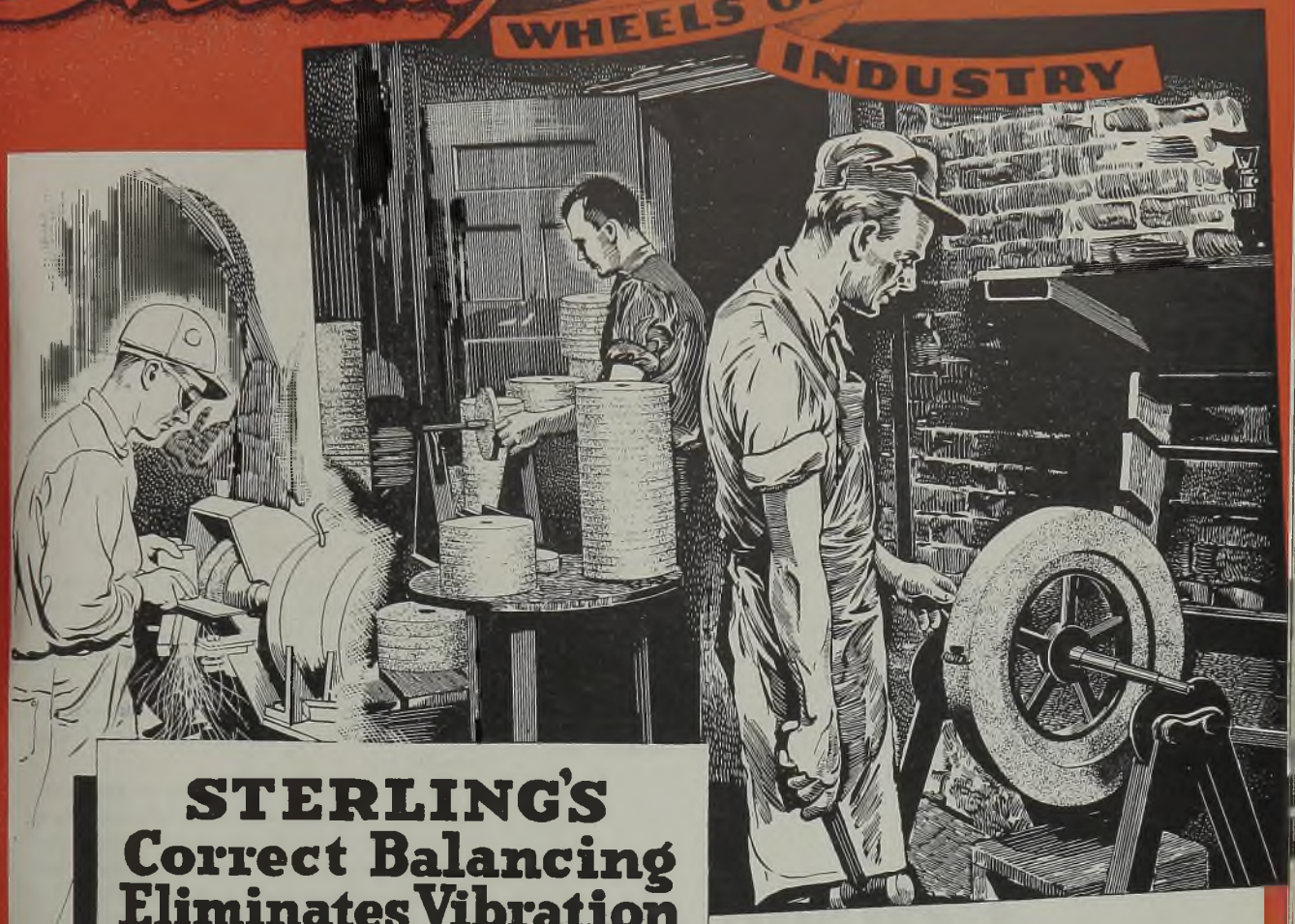
Wire Rope Testing: Wire rope is one of the most important products tested. The rope is tested as a whole, and up to 200 ton loads may be used for this purpose. In addition, each individual wire may be tested. For the very fine wires, a machine with maximum capacity of 200 pounds is available; for slightly larger wires, there is one up to 700 pounds; and for the largest wires, a 6000-pound machine is used.

—In torsion tests, wires are twisted until fracture occurs. One torsion machine registers the work being done in foot-pounds, while a graph is obtainable which shows the behavior of the wire during the test. A known tension also can be applied during the torsion test.

