STEEL

The Magazine of Metalworking and Metalproducing

VOL. 116. No. 5 JANUARY 29, 1945

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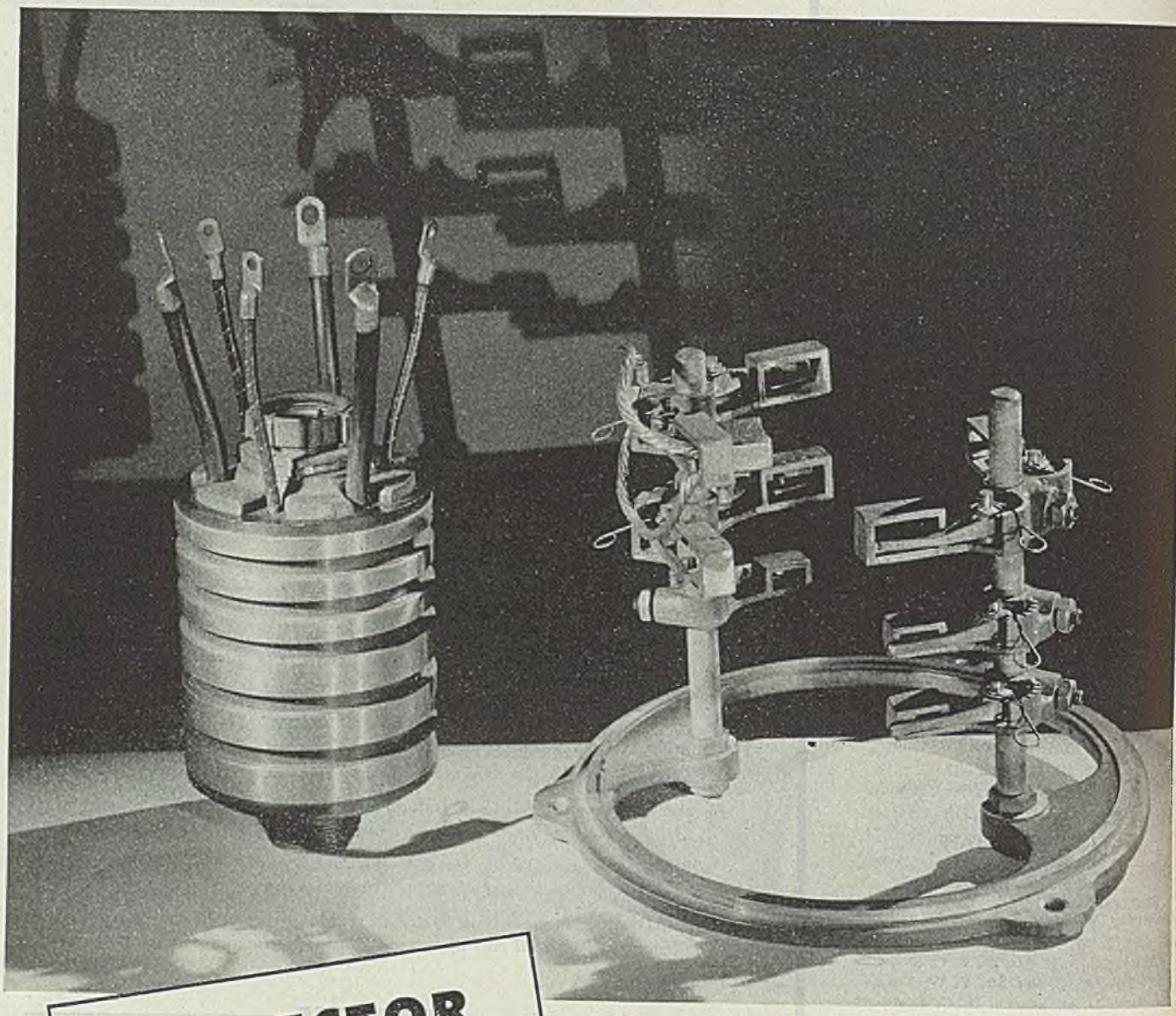

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STEEL
January 29, 1945

Reject the Appointment!

President Roosevelt's action in ousting Jesse Jones to make room for Henry Wallace is the biggest bombshell he has exploded in the face of American industry since he first assumed office in 1933. It is so preposterous from so many different angles that one is entitled to wonder whether the Chief Executive expected or even wanted Congress to confirm the appointment. Can it be that—shoddy and unworthy as the trick may be—he hopes secretly that the appointment will not be approved, thus leaving him in the position of having tried to pay his political debt by offering Mr. Wallace the job of his choice?

Of course the outstanding feature of the appointment is that Mr. Wallace is so manifestly unsuited by temperament, experience or native ability for the duties of secretary of commerce or of the director of RFC and its affiliates. Mr. Wallace is a dreamer, a crusader and a reformer. He is unfamiliar with business and commerce. Undoubtedly, in his own mind, he thinks he is competent for the job because he has dreams about what business and commerce could do to promote full employment.

There is a place in government for the development of sound ideas regarding employment, but that place is not in the office of the secretary of commerce or in the offices of the money-lending agencies. The statutory functions of the Department of Commerce are "to foster, promote and develop the foreign and domestic commerce, the mining, manufacturing, shipping and fishing industries, and the transportation facilities of the United States." Mr. Wallace does not want to "foster, promote and develop" these facilities in the manner intended; he wants to utilize the authority vested in the job to experiment with these facilities.

The stated purpose of RFC is to "extend financial assistance" to certain specified interests. The job of supervising this and similar agencies manifestly calls for banking or other financial experience which Mr. Wallace lacks. We doubt if Mr. Wallace's warmest admirers would select him to handle their personal finances. Why, then, should he be chosen to handle the largest pool of the people's money ever assembled?

The most unfortunate aspect of the Jones ouster and Wallace appointment is its chilling effect upon business morale. The duty of Congress is clear-cut: Reject the appointment.

The President's plea, phrased in the cheap terms of a precinct political pay-off, cries aloud for such rejection.

DIRECT ACTION BEST: Out of the welter of conflicting opinion regarding manpower will come legislation by Congress authorizing limited national service. Regardless of its final form, it is a safe bet that the action of the lawmakers will fall far short of achieving the immediate objective, which is to place more men where they are needed most urgently—now.

Hope for early relief in manpower difficulties lies more in the realm of "direct action." For instance, the investigation of Norfolk Navy Yard seems to reveal manpower waste, which if corrected promptly would release hundreds of men for essential work.

A 10 per cent increase in productivity, obtainable through reduction of absenteeism, loafing and stalling, would wipe out labor shortage in the Detroit area. The effect of the drastic experiment of WMC in the Bethlehem-Allentown-Easton district remains in doubt at this writing, but the positive discouragement of employment in nonessential activities is bound to speed the flow of workers into war jobs.

Every effort to correct the manpower situation

(OVER)

now being made hastily in an atmosphere of near panic could have been made quietly and in an orderly way at anytime since Pearl Harbor. Common sense, work and efficiency can cure the manpower ailments. —pp. 41, 47, 57

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FREEDOM OR SECURITY? Problems involved in guaranteeing an annual wage to employes were discussed in a forum sponsored by the National Industrial Conference Board. Philip Murray, while admitting there are difficult complications, insisted that he believes the proposal can be worked out satisfactorily. Senator Robert Taft asked pertinent questions. Do we need 60,000,000 jobs to sustain 35,000,000 families? Are 60,000,000 jobs necessary to do the work of the nation? Under wage guarantees, does the worker choose his job or does the government pick it for him?

Clarence B. Randall declared that a guaranteed annual wage is a proposal for regimenting the buying habits of the public. "To buy or not to buy is a function of freedom." If we are to have steady production and employment, he inferred, we must have steady buying by the public.