—In testing wires for fatigue values, a machine revolves a wire about its own axis at about 7000 revolutions per minute, the wire being bent to obtain maximum bending moment in the center of the length under test. A number of wires are tested under different fiber stresses in order to obtain the safe load for actual use, which is, for practical purposes, 12,000,000 cycles.

Test for Springs: The test for springs is simple but effective. A spring is held vertically in position and a rod is rested upon its free end. This rod then is made to compress and release the spring thousands of times until, finally the spring breaks as a result of fatigue. The number of times the spring is compressed and released before this fracture occurs gives the working figure for measuring fatigue resistance.

Sterling THE WHEELS OF INDUSTRY



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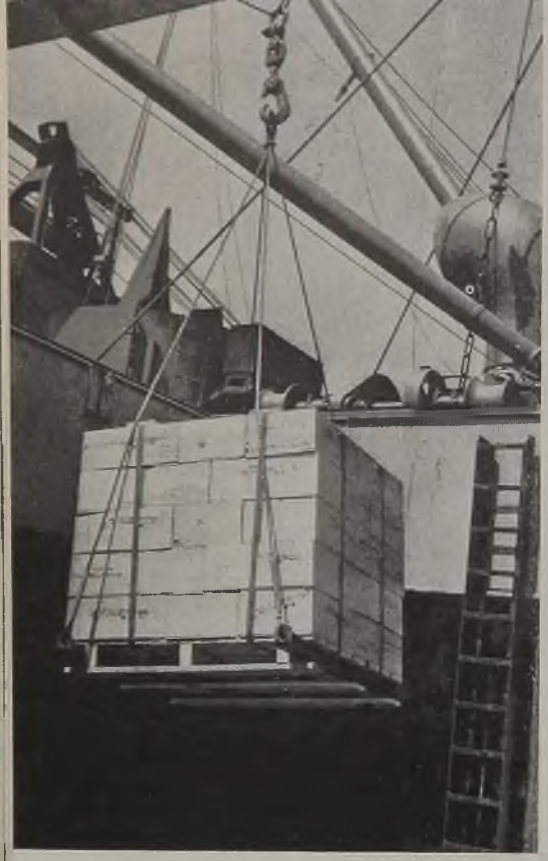
THE WHEELS OF INDUSTRY



Loads, steel strapped to pallets, are swung down into ship's hold

in keeping the guns of our fleet supplied with ammunition, the U.S.N.A.D. made a thorough study of the entire materials-handling problem. Bottlenecks were clearly evident. They were not the kind that could be broken by the purchase of a few machines; rather, they were of such a fundamental nature that the evolution of an entirely new system of packing and handling was required to keep pace with the terribly swift tempo of battle.

The first job done by the Navy Bureau of Ordnance was one of education. In all well-planned schedules of operations it is essential to have trained personnel ready before each progressive stage is entered. For this purpose the Materials-Handling Laboratory and the Ammunition Packaging School were established at the Naval Ammunition Depot, Hingham, Mass.

The Materials-Handling Laboratory is doing the experimental work required to properly package and palletize ordnance items. Through experiment, officers of the Laboratory have evolved highly efficient methods for handling palletized shipments in and out of freight cars, motor trucks, warehouses, lighters and ships. The practical results derived from the work of the Laboratory form the basis of instruction at the Ammunition Packaging and Handling School.

At this school ordnance officers are taught through actual work demonstrations, as well as by study conferences, how to apply modern techniques of packaging and handling to problems as they arise in the field.

Study Materials Flow: Among early projects of the Navy Materials-Handling Laboratory was a careful study of the flow of a great many different kinds of materials passing through a large Port of Embarkation. These studies showed, among other things, that 68 per cent of the man-hours then required to unload projectiles from freight cars could be saved by using better handling methods.

The action taken as a result of the Laboratory's studies was the adoption of the unit load principle for the packing and handling of items at all ordnance activities. Whenever practical, projectiles, ammunition and repair parts in cartons, boxes and cases are palletized on the Navy's standard (inexpensive) 4 x 4-foot sling pallet.

Savings Through Unit Loads: Adoption of the fork-truck-pallet system speeded the flow of materials through every handling operation; and high stacking enabled the best possible utilization to be made of all available storage space. The substitution of one man (or woman) for a whole labor gang—*meaning greater economy of time and manpower*—is rapidly becoming standard practice. Old conceptions of the manpower and time required for handling are falling apart.

As a result of palletization, handling time in ordnance activities is being cut as much as 75 per cent. Even where the only available handling equipment is motorized hand trucks, handling time is cut 50 per cent.

Palletized Shipments: It soon became evident that each and every time palletized materials are handled without manually breaking bulk, the result was additional savings of time and manpower. Obviously, the closer to the manufacturing process a product can be palletized, the greater will be the overall savings through elimination of manual handling all the way to the loading of cargo vessels.

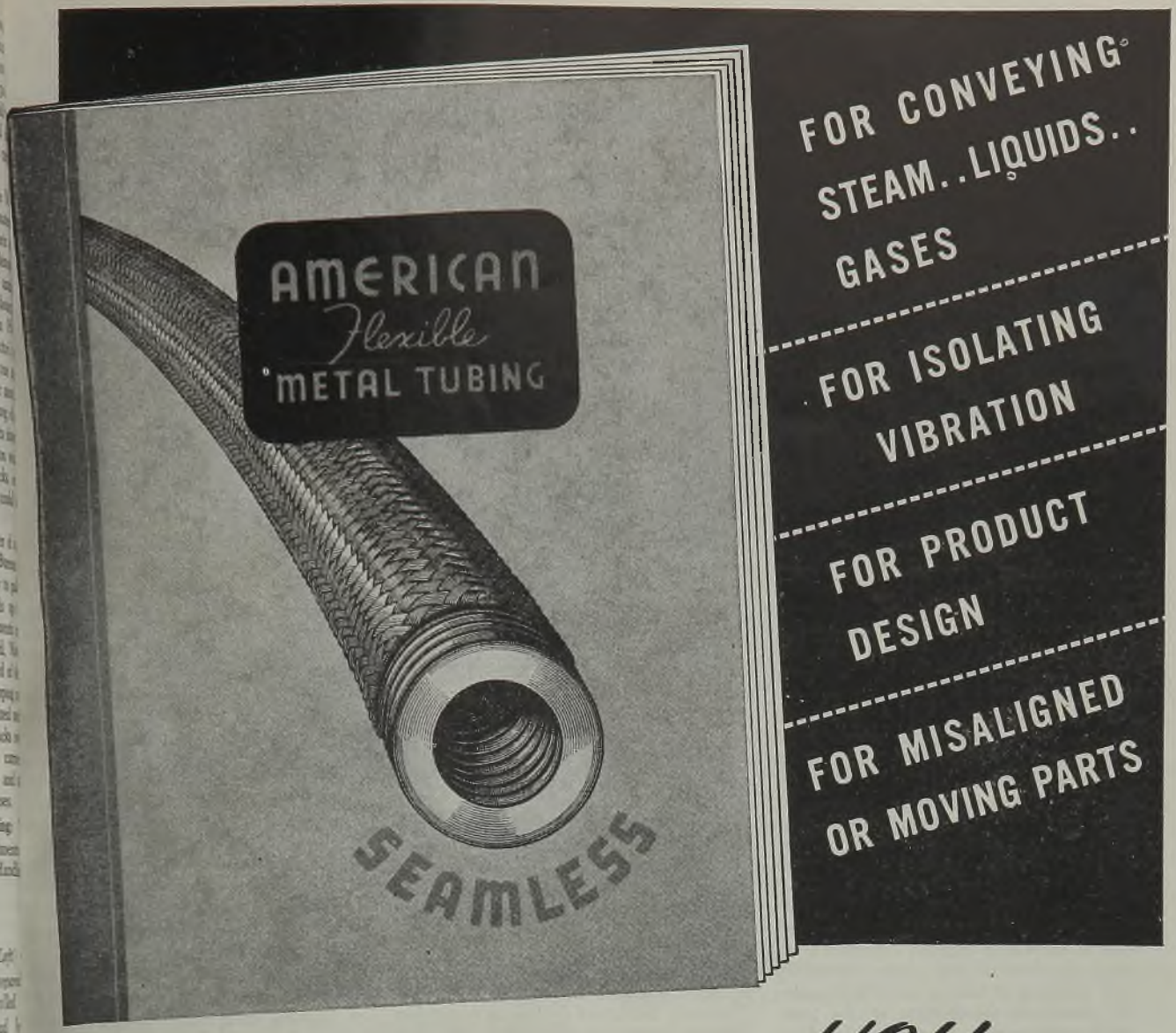
With this end in mind, the Navy experimented with palletizing materials on the shipping platforms of their contractors. These experiments demonstrated that palletized shipments of ammunition formerly requiring 50 man-hours to unload could be unloaded in 1½ hours. In addition, on the contractor's end of such palletized shipments, one man and a fork truck can load a car more quickly than an 8 to 10-man gang of manual laborers. Other experiments showed that when palletized ammunition was loaded onto lighters by fork trucks, or motorized hand trucks, 6 men could do work previously done by 100.