The upshot of this discussion is simply this: We can have freedom or security, but we cannot have both. Which do we cherish more? —p. 46

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A BOON FOR LOCALS: Perusal of the list of technical and trade associations which have canceled conventions and shows and of the list of those whose applications have been denied by the War Committee on Conventions indicates conclusively that national and regional meetings involving 50 or more persons are definitely "out" until the present restrictions are relaxed.

The effect of this black-out will be more far-reaching than is generally realized. The educational services rendered by conventions and shows will be undertaken in part by other mediums. Technical men will look more to the printed word in their engineering publications. Much of the verbal exchange of opinion and experience that has been voiced in national and regional meetings now will be transferred to the rostrums of the local chapters.

Greater opportunities for locals will be a wholesome by-product of the emergency. Strengthening local chapters in 1945 will make for better national organizations in 1946, 1947 and beyond. —p. 49

FEAR OF INJUSTICE: According to the Division of Simplified Practice, some manufacturers are not using the division's services because they (1) are too busy with war work, (2) believe simplification may hamper them after the war, (3) fear the effect of nonco-operation by competitors, (4) feel simplification will interfere with progress in their industry or (5) fear acceptance of simplification by an industry group may be construed by the Department of Justice as an act in restraint of trade.

Thousands of industrialists who believe thoroughly in reasonable simplification to limit sizes and varieties doubtless are deterred by one or more of these reasons. However, the greatest deterrent is fear of antitrust action. Industry cannot easily forget that scores of companies have suffered the outrage of "consent decrees" high-pressured by attorneys general for nothing more criminal than acceding to the request of a government agency for co-operation.

Unfortunately nobody can do anything about this until the Department of Justice itself through consistent fair dealing over an extended period lives down its unsavory record of the past decade.

—p. 50

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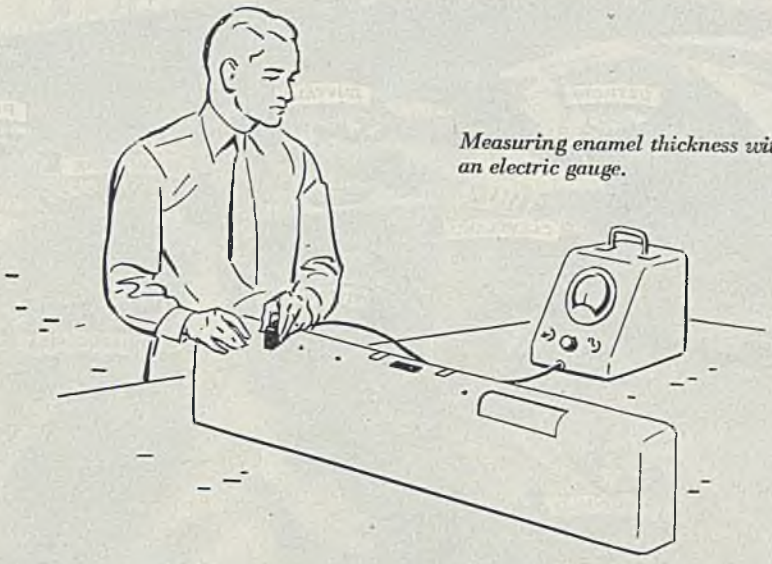
PRECISION CASTING: One of the methods of casting metals which has made remarkable progress in the war period is the "lost wax" or investment process. It consists of making a wax pattern, imbedding it in a mold, removing the wax by melting it and pouring molten metal into the emptied cavity.

This age-old practice has been refined and adapted to the mass production of buckets for aircraft engine turbo-superchargers. Thousands of these buckets are being turned out daily to close tolerances and with surfaces so smooth that little finishing is required. Each bucket is X-rayed individually and after assembly each completed turbine wheel is checked by X-ray.

It is difficult to believe that the "lost-wax" process will lapse into its long-time obscurity after this convincing demonstration of its possibilities. It is likely peacetime applications will be found for it—particularly in the field of high-melting point metals and alloys. —p. 72

E. L. Shaner

EDITOR-IN-CHIEF



Measuring enamel thickness with an electric gauge.

TI-NAMEL

Another New Creation by Inland Steel Company's Research Laboratories

The long awaited porcelain enameling base, which eliminates the necessity for a ground coat, is here! It is Ti-Namel, the new titanium alloy steel—the newest creation by Inland's research laboratories.

Ti-Namel is superior in every respect to older types of base metals. Its drawing properties are equal to the best deep-drawing steels. It does not age strain no matter how long it remains in storage before fabrication. Inland Ti-Namel Steel does not reboil. Therefore vitreous enamel finishes, equal to the best multi-coat ware, are obtained with white or color coat enamels applied direct to the base metal. This results in a thinner coat which reduces chipping hazards and increases the service-life of the ware.

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Write for copy of the Ti-Namel Bulletin and licensing agreement. Inland Steel Company, 38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Cincinnati, Detroit, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

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Output Under Spot Authorizations To Be Limited

Production of electric irons for civilians, shown above at the Mansfield, O., plant of Westinghouse Electric & Mfg. Co., has been voluntarily halted in order to transfer employes to war work

Program will not be revoked, but production will be restricted until present tight situation in raw materials, components and manpower has eased. New authorizations will not be granted in areas where labor shortage exists

PRODUCTION of most civilian goods under the War Production Board's spot authorization program during the next several months at least will be far below the amount authorized. The plan will not be revoked but activity under it will be restricted until the present tight situation in supply of critical raw materials and manpower has eased; this means until victory is won in Europe.

Allotments and authorizations already granted have not been canceled. However, because of the shortage in manpower and materials, it is unlikely that mill orders for steel, copper in most forms, and aluminum sheet placed under the "spot authorization" order PR-25 will be filled during the first and second quarters.

Reflecting WPB's general retrenchment policy in regard to spot authorization, the agency on Dec. 1 adopted a policy of granting no spot authorizations in group 1 labor areas and in 44 other labor areas for 90 days. This policy is expected to be continued for another 90 days beginning March 1, barring an unexpected early termination of the European war. On Dec. 16 the WPB announced that programs for the manufacture of civilian items would, in general, be restricted to the production level allowed during the fourth quarter of 1944.

Spot authorizations still can be approved to utilize any amount of idle and excess material provided the applicant has available facilities and labor. No new allotments will be made of copper wire mill or brass mill products. New allotments of steel will be limited to not more than 10 tons of carbon and 2 tons of alloy steel to "piece-in" idle and excess materials. No limit has been placed yet on new allotments of aluminum.

Steel distributors, now the best source of new material for spot authorizations, have been directed to deliver under the spot authorization "Z" allotment procedure only 10 tons of carbon steel and 2 tons of alloy steel per customer each quarter. Stainless steel deliveries have been stopped entirely.

The current status and outlook for production of certain types of civilian goods are summarized below.

Prospects for reconversion of the heavier electrical appliance industry are still remote. Manpower, facilities, components and materials needed for the production of washing machines, mechanical refrigerators and vacuum cleaners are not likely to be available for some months. Production of these items under the spot authorization procedure will of necessity be spasmodic and small in quantity. Prospects for output of smaller electrical appliances under the plan are somewhat brighter, though delays in delivery of material hamper production.

Output of domestic mechanical refrigerators, prohibited since early in 1942, probably will not be resumed until after victory in Europe. Manufacturers estimate it will take from 5 to 6 months to get into production after they are authorized. Before the war, 3,700,000 mechanical refrigerators were made per year on an average. The original stockpile of 700,000 refrigerators, established in February, 1942, has dwindled to less than 45,000.

Enough steel was expected to be available to permit the manufacture of 375,000 ice refrigerators in the fourth quarter of 1944 and the year 1945. However, manufacturers were not able to start production last year, because of delays in delivery of needed materials, and the steel supply outlook to date this year has grown more critical. Of the 375,000 all-metal ice refrigerators planned for production, 55,900 per quarter are for civilian requirements. The remainder is needed to meet require-

ments of the Maritime Commission, Foreign Economic Administration and National Housing Agency.