Soon every manufacturer of a palletizable item for the Navy Bureau of Ordnance will be taught how to palletize his shipments in unit loads up to 4500 pounds. Thus, as shipments come into depots already palletized, Naval depot personnel will be relieved of the burden of constructing and strapping unit loads, and by simple, standardized routines employing electric fork trucks swiftly load and unload common carriers, move freight through depots, and store it in magazines and warehouses.

Palletized Ship Loading: The next logical step in the experiments conducted by the Navy Materials-Handling Labora-

(Left) — Car is prepared for controlled "floating" load by use of heavy steel straps overall. Resulting economies in handling cut loading time from 50 to only 1½ hours per car. Each pallet carries 3600 pounds of ammunition

(Right)—Delivering palletized loads at shipside. One man with fork truck unloads car (illustrated above) faster than 8 to 10-man gang



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JUST PUBLISHED, this story of American Seamless Flexible Metal Tubing is something you'll want to read and keep for reference. It contains valuable information for every manufacturer, engineer and machine designer.

How American Seamless is made, the jobs it can do—from the conveying of steam under pressure to the joining of misaligned or moving parts—this 40-page booklet covers flexible tubing requirements in the industrial field. There are many illustrations in color to show the great diversity of services in which American Seamless has proved itself to be the most dependable flexible connector obtainable.

A copy of this booklet, Bulletin No. SS-50, is ready for you. Write to AMERICAN METAL HOSE BRANCH of The American Brass Company, Waterbury 88, Connecticut. 44200

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(Left, above)—Palletized loads are easily spotted in correct positions with these powerd transporters

(Right, above)—Tiering is handled easily and quickly with high-lift fork truck

tory demonstrated conclusively that palletizing a ship's cargo is also a practical, time-saving operation.

Palletized shipments in cargo vessels are made possible through the permission granted by the U. S. Coast Guard to use electric storage battery-powered fork trucks to stow palletized loads of ammunition aboard cargo ships. This extension of the fork-truck-pallet system to the holds of ships produces 50 per cent savings in loading time and relieves the critical manpower shortages through 75 per cent savings in man-hours.

Overseas shipments are now being palletized at some coastal ports. The practice is spreading rapidly. Furthermore, large numbers of fork trucks are being sent overseas as fast as possible in order to extend the advantages of the fork-truck-pallet system of unit load handling to foreign ports.

Unloading on Beachheads: At the present time, equipment is being developed by the Navy which will swing palletized loads from landing barges directly on to a landing beach. Inasmuch as unloading supplies under enemy fire is one of the most hazardous of military operations, every minute thus saved by this spectacular extension of palletized shipping means a very, very important reduction in the number of battle casualties.

Delivering the goods to the battlefronts is a serious job, far from finished. The Navy Bureau of Ordnance recognizes that the packaging, palletizing, and shipping problems of each of its suppliers are different. Such problems continue to be so important that expert assistance of the personnel of the material-handling laboratory is always available to ordnance suppliers if they will write directly to: Chief of the Bureau of Ordnance, Navy Department, Washington.

Graduates of the Ammunition Packaging School are spreading throughout the world practicing and preaching the gospel of the Fork Truck Pallet System of shipping. When the detailed advantages of palletization are made clear to manufacturers, they are most enthusiastic converts.

It is doubtful whether either group of men will ever revert to the more expensive, old-fashioned methods of shipping, when normal business activities are resumed once more.

The same type of equipment and methods employed to do this spectacular job of wartime materials-handling and shipping will be equally useful during peacetimes. It will lower the costs of handling and delivering industrial products along all the channels of distribution from producer to consumer.

Bureau of Mines Offers Abstract of Publication

The publication of a technical paper describing a part of the Bureau of Mines' research in the removal of undesirable carbon from high-carbon chromium and ferrochrome is announced by Dr. R. R. Sayers, Director of the Bureau.

The first part of the publication discusses methods employed and results obtained in determining necessary—and previously unavailable—reliable fundamental data concerning the carbides of chromium. The second part discusses application of the fundamental data to the decarburization of chromium and ferrochrome.

Copies of the publication—Report of Investigations 3747, "Equilibria in the Reduction of Chromic Oxide by Carbon, and Their Relation to the Decarburization of Chromium and Ferrochrome" by F. S. Boericke, metallurgist at the Bureau's Pacific Experiment Station, University of California, Berkeley, Calif.—may be obtained by writing to the Publications Section, Bureau of Mines, U. S. Department of the Interior, Washington 25.