As of Nov. 25 last, spot authorizations for production of 116,228 vacuum cleaners in 1944 and 313,492 in 1945 had been issued. Because of delays in delivery of materials and the manpower shortage, production of vacuum cleaners is not expected to reach the authorized amount. As in the case of household mechanical refrigerators, all vacuum cleaners produced under the spot authorization plan are added to the "frozen stockpile" to insure that essential requirements will continue to be met. Production of vacuum cleaners before the war averaged approximately 1,903,000 yearly.

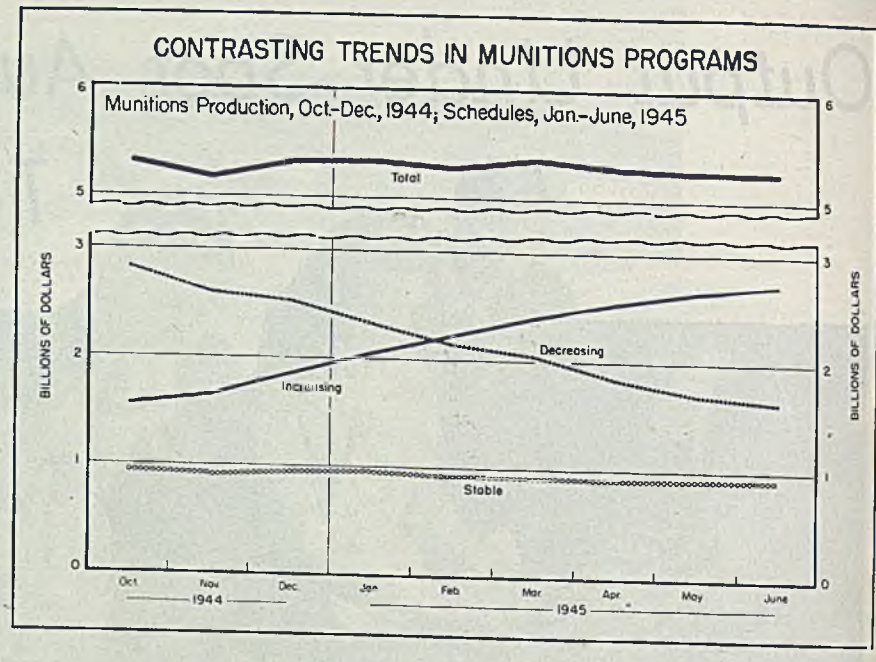
Of the 88,000 domestic electric ranges planned for production in 1944, only about 76,000 were completed due to the manpower shortage. Production of 35,000 domestic electric ranges per quarter has been approved for 1945. Of the total 1945 production, about 35 per cent will be required for the armed forces and the National Housing Agency, the remainder for institutional and individual consumers.

Output Falls Short of Authorizations

Authorizations for the production of more than 2 million electric irons, including both automatic and nonautomatic types, have been granted 32 manufacturers by WPB. However, output has fallen far short of the amount authorized because of delays in obtaining critical materials, as well as the necessity of shifting employes into war plants. About 700,000 irons were assembled by the close of last year. Current WPB policy is to hold electric iron production for 1945 at the level allowed during the fourth quarter last year, and it is not expected that the 1945 overall output will exceed that for 1944. Indicative of the problems facing manufacturers, the Mansfield, O., plant of Westinghouse Electric & Mfg. Co. has stopped production of 157,000 electric irons authorized for that plant last April under the "spot authorization" plan.

Resumption of domestic sewing machine production is "extremely remote," WPB has informed the industry advisory committee. Many of the materials required for sewing machines are critically short due to the increased demand for ammunition, communications wire and other war items. Cold-rolled sheet in the 16, 18 and 20-gage sizes cannot be obtained until at least the end of this quarter. Brass and copper products, aluminum sheets in certain gages and heavy aluminum extrusions, zinc die castings, nickel anodes, certain chemicals for platings, and many components are in critically short supply.

Backlog of orders for fractional horsepower motors, however, has been reduced from 10 or 12 months to approximately 5 months. Motors of this type are expected to be available in sufficient quantity to permit sewing machine production at prewar levels after the defeat of Germany.



During most of 1944 manufacturers of cast iron ware were permitted to produce at about prewar levels, but actual output was considerably below that rate because manufacturers were busy on war work. 2,774,000 cast iron skillets, 335,000 dutch ovens and 541,000 flat irons were produced in the base year, July 1, 1940 through June 30, 1941. Manufacturers are now permitted to make any desired type of cast iron ware.

Current level of enameled ware shipments continues below the 1943 quarterly average of $5,839,000. Throughout 1944 the use of iron and steel for civilian enameled ware production was limited to 70 per cent of the usage in the year ended June 30, 1941. The iron and steel quota to fill preferred orders has been set at 55 per cent of the base period usage. Though manufacturers may now make any desired type of enameled ware, in any size, overall output will not be increased since additional steel has not been made available.

Galvanized ware manufacturers may expect increased difficulty in obtaining galvanized sheets in 1945. Requirements for galvanized sheets have reached an all-time high, but the manpower shortage is so acute that production can not be increased accordingly.

Issuance of allotments for copper base alloy for use in production of common and safety pins, church goods, and "blanks" for silverplated table flatware will be discontinued beginning with the second quarter.

Use of lead in the less essential civilian uses has been tightened further. Late in December, WPB limited use of lead to 60 per cent of the 1944 level, and last week new restrictions were imposed on use of this material in collapsible tubes, gutters and leaders on dwellings, and in sheets, pipe and fittings.

Pig Iron Output Set New Yearly Record in 1944

PIG IRON production in 1944, at 61,939,474 net tons, slightly exceeded the 61,777,296 tons produced in 1943, the American Iron and Steel Institute reports. This sets a new yearly record for pig iron production. The total includes 680,774 tons of ferromanganese and spiegeleisen, compared with 623,696 tons in 1943. Total output in 1944 represented 91.7 per cent of capacity, while in 1943 the percentage was 96.4.

December production was 4,998,757 tons, including 57,078 tons of ferro and spiegel, compared with 4,904,011 tons in November, with 63,341 tons of ferro and spiegel. The output represented 86.7 per cent of capacity in December, 87.6 in November, and 95.6 in December, 1943.

Details of production by various districts and percentages of operations are presented in the following tabulation:

	Pig iron	Ferrospiegel	Total December	Total Year to date	Per cent capacity
Eastern	898,258	17,033	915,291	11,321,885	84.9
Pittsburgh-Youngstown	1,975,606	20,017	1,995,623	25,254,455	87.8
Cleveland-Detroit	508,945	.....	508,945	6,220,327	90.9
Chicago	1,052,500	.....	1,052,500	13,115,268	88.5
Southern	348,126	20,028	368,154	4,308,919	86.4
Western	158,244	.....	158,244	1,718,620	65.9
Total	4,941,679	57,078	4,998,757	61,939,474	86.7

American Iron and Steel Institute. During 1943 companies included above represented 99.5 per cent of total blast furnace production.

Total December Munitions Output Higher, but Under Month's Schedule

Sharp advances necessary to meet January goals in many critical programs. Overall production expected to vary little from horizontal plane of 1944 during first half of this year, although increases are possible

TOTAL munitions production and war construction for December amounted to $5445 million, an increase of 1 per cent over November but 2 per cent behind the schedule for the month. In the critical programs, some further progress was made, although schedules were missed by considerable margins in several of the groups, according to a report by Hiland G. Batcheller, chief of operations for the War Production Board.

Preliminary figures show the overall picture for December to be: Aircraft, 2 per cent gain over November, but 2 per cent under schedule; ships, 6 per cent under November and 4 per cent below schedule; guns and fire control, 1 per cent under November, but on schedule; ammunition, 3 per cent under November and 1 behind schedule; combat and motor vehicles, 7 per cent over November, and 1 under schedule; communications and electronic equipment, 1 per cent under November and 4 per cent under schedule; other equipment and supplies, 3 per cent over November and 2 per cent under schedule.