Test Brass Powder for Sintering Properties

Results of laboratory experiments conducted by New Jersey Zinc on the sintering characteristics and sintered properties of its brass powder No. 1104 (70 per cent copper and 30 per cent zinc) has been summarized in a series of graphs for users of the material. These show time-at-temperature curves, with per cent elongation per inch, of tensile bars 1.0 square inch in pressure area and about 0.1-inch thick; also tensile strength, density, length and weight changes of specimens at sintering temperatures varying from 820 to 900 degrees Cent.

Study of Wage Incentive

Wage Incentives, by J. K. Louden; cloth, 174 pages, 5¼ x 8 inches; published by John Wiley & Sons Inc., New York, for $2.50.

The author is production manager of the glass and closure division of the Armstrong Cork Co. but he states the volume represents his free thinking and does not necessarily conform to the practice and policies of the company.

He seeks to plead the cause of incentives by attempting to tell their story in a balanced manner and has written primarily for the man of management and the man of labor rather than for the engineer.

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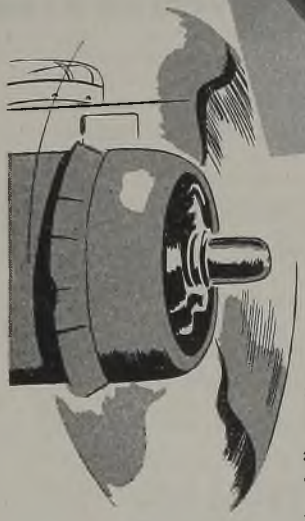

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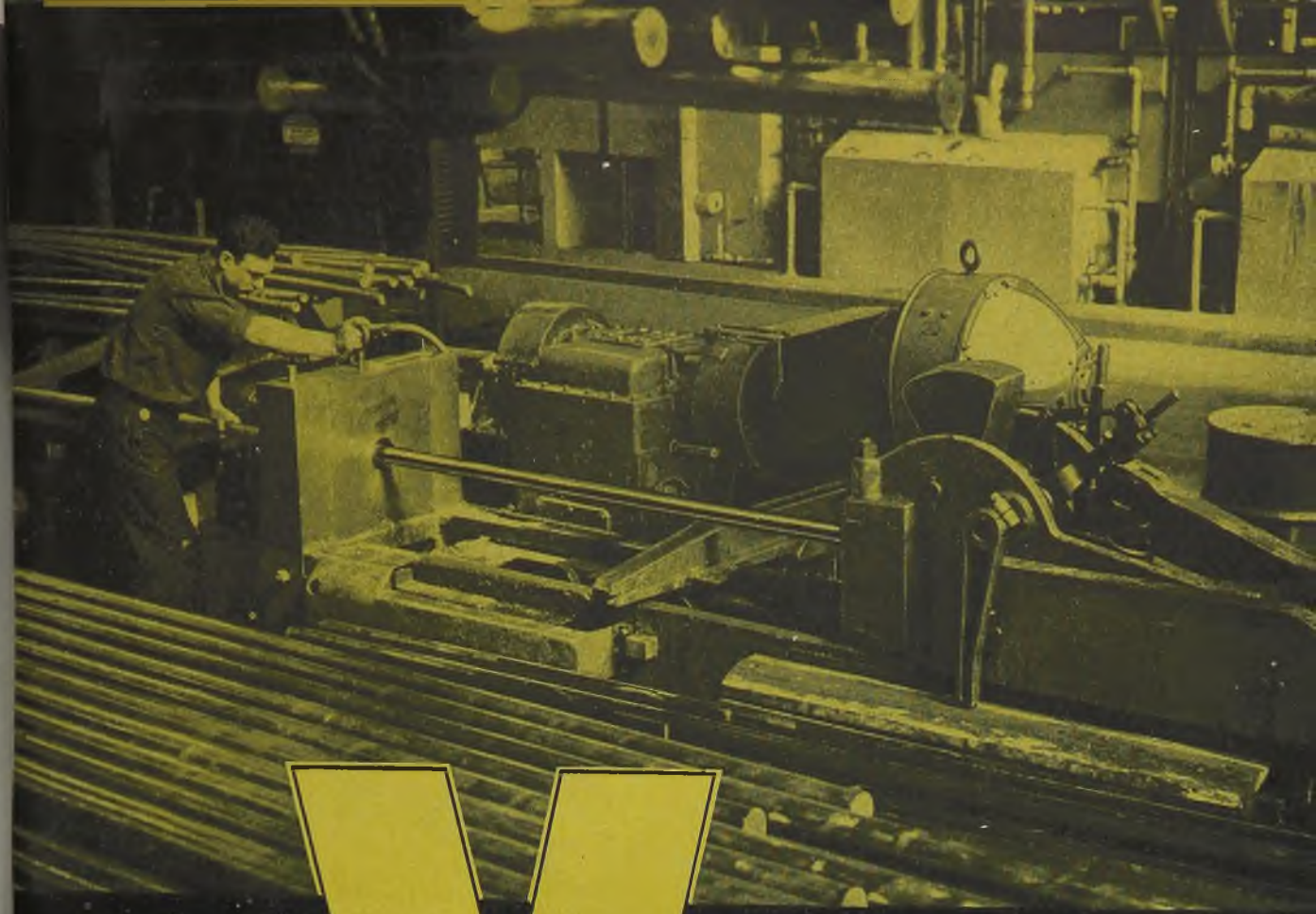

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ALIEN PATENTS

Available to Industry

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

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

CLASS NO. 80—METAL ROLLING

LIST OF ENEMY PATENTS

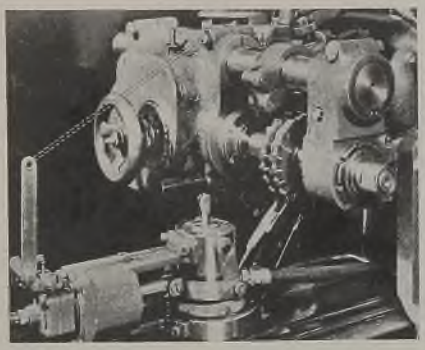
DESCRIPTION	PATENT NO.
Drive mechanism for the rolls of rolling mills	1864090
Machine for rolling rings	1904734
Device for the manufacture of shaped pieces from annular blanks	1986072
Ring rolling mill	2049202
Screw threading machine	2257253
Screw rolling machine	1600112
Method for the production of threads in screw thread rolling cheeks	1940367
Rolling mill	1764598
Rolling mill and process for rolling tubes	1815867
Rolling mill	2041271
Apparatus for reducing tubes	2170513
Rolling mill plant for the manufacture of seamless tubes	2204491
Continuously running rolling mill for producing tubes	2214279
Drawing tube	2207245
Slant rolling	2234182
Rolling mill for pierced or solid metal blanks	1587112
Tube expander	1682724
Rolling mill	1714084
Apparatus for cooling the mandrels of tube rolling mills	1732404
Rolling mill	1753767
Method of rolling tubes from hollow blocks	1771420
Process of and apparatus for expanding blanks by rolling	1778111
Rolling mill	1784791
Tube expander	1808631
Rolling mill	1868227
Apparatus for rolling seamless tubes	1897770
Apparatus for rolling seamless hollow bodies	1936019
Tube expanding roller mill	1957386
Rolling mill having inclined rolls	1990607
Rolling mill with inclined rolls	2040612
Tube rolling mill	2093244
Tube rolling mill	2126509
Production of metal tubes in inclined rolling mills	2198540
Tube rolling mill	2224487
Work piece shifting device for use in connection with reciprocating or oscillating rolling mill	1670256
Rolling mill of the pilger type	1724314
Pilgering mill	1744781
Pilger rolling process and roll for performing same	1876691
Pilgering rolling mill	1917448
Feeding device for pilger rolling mills	1936475
Pilger rolling mill	1960178
Revolving device for pilger mills	1982472
Pilger rolling mill	2005657
Process and apparatus for the production of seamless tubes	2090535
Rolling mill	1986485
Device for the manufacture of metal balls	1674112
Apparatus for rolling sections having transverse ribs	1967787
Apparatus for producing profile metal articles	1967788
Method and apparatus for producing metal bars with transverse ribs	1990140
Machine for manufacturing hollow rotary elements from circular blanks of sheet metal	1896426
Rolling mill	1900630
Rolling mill and method	1792458
Process of rolling metallic strips and sheets of thin sections of any desired length	1957009
Roll bearings in universal rolling mills	1788693
Rolling mill	1846175
Universal rolling mill	2053694
Roll stand unit for a continuous reducing mill	2071712
Rolling mill	2120539
Rolling mill	2121929
Rolling mill	1858788
Rolling mill	1878595
Multihigh rolling mechanism	1903724
Machine for rolling the bases of cartridge cases	2184030
Method of heating rolls	1783524
Cooling rolling mill	2150340
Hotbed	1689552
Cooling bed	1718870
Device for introducing superposed plates of different metals	1955072
Tube transporting device	1783555
Rolling mill appliance	1618954
Apparatus for turning over the work in roll trains	1791962
Universal rolling mill	2019081
Continuous rolling mill	2036101
Rolling mill	2240362
Rolling mill	2150248
Rolling mill	2200837
Bearing	2205049
Rolling mill	2211386
Rolling mill	1697012
Bearing adjusting means for roller mills	1784793
Pilgering rolling mill	1760757
Rolling mill	1811586
Constructional form of rolling mill	1882507
Regulating means for rolling mechanisms	2040755
Screw down for rolling mills	2060476
Method and apparatus for manufacturing imitation metallic and coloring foil films	1580196
Safety device for machine parts subject to high pressures	2108746
Electrically operated edge driven roll	1784304
Rolling mill roll	1851848
Manufacturing compound rolls	2129683
Roll	2215424
Process for the production of soft iron	1742111
Method of making flanged cup shaped metal parts	1795879
Process for raising the resistance of zinc to tearing during rolling	1845155
Hot rolling steel strips	1946240
Rolling method	2027293
Method of manufacturing annular disks	2154534
Reheating method and furnace	2222372
Tube mill and process	1617936
Method of rolling tubes	1626481
Method of and apparatus for rolling tubes from a hollow block	1767896
Production of seamless tubes	1789721
Manufacture of seamless tubes	1808957
Manufacture of seamless tubes	1823080
Method of rolling tubes	1837161
Rolling tube	1849973
Means for rolling out a tube with an internal thickening at the rear end from a tubular blank	1867120
Method of rolling tubes with internally thickened ends	1898779
Method of producing an end thickening in tubular bodies made by rolling with skew rolls	1999824
Method of manufacturing tubes and pipes	2010400
Tube making	2011907
Process for producing seamless tubes	2042552
Rolling process	1894288
Process for the production of forged shafting	1913711
Method of rolling metals and apparatus therefor	1804879
Rolling of channel sections with wide flanges	1850026
Process for improving the texture of rolled products	2171074
Tube rolling mill	1800891
Rolling mill	1830278