Gains Are Necessary for January

In the critical programs, gains over November were made in all groups except Navy rockets, but in almost every case further large gains will be necessary to meet January schedules. Critical aircraft must increase 27 per cent to meet January schedules. Artillery ammunition must be increased 14 per cent; heavy field artillery, 5 per cent; Navy rockets, 92 per cent; Navy heavy caliber ammunition, 3 per cent; communications wire, 11 per cent; truck and bus tires, 17 per cent; cotton duck, 3 per cent; military dry cell batteries, 49 per cent.

Truck and tank schedules are expected to be increased further. In 60 and 81-millimeter mortars a 56 per cent increase is needed to meet February schedules.

"No great progress was made in December in removing items from the critical list," said Mr. Batcheller. "As expected, combat loaders were removed from the list last month. In the aircraft group, one model was dropped and three new ones were added. Navy 40-millimeter antiaircraft guns are no longer critical.

"Modification of the integrated truck program made it possible to narrow the critical area in heavy trucks to Army vehicles. There were some additional minor changes in the list, in quartermaster and engineer items, and in some specialized fire control equipment."

Mr. Batcheller emphasized that even the latest schedules frequently are tentative. Many programs call for production rises through the first half of 1945 and then a "slumping off." "While this could mean that needs will decrease after mid-year, it means more often only that rock-bottom minimums have been set for the more distant months, with the schedules to be increased as soon as needs can be more accurately determined."

For more than a year, total munitions have been moving virtually on a horizontal line (see chart on page 42), and it is not expected to vary greatly from that trend in the next six months. Some programs will increase, some will decrease and others are expected to hold relatively stable.

Stainless Steel Producers Charged Under Trust Act

Civil complaint has been filed in the United States district court at Trenton, N. J., charging 18 steel manufacturers with conspiracy to restrain trade and fix prices in the stainless steel industry in violation of the Sherman Antitrust act. A federal grand jury at Trenton returned a criminal indictment against the same manufacturers, together with six of their officers on Nov. 15, 1944. (See STEEL, Nov. 20, 1944, p. 73.) Defendants will be arraigned on the criminal charge, also involving the Sherman Antitrust act, on Feb. 3.

Present, Past and Pending

■ PIG IRON INVENTORIES LIMITED TO 30 DAYS

WASHINGTON—Pig iron inventories will be limited to a 30-day supply, based on present melting schedules, under a directive issued by WPB. The directive became effective Jan. 26 and was issued on the ground that supply and demand are in very close balance. Should larger inventories be necessary for special reasons, appeal may be made to WPB.

■ BETHLEHEM STEEL EARNS $9.93 A COMMON SHARE IN 1944

NEW YORK—Bethlehem Steel Corp.'s 1944 net profit totaled $36,167,723, equal to $9.93 per common share, against $32,124,592, or $8.58 a share, in 1943. Regular quarterly dividend of $1.50 a common share has been declared.

■ NATIONAL STEEL SEEKS RIGHT TO RAISE SALARIES

PITTSBURGH—National Steel Corp. and subsidiaries is seeking to increase compensation of all salaried employes about 5 per cent, retroactive to December, 1943.

■ U. S. STEEL REPORTS ON 1943 RENEGOTIATION

NEW YORK—Thirteen steel producing and fabricating subsidiaries of United States Steel Corp. had no excessive profits under war contracts in 1943. In the case of the Federal Shipbuilding & Dry Dock Co., renegotiation for 1943 resulted in reduction of $4,500,000 in the selling prices of ships, which, after taxes, amounts to reduction of $816,804 in the 1943 reported income of United States Steel.

■ AMMUNITION CARBON STEEL NEEDS TO RISE SHARPLY

WASHINGTON—Army ammunition carbon steel requirements are expected to increase from 2,020,000 tons this quarter to more than 3,400,000 tons in final three months this year. Shell steel billets would account for 50 per cent of the total, with 20 per cent for sheets, 9 per cent tubing, and smaller percentages for hot-rolled bars, cold-finished bars and plates. The rocket program will use 320,000 tons of steel monthly.

■ ALLOY STEEL OUTPUT IN 1944 BELOW 1943 TOTAL

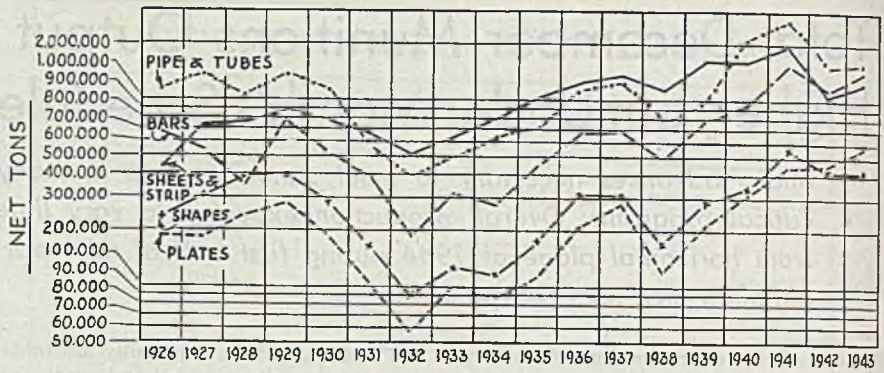
NEW YORK—Alloy steel output in 1944 totaled 10,525,436 tons, about 12 per cent of total steel production, compared with 13,149,818 tons, or 15 per cent of the total, in 1943. Output of alloy steel in December came to 848,274 tons compared with 803,507 in November and 798,647 in December, 1943.

■ MACHINE TOOL SHIPMENTS INCREASE 1.4 PER CENT

WASHINGTON—Machine tool shipments by 199 firms reporting to WPB increased 1.4 per cent in December to $36,782,000. Net new orders increased $3,399,000, or 5.8 per cent over November total, while order backlog increased $260,501,000, or 10.7 per cent.

Adjustment In Prices Is Delayed

Revision of distributors' list awaits amendment of recent change in steel price schedule. Large tonnage involved



Wide fluctuations in mill shipments of key finished steel products to steel distributors from 1926 through 1943 are depicted in the above chart. Peak in these shipments occurred during 1941

ALTHOUGH it had been reported the Office of Price Administration would amend its recent price order so as to make it clear permitted interim increases of $2 to $5 per ton on certain finished products applied to mill base prices, action had not yet been taken late last week.

As the order stood toward the close of the week, the advances applied only to maximum delivered quotations and thus warehouse steel distributors continued unable to advance their quoted prices in line with the higher prices they now have to pay the mills for material.

The delay in announcing the price amendment is difficult to explain since it is understood OPA officials had assured warehouse operators at a meeting in Washington Friday, Jan. 19, the revision would be made no later than Jan. 22. Because of this failure of OPA to act, a large volume of the particular products singled out for increases has not yet been affected pricewise.

Steel distributors held second position last year, the same as in 1943, as a major outlet for steel mill products, topped only by the shipbuilding industry in both years. In 1942, warehouses were in third place and in 1941 they led all industry classifications in the purchase of steel.

During 1944, steel distributors received an estimated 7,767,700 net tons from the mills, or 14.2 per cent above the 6,803,166 tons in the preceding year. In 1942 and 1941 the corresponding figures were 5,937,609 and 9,166,454 tons respectively. Expressed in percentage of total mill shipments, the estimated warehouse 1944 share represents 12.8 per cent, while in the three immediately preceding years the figures were 10.5, 10.0 and 14.7 per cent.

No material change in the position of steel distributors as an outlet for steel is expected in 1945.