(*Please turn to Page* 117)

INDUSTRIAL EQUIPMENT

Holding Fixture

Air is employed only to actuate the locking and unlocking mechanism in the new Air-O holding fixture insuring uniform holding power regardless of variations in air pressure. It can be tied to the cycle of the machine; it is used to make the complete operation automatic,



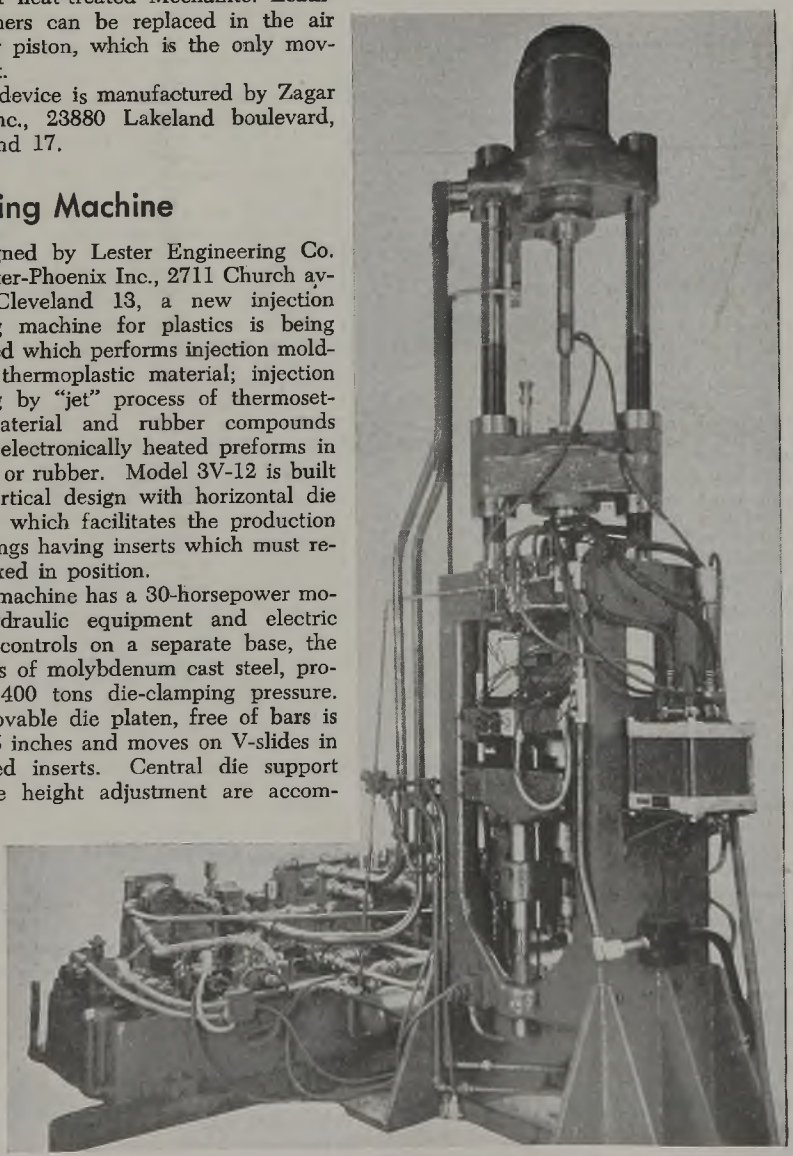
and leaves the operator's hands free to load and unload. The air cylinder is made of heat-treated Meehanite. Leather washers can be replaced in the air cylinder piston, which is the only moving part.

This device is manufactured by Zagar Tool Inc., 23880 Lakeland boulevard, Cleveland 17.

Molding Machine

Designed by Lester Engineering Co. for Lester-Phoenix Inc., 2711 Church avenue, Cleveland 13, a new injection molding machine for plastics is being marketed which performs injection molding of thermoplastic material; injection molding by "jet" process of thermosetting material and rubber compounds and of electronically heated preforms in plastics or rubber. Model 3V-12 is built in a vertical design with horizontal die platens, which facilitates the production of castings having inserts which must remain fixed in position.

The machine has a 30-horsepower motor, hydraulic equipment and electric timing controls on a separate base, the frame is of molybdenum cast steel, providing 400 tons die-clamping pressure. The movable die platen, free of bars is 21 x 25 inches and moves on V-slides in hardened inserts. Central die support and die height adjustment are accomplished through a single large thread screw; turning a hand crank rotates the screw through worm and worm wheel. Die opening and closing is by hydraulically actuated double toggle linkage, provided with hardened cam and wedge locks to insure rigid metal-to-metal die support. Total weight is about 19,500 pounds.



Overload Relay

A new bimetallic overload relay which provides an easy yet positive method of changing from automatic to hand reset has been announced by the Industrial Controller Division of Square D Co., Milwaukee. An unusual feature of this relay is a simple means of adjusting the tripping point from 85 to 115 per cent of nominal rating. Thus, changes can be made in settings to take care of variations in ambient temperature or load conditions at the motor. Overload protection is not limited to the usual selection of heater sizes since intermediate points can be obtained.

These Type AR relays, designed for separate mounting or front mounting on size O and I starters, are needed whenever starters are mounted in remote or inaccessible locations. They are particularly well suited for use in built-in machine tool control because they eliminate the need for external reset mechanisms.

Butt Welder

A completely automatic DoALL butt welder for salvage and extension welding of small tools is announced by Conti-

nental Machines Inc., Minneapolis. Steel rods, steel tape, wire and wire forms up to ⅜-inch in diameter can be welded quickly. Extensions to drills, screw drivers, small grinding wheels, tape reamers, and cutting tools can be made to order quickly by inexperienced operators. In addition, the butt welder joins all types of band saws in widths up to 1¼ inches.

Welding, annealing, and grinding off of the flash are all accomplished in four simple steps. No adjustments are necessary for different sizes saw or tool welds.

An electric attachment for quickly marking tools, templates, parts, etc., also is available. It is clamped to one of the welding jaws and marking is done with an etching pencil.

Two models are available, each with the same capacity. One is a table model for portability and the other a pedestal type containing storage space.

Magnifier

Known as Magna-Eye, this magnifier fits the micrometer scale and aids in rapid reading, saves time, reduces errors and protects micrometer from dirt. Magna-Eye is of transparent methylmethacrylate and is lightweight. One feature is its ability to gather light which greatly eliminates eye-strain. Because of its large magnification, it is easy to split the diversions of the ordinary micrometer into tenths.

Stebar Mechanical & Electrical Research Laboratories, Minneapolis 8, manufactures the magnifier which is available for all standard makes of micrometer.

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