Recent sharp upward revision in key war programs may force the War Production Board to temporarily reduce mill warehouse load directive. WPB has already sharply cut back the steel available under the spot authorization plan, through eliminating entirely the authority to purchase stainless steel and drastically curtailing allotment of carbon and alloy steel under this plan. There will be no new allotments of carbon or alloy steel except those to consumers to obtain from warehouses a maximum of 10 tons of carbon steel and 2 tons of alloy in a quarter. WPB ruling prohibiting all mill shipments on "Z" priorities is expected to be a logical de-

Breakdown of Mill Shipments to Steel Distributo

(Net Tons)

Products	1944†	1943	1942	1941	1940	1939	1938
Semifinished (Ingots, blooms, billets, slabs, tube rounds, sheet and tin bars)	36,600	38,744	39,097	54,431	23,536	.....	.....
Structural shapes and sheet piling	537,400	412,727	410,708	547,511	331,523	283,235	170,8
Plates (Universal and Sheared)	773,500	565,622	456,582	438,540	313,663	215,241	120,6
Rails—60 lbs. and over	5,300	3,479	7,663	4,538	.....	.....	.....
All other rails	16,700	11,136	11,226	21,310	.....	.....	.....
Total rails	22,000	14,615	18,889	25,848	22,054	16,037	7,5
Tie plates and track accessories (incl. track spikes)	11,900	24,395	40,660	72,011	53,383	46,515	19,5
Hot-rolled bars (carbon, incl. hoops and bands)	875,900	923,598	684,881	750,821	604,285	.....	.....
Concrete reinforcing bars	66,700	32,875	186,469	432,657	311,730	302,583	218,0
Alloy bars	47,000	111,211	67,118	90,015	62,011	.....	.....
Cold finished (carbon and alloy)	391,500	368,632	208,277	314,745	.....	.....	.....
Total bars	1,381,100	1,436,316	1,146,745	1,588,238	978,026	778,742	489,7
Pipe and tubes	1,993,200	1,647,543	1,633,738	2,692,424	2,142,147	983,957	789,9
Wire rods	11,200	6,714	8,852	19,082	11,581	.....	.....
Wire and wire products (incl. fence posts)	1,261,400	1,306,300	935,104	1,536,347	1,054,843	1,045,367	760,4
Black plate	93,400	62,250	67,645	70,964	31,807	57,032	32,1
Tin and terne plate (Hot and cold reduced)	38,300	24,705	20,240	64,966	48,711	.....	.....
Sheets and strip:							
Hot-rolled	657,600	604,929	510,869	834,640	483,340	.....	.....
Cold reduced	389,300	274,014	247,136	399,787	309,419	.....	.....
Galvanized	531,800	318,674	283,196	676,835	733,848	857,519	637,9
All other	.....	14,832	34,025	67,655	88,811	.....	.....
Total, sheets and strip	.....	1,212,449	1,075,226	1,978,917	1,615,418	1,627,777	1,129,9
Tool steel bars	13,600	15,298	16,423	37,964	7,525	.....	.....
Wheels and axles	185	239	157	1,484	.....	.....	.....
Forgings	.....	2,363	4,704	10,017	.....	.....	.....
Steel castings	.....	282	408	1,278	.....	.....	.....
Skelp	.....	32	381	.....	.....	.....	.....
All other steel products	16,300	32,572	62,050	26,432	52,317	125,757	67,9
Grand Total	7,767,700	6,803,166	5,937,609	9,166,454	6,686,534	5,179,660	3,586,9

†Preliminary. Blank spaces indicate figures not available. Figures 1927-39 compiled by STEEL; 1940-43 by American Iron and Steel Institu

velopment if the steel supply situation continues to tighten. WPB also may revoke the order granting steel distributors permission to purchase from the mills up to 25 per cent in excess of shipment from stock.

Reflecting augmented steel demands for various war programs and inability of many companies to get mill deliveries promptly enough to meet revised schedules, distributors have experienced an increase of 10 to 15 per cent in demand the past few months.

One of the major problems facing steel distributors today is the inability to move material out of stock sufficiently fast to meet demand. This is due primarily to the manpower shortage and difficulty in obtaining adequate transportation facilities. One large interest states that double the present staff is needed, pointing out that deliveries are now 10 to 15 days behind on orders requiring shearing and cutting operations. The warehouse steel demand has been heavier than ability to ship for some months now.

Despite greater mill shipments throughout 1944, steel distributors' inventories on Jan. 1 last were moderately below those reported at the close of 1943, reflecting the general increase in warehouse steel demand. Expressed in terms of percentage to 1941 base period inventory tonnage, steel distributors' stocks represented 113 per cent at the close of last year. This compares with 115 per cent on Sept. 30, 117 on June 30, and 116 per cent on Dec. 30, 1943. However, the current inventory level compares favorably with 74 per cent of the base tonnage reported on Dec. 30, 1942.

Postwar Construction Discussed

Investment of $5 billion annually in public works seen needed in immediate postwar years to supplement private employment and help stabilize construction

CHICAGO

POSTWAR construction prospects were discussed at the forty-second annual convention of the American Road Builders' association here Jan. 16-19. To supplement private employment and help to stabilize the construction industry, total investment in public works of at least $5 billion annually in the immediate postwar years by federal, state and local governments will be necessary, asserted Maj. Gen. Philip P. Fleming, Federal Works Administrator, Washington.

He cited as postwar planning accomplishments the $1,500,000,000 federal-aid highway act of 1944 and Title V of the war mobilization and reconversion act of 1944, which authorizes federal loans for the planning of local works, but urged that the President's request for a $75,900,000 appropriation to implement the loan assistance program be put into effect before the end of the present fiscal year.

National, state and local plans already completed should account for about one-half of the desired public construction goal of $5 billion a year, he said, so that the problem now is to get $2,500,000,000 more of nonhighway state and local plans into the completed stage.

The United States passed the peak of domestic military construction in 1942, but the Army still plans more than $250,000,000 of additional building, stated Maj. Gen. Eugene Reybold, chief of Army Engineers, Washington.

Admonition not to rush to buy construction equipment when it again becomes available was given by W. A. Roberts, vice president, Allis-Chalmers Mfg. Co., Milwaukee. He warned the road builders to be particularly cautious in buying surplus construction equipment, and advised them to buy this only through regular trade channels.

Construction equipment made during the war is not up to prewar standards, because of shortages in certain metals, Mr. Roberts said, and he added that the models for about a year after the war will be the same as those being built today.

The construction equipment industry will be able to provide the needed equipment for the postwar construction programs now being planned, Mr. Roberts said. Whereas the industry produced $200,000,000 worth of machines in 1939, it produced four times as much in 1943, and there is still room for expansion.

An industry committee that has been at work on the problem has not been successful in determining "what, where or how much" surplus construction equipment will be on hand after the war. The Army itself will not know what it has for some time after hostilities.

by Product Classification from 1927 through 1944

(Net Tons)

1937	1936	1935	1934	1933	1932	1931	1930	1929	1928	1927
313,254										
284,784	317,302	173,968	114,731	123,213	87,761	163,771	281,015	399,131	388,810	306,882
	212,784	119,664	86,944	99,290	57,271	103,356	183,785	274,727	237,635	184,622
								5,058	1,589	23,797
18,471								7,450	6,941	10,711
16,211	14,709	4,885	7,127	2,690	1,491	3,744	8,064	12,508	8,530	34,508
	16,849	11,536	8,028	7,719	3,232	11,127	14,036	19,884	16,066	14,988
238,283										
	214,492	108,320	61,541	30,875	26,667	90,256	93,288	117,005	56,394	17,306
896,294										
1,212,958	674,526	452,731	278,109	312,850	186,453	395,324	523,351	787,078	352,654	523,645
	1,115,703	700,902	630,878	478,773	396,757	579,004	1,151,266	1,390,320	1,074,749	1,321,244
808,961										
47,347	905,102	769,681	508,742	563,989	373,331	489,419	498,729	611,253	505,333	776,966
	34,750	37,908	47,134	55,356	57,511	38,567	38,827	57,798	74,164	61,274
756,998										
	681,031	516,479	454,785	320,226	280,009	376,173	398,795	462,347	397,744	304,621
397,810										
	1,267,242	1,048,801	787,554	627,471	506,723	666,934	781,350	878,286	752,472	744,144
64,845										
562,935	42,549	45,668	23,597	19,980	11,415	18,992	44,495	37,950	57,907	78,493
	4,601,517	3,365,744	2,492,843	2,295,331	1,681,944	2,470,238	3,524,919	4,468,937	3,462,721	4,046,812

CLARENCE B. RANDALL

SEN. ROBERT TAFT

PHILIP MURRAY

Guaranteed Annual Wage Discussed

Views of industrialist, labor leader and Senator aired. Steel executive says prosperity determined by public's buying habits. CIO head says problem complicated but thinks plan can be worked out. Senator Taft questions so-called full employment

THE guaranteed annual wage, as demanded by the steelworkers' union, is a proposal "for regimentation of the buying habits of the American people, something that cannot be done in a free America," Clarence B. Randall, vice president, Inland Steel Co., Chicago, declared at the 266th meeting of the National Industrial Conference Board, Waldorf Astoria hotel, New York, recently, the last of such gatherings until after the transportation emergency is over.

Speaking on a forum with Senator Robert Taft, (Rep., O.) and Philip Murray, president, Congress of Industrial Organizations, he declared that steel responds directly to the buying impulses of the nation and registers almost immediately the decisions of the public to buy or not to buy.

"The thing that creates insecurity," he declared, "both for the steel companies and the steelworkers is the right which every American has not to buy something. When the public doesn't buy automobiles, steel production must fall. And conversely, it is the right of the steelworker not to buy radios that creates insecurity for the electrical workers.

"To buy or not to buy is the function of freedom. No government can tell an American citizen what automobile he shall drive or when he shall buy it."

Mr. Randall said nobody wants to shut down a blast furnace, or a coke oven or a rolling mill. To do so, he pointed out, is always costly and sometimes dangerous. The steel industry, he maintained, is doing a number of things in the ordinary course of business to cushion a downward economic cycle.

"We stockpile iron ore at underground mines," he asserted. "We keep blast furnaces going and pile up pig iron. We pour ingots for inventory and pile up slabs and blooms and billets. We place steel in warehouses. We urge our customers to give advance orders for the types of steel that recur frequently in their buying.

"But when all these things are done there remains a gap. Steel is a tailor-made commodity rolled to order, and the problem presented by the union demand is simply this: When all means fail and the demand for steel plunges from 100 per cent to 50 per cent of capacity, shall management make good its proposed guarantee by continuing to operate at 100 per cent regardless of orders on hand?"

Murray Admits Complications

Philip Murray admitted that there are many complicated aspects, but insisted that such a proposal can be worked out. Pointing out that President Roosevelt is now in the process of creating a presidential commission, he said: "Here is a working mechanism soon to be created, for which industry and labor can cooperate toward the common good of full production and full employment."

He declared that the guaranteed minimum annual wage is a specific, constructive proposal in which industry as well as labor can find the solution "to many of their vexing problems." The "prince-and-pauper" steel industry may well hold the key to full production and employment, "because as J. P. Morgan once observed 'no other power (can) exert as important a bearing on the general prosperity of America'."

Mr. Murray went on record as being opposed to the outright guarantee by government of employment and purchasing power, "because I realize the dangerous by-paths down which this would lead America. I am equally opposed to leaving the job of postwar full production and employment to 'free enterprise,' because I know it is not organized, and is incapable of that degree of self-organization necessary to assure full employment. Our free institutions would be just as much threatened by the inevitable economic depression that would surely follow in the wake of the failure of 'free enterprise' as it would be by governmental assumption of a guarantee of full employment. What is needed, and sorely lacking in industry, is a different concept of the role of government and the part organized labor must play in America's economic life."

The CIO leader also referred to the wage situation. He declared that the freezing of wages and salaries has worked a great hardship on the great majority of American people, as he estimates that the cost of living is now three times greater than that on which the Little Steel formula was based. This Little Steel formula, he said, "cries for revision on an equitable and realistic basis."

Senator Taft directed his attention primarily to the proposal of a government guarantee of full employment. He questioned the necessity or wisdom of providing 60 million or even 43 million full-time jobs. There are only 35 million families in the United States, and this would provide two jobs for many millions of families. "Should there be an obligation to provide a full-time job for every woman who wants to work when perhaps her husband or other member of her family is able and perfectly willing to support her? Is it perhaps not better to keep boys and girls longer in school, and retire the

aged at a lower age? How can we say that there must be 60 million jobs when perhaps 50 million workers can do all the work of the nation?"

He also raised the question as to what is full employment and what is a good wage. Is the proposal to be a guarantee of any job any man wants in any industry, or is it to be such a job as the government chooses to provide, he queried. Who is to decide what a good wage is? Is the government going to guarantee a flat wage for all, or a wage having some relation to the amount or quality of work that a man does? Who will decide when his wages are to be raised?

"It is clear to me," he said, "that any direct guarantee of full time jobs at good wages would involve the government in the placement of every man and woman in the country, and ultimately of the assignment by the government of every man and woman to the job selected by the government."

The President, he continued, says that full employment means employment in productive jobs and therefore the public works must not be makeshift or make-work projects, but must be real public works. Senator Taft then went on to analyze what possibly could be done in this direction and concluded that the government could scarcely scratch the surface.

Tune Up Private Economic Machine

"Supposing we find $5 billion a year of worthwhile projects for the expenditure of federal funds, that would mean about 2,500,000 jobs. But we are trying to provide 60 million jobs. We could get many more jobs by tuning up the private economic machine by 10 per cent than by the largest public works program anyone has conceived."

He warned against too much reliance on exports, declaring that "the idea that foreign trade can produce any tremendous increase in employment, unless we are going to give our products away at taxpayers' expense, is a mirage."

Incentive will be highly essential in developing work both for business and the individual, he said, adding that if present tax rates continue there will be no incentive to anyone. One industry after another will become unprofitable, with the government having to finance necessary expansion and finally having to absorb these industries, one by one.

He declared that prosperity and happiness cannot be solved by any panacea of public spending or a government guarantee of full employment. "It can only be achieved by the gradual speeding up of the great private economic machinery upon which our prosperity depends."

To secure the best results, he declared, prices must bear the right relation to wages and wages to prices. There must be an accurate adjustment between production of capital goods and consumer goods, an incentive to wages and investment, and a continued reward for

(*Please turn to Page* 144)

House Military Committee Votes Labor Draft of Men 18 to 46

NATIONAL service legislation is rapidly taking shape. Last week the House Military Affairs Committee approved a limited national service bill for men 18 through 45 after an "anti-closed shop" clause has been deleted.

By a vote of 14 to 10, the committee voted to give registrants reasonable choice of employers for whom to work when directed to do so by their local draft boards. Originally, the amendment would have permitted a man assigned to an essential job to work in a closed shop without joining a union. This, however, was deleted in committee.

The bill was approved by a vote of 20 to 5, and it was planned to clear it for debate no later than Monday of this week.

The legislation as it comes from committee provides that men 18 through 45 years who are already not in service or deferred by law shall not leave essential jobs without draft board approval, or must move into such jobs at draft board request. Failure to do such would subject offenders to immediate military induction or punishment of five years in prison and a fine of $10,000.

Also, the bill provides that a man under job orders from his draft board has the same right of appeal as a man ordered up for induction, and it gives a registrant a "reasonable" choice of employer to permit the worker to select a closed or an open shop, or a job, in which working conditions were most suited to him.

The government also would furnish travel and subsistence allowances for workers assigned to jobs in areas away from their homes while traveling to the job and would return him home when the job ends.

"Draft" Nonessential Firm Workers for War Work in WMC Test in Allentown Area

ALLENTOWN, PA.

LAST week a government "war-work-or-no-work" plan, described as a manpower guinea pig, went into effect here.

Under the plan some 1000 workers in nonessential industries in the area will be forced to accept war work or go without jobs entirely, and expectations are if the plan works here it will be put into effect in other tight labor areas. This area embraces heavily industrialized Bethlehem and Easton, Pa.

Ninety-seven brewery and soft drink plant workers were the first affected. They were released from their jobs late last week and faced the alternative of accepting war work—in some cases at lower pay—or remaining idle.

Under the plan War Manpower Commission employment ceilings of nonessential plants are cut and the workers thus released are referred by WMC to war plants. If a worker refuses a war plant assignment without valid reason, WMC simply does not refer him to any employer and he consequently is without employment.

Valid reasons for refusing war plant referral are classified as: Poor health; 2, the new job would not utilize the worker's skill or ability to the fullest; 3, it would entail an unreasonable amount of travel to and from work.

According to the local WMC office each of the co-operating nonessential plants has agreed to protect the seniority and job rights of those transferred from their plants to war industries.

Unclassified Business' Employment Ceilings Are Cut 10 Per Cent by Sixth Regional WMC

CHICAGO

IN ITS effort to obtain workers for critical plants in Illinois, Indiana and Wisconsin, the Sixth Regional WMC has ordered a 10 per cent slash in employe ceilings of unclassified businesses. This is the most drastic step thus far taken here.

The order applies to unclassified businesses in tight labor markets (group 1 and group 2) in the three states. Employers affected are those with ten or more employes. A 5 per cent reduction of their ceilings must be made by Feb. 15, and an additional 5 per cent by March 15.

Employers will be considered complying with the order when the following conditions are met: 1. The workers released are all male, if, in the WMC area director's judgment, this is possible; 2. the workers are released in accordance with procedure established by the area director and he has determined that they may be counted against the reduction imposed upon the employer; and 3. the employer has supplied to each worker released and to WMC a written statement guaranteeing seniority and re-employment rights to workers going into critical war production.

Wallace Nomination Arouses Storm

Congress moves to divorce RFC from Commerce Department as President pays political debt. Nomination seen as sharp move to left by administration

JESSE JONES

Believes new nominee not qualified for job

NOMINATION of former Vice President Henry Wallace to succeed Jesse Jones as secretary of commerce and head of the Reconstruction Finance Corp. with its vast, war-expanded subsidiaries was greeted with consternation in the business and industrial world last week.

Mr. Wallace, who, as secretary of agriculture, advanced the doctrine of scarcity as a cure for economic ills, is the protege of the extreme left wingers in the New Deal and of the CIO's Political Action Committee.

On Capitol Hill, his nomination was immediately and vigorously attacked on the ground that the ex-vice president is not qualified by training, experience or ability to handle the job. The attack centered on the question of his ability to handle the RFC, with its tens of billions of assets, and a bill was promptly introduced in Congress to divorce the duties of the secretary of commerce from those of federal loan administrator. Senate action on the Wallace nomination was delayed until after the divorcement bill was considered.

In a letter to Jesse Jones asking him to relinquish the Commerce Department position "for Henry", the President frankly admitted the nomination of Wallace was in payment of a political debt. The letter, released by Mr. Jones, said: "Henry Wallace deserves almost any service which he believes he can satisfactorily perform. I told him this at the end of the campaign, in which he displayed the utmost devotion to our cause, traveling almost incessantly and working for the success of the ticket . . ."

In reply, Mr. Jones sharply questioned the fitness of the former vice president for the post, especially in the administration of the RFC. "For you to turn over all these assets to a man inexperienced in business and finance will, I believe, be hard for the business and financial world to understand."

The nomination aroused a storm of protest throughout the country and was a topic of conversation rivaling the war wherever men met. Newspapers, including many which supported the President for a fourth term, were bitterly critical of the Chief Executive's action.

The scope of the RFC and its subsidiaries is so large that it is difficult to comprehend. Mr. Jones estimates its assets at about $20 billions of dollars. These include nearly 1000 aircraft plants, steel mills, foundries, shipyards and munitions plants. They also include between $3 and $4 billion in raw materials—tin, zinc, copper and other metals and critical materials. The RFC unquestionably is the largest corporation in the world, and holds tremendous lending powers. Its administrator will have a powerful voice in the disposition of government-owned plants in the postwar era and in the shaping of the type of economy this country will have. The organization has been described as "the fourth branch of the government."

Once a Separate Agency

The RFC was created as a separate government enterprise during the Hoover administration, but was transferred to the Commerce Department under Presidential order in 1942.

Chief among its subsidiaries are:

Defense Plant Corp. which has made commitments for war plants, facilities and machine tools aggregating $10,704,935,000.

Defense Supplies Corp. which has authorized total expenditures of $10,350,000,000.

Metals Reserve Co. which has made total commitments aggregating $5,174,000,000.

Rubber Reserve Co. which has invested more than $700 million in plants and facilities for the manufacture of synthetic rubber.

War Damage Corp. which has maximum insurance liability of $140 billion,

HENRY WALLACE

"Displayed utmost devotion to our cause"

and which has collected premiums totaling $223,987,000.

In addition, RFC supplies the funds necessary to the operation of the United States Commercial Co., Petroleum Reserves Corp. and Rubber Development Corp.

In his recent utterances, Mr. Wallace has given no clear-cut definition as to the policies he would follow if confirmed to the cabinet post. During the campaign last fall, he gave lip service to the responsibility of industry to provide jobs in the postwar period. This was qualified by the assertion that if industry did not provide sufficient jobs, then government should take over the responsibility. These ideas were reiterated following his nomination, but they were extremely indefinite.

The former vice president is the champion of those left wingers who want a thoroughly government-run economy. Under their plans, the productive enterprise of the nation would be managed by a "national production council," with full government authority. This council would determine what they believe should be the country's employment and production. Then, yearly production quotas would be established. Prices and wages would be fixed by government for each year.

Should Mr. Wallace achieve the Commerce Department post with full authority over the RFC and its subsidiaries, he would be in a powerful position to launch such a program.

Only Two Meetings Win Approval

Committee on Conventions turns down requests from national and regional trade associations, medical, banking, agricultural, fraternal and other groups

INDICATING the government's intention of being "hard-boiled" in the matter of approving requests for conventions, the War Committee on Conventions in its first week allowed only two of 110 requests for permission to hold group meetings with attendance of more than 50 persons, the Office of Defense Transportation announced last week.

Included among those refused permits are national and regional trade associations, medical, educational, banking, agricultural, professional, government employe, religious, fraternal, recreational and social groups. In addition a number of trade shows, exhibitions and market weeks were disallowed.

The two organizations whose meetings were approved are the American Red Cross, which plans a series of regional meetings in connection with its forthcoming $200 million war fund campaign, and the United War Fund of North Carolina, which will hold a one-day meeting of 65 persons.

It is understood requests of several organizations were not denied until they had been ruled upon by the War Production Board and the War Department. Among these were the Steel Founders' Society of America and the Drop Forging Association.

Included among the organizations denied permission to hold meetings are:

American Management Association, Feb. 14-16, Chicago

National Industrial Conference Board, March, New York

National Canners Association, Feb. 4-6, Washington

New England Farm Equipment Dealers Association, Feb. 7-8, Boston

Northwest Newspaper Mechanical Conference, Feb. 17-19, St. Paul

Ohio State Association of Master Plumbers, Feb. 12-14, Columbus, O.

California Chamber of Commerce Managers Association, Feb. 7-9, Sacramento, Calif.

Sheet Metal and Warm Air Heating Contractors Association of Indiana, Feb. 13, Indianapolis

Kansas Oil Men's Association, Feb. 5-6, Wichita, Kans.

Virginia Building Material Association, Feb. 14-15, Richmond, Va.

American Society of Lubrication Engineers, Feb. 8-9, Chicago

Iowa Engineering Society, Feb. 6-7, Des Moines, Iowa

New England Hardware Dealers' Association, Feb. 20-22, Boston

Steel Founders Society of America, Feb. 14-15, Chicago

Drop Forging Association, Feb. 16-17, New York.

The convention committee through its chairman, Col. J. Monroe Johnson, last week also announced that after Feb. 1 purely local meetings of more than 50 persons using only city or suburban transit facilities and for which no hotel sleeping accommodations are necessary, are not required to file a permit application.

In addition to the list above, the following groups have canceled meetings:

National Aeronautical Association, Monorail Manufacturers' Association, American Mining Congress, American Warehousemen's Association, American Concrete Institute, Chamber of Commerce of the United States, National Automobile Dealers' Association, Radio Manufacturers Association, American Institute of Mining and Metallurgical Engineers, National Office Machine Dealers Association, World's Invention Exposition, Public Utility Buyers Group of the National Association of Purchasing Agents, National Institute of Governmental Purchasing, American Iron and Steel Institute, American Steel Warehouse Association, American Foundrymen's Association, American Society of Tool Engineers, National Metal Trades Association, National Electrical Manufacturers Association, and New York Traffic Club (February dinner).

Lubrication Convention Postponed Indefinitely

The American Society of Lubrication Engineers has postponed its convention scheduled for the Stevens hotel, Chicago, Feb. 8 and 9, to help relieve strained traffic conditions. Technical papers scheduled for the meeting will be published so that the society members and industry will have the benefit of them even though the convention will not be held. The Chicago section of the society has arranged a local meeting for Feb. 9 at 7:30 p.m. at the Stevens hotel. Speakers are: Warren Bailey, McKinsey-Kearney Co., Chicago, on "Lubrication from Management's Viewpoint," and N. C. Penfold, Armour Research Foundation, on "Engine Lubrication Research."

Powder Metal Products Are Discussed by Engineers

"The use of special powder metal products has been very large and essential to the success of the war production program," Gregory J. Comstock, professor of Powder Metallurgy and director of the Powder Metallurgy Laboratory, Stevens Institute of Technology, told a dinner meeting of the Metropolitan Section, American Society of Mechanical Engineers in New York recently.

In a general discussion on the commercial aspects of applied powder metallurgy, with special emphasis on its use in production of war materials, Professor Comstock said that employment of the metal powder products, such as the hard cemented carbides, in the machining of war materials, had speeded machining operations to a greater extent than any other single factor.

POSTWAR PREVIEWS

SIMPLIFIED PRACTICES—Bureau of Standards offers industry means to limit number of stock sizes and varieties of products when wartime limitations are lifted. See page 50.

FULL EMPLOYMENT—Murray bill designed to establish national policy and program for assuring jobs for all. See page 53.

HOUSING—Welding and the use of light steel plates developed during the war will be used extensively in postwar homes, steel executive predicts. See page 63.

AIRCRAFT—Standardization activity, spurred by wartime development, still has broad future to be explored. See page 64.

PRECISION CASTING—Important postwar use of "lost wax" of investment method of precision casting foreseen because of ability to cast parts of intricate design, such as buckets for aircraft engine turbosuperchargers, to tolerances of 0.001-inch or less with smooth surfaces requiring little or no finishing. See page 72.

INDUCTION HEATING—Hearing before Federal Communications Commission reveals that high-frequency induction heating is becoming an industrial tool of first importance. Electronic engineers describe remarkable new developments affording faster production, improved products at lower cost, and submit requests for special frequency allocations in the radio spectrum. See page 81.

PACIFIC COAST COKING OVENS—Cost of freighting Utah coal 800 miles for coking in Kaiser by-product ovens at Fontana, Calif., is compensated by efficiencies in other phases of coking process. Low-temperature char, petroleum coke, tamping of coal under investigation as means for effecting future economies. See page 84.

Simplified Practices Offer Means To Limit Stock Sizes and Varieties

Recommended limitations are voluntary. Benefit manufacturers, dealers and consumers. Many producers fear Department of Justice might raise question of legality under antitrust act, but Bureau of Standards believes such fears are groundless

ONE government agency that currently is handling considerably less business than might be expected is the Division of Simplified Practice, National Bureau of Standards.

This division at all times has a lot to offer to business and industry in that it is set up specifically to sponsor voluntary simplified practice recommendations. These arrangements reduce the number of stock sizes and varieties in which various types of merchandise are offered. Manufacturers benefit by getting along with fewer patterns and related devices, and with less equipment. Distributors benefit by carrying stocks which in the aggregate are smaller. Consumers benefit in the long run because the savings to the manufacturer and distributor usually are reflected in the price tag on the product.

On the other hand, companies participating have nothing to lose because there is nothing binding about these arrangements, and a manufacturer is free at all times to make any special or new item not included in the recommendation.

Has Much To Offer Business

Under present conditions the division has even more to offer to business and industry than usual. This is because all of the limitation orders of the War Production Board will expire at the end of the war. Many manufacturers who have operated under the various war limitation orders have grown to like them, and they would like to have these orders adapted to apply to the usual run of demand in the postwar period. As things now stand, with no legal provision for continuance of the powers of the WPB after the war ends, Simplified Practice Division is the only agency that can get behind such moves.

It might be expected, therefore, that manufacturers in industries covered by the L orders would flock to the division to obtain simplified practice recommendations to extend desirable features of the various L orders into the peacetime period, and that they would be in a hurry to bring about such a result in order to prevent a period of confusion which, without such voluntary recommendations, is bound to occur when the L orders expire and the manufacturers covered by them are left without any protection of this kind in the era of intense competition which is expected immediately after the war.

Such, however, is not the case. Although at least 175 of the 380 L orders of WPB are susceptible to permanent peacetime adaptation, only a handful of industries covered by these orders is working seriously to this end. And most of these few industries have worked with the Simplified Practice Division in the prewar period; their voluntary simplified practice recommendations, in fact, constituted the basis of wartime L orders, so that what they want to do is re-adapt these orders for the future.

EDWIN W. ELY

Altogether the division is in correspondence with the members of some 40 industries which stand to benefit from the adoption of voluntary simplified practice recommendations. Aside from the few industries alluded to above, however, most of these negotiations are in a preliminary stage, and real progress is held up because of objections advanced by some of the manufacturers. These objections are as follows:

1—Many manufacturers say they are fully occupied with war production; they haven't time for postwar problems now and will cross that bridge when they come to it.

2—Many manufacturers and distributors believe that simplified practice recommendations would unduly hamper them after the war; they apparently have not yet become aware that whereas compliance with the L orders is mandatory, the arrangements sponsored by the Simplified Practice Division are voluntary and are not subject to regulation.

3—Many who do not understand that acceptance of a simplified practice recommendation is not binding refuse to become interested by reason of that very fact. They fear non-co-operation on the part of competitors. "Unless a law is passed making it compulsory to live up to the recommendation," they say, "we would not be interested."

4—Many manufacturers fear that such arrangements might interfere with progress in their industry. They want to be free at any time to develop and introduce improved types of merchandise, and do not realize that under simplified practice recommendations they are entirely free at all times to do so. As a matter of fact, past experience has shown that simplification clears the decks of dead wood and thus encourages development of new and improved products.

5—Many fear industry acceptance of a simplified practice recommendation might smack of restraint of trade or collusion, and that the Department of Justice might at any time lodge an antitrust suit against them. Many refuse even to sit in a room as part of a group gathered together to discuss the elimination of stock sizes and varieties of a product.

This last objection has persisted despite the fact that the division handles these matters strictly in accordance with an approved procedure. In setting up lists of sizes and varieties of the product of an industry, it does not deal with a trade association or other representative of the industry, but with individuals actually affected. Next, it submits a copy of the proposed simplification to the distributors of that product in the United States and calls for criticisms and suggestions. It finally sends the proposed simplification to representative consumers all over the country—in many cases thousands of them—in order that no acceptance angle may be ignored. All the way through it is a case of dealing with individuals, not with groups.

Legality Has Not Been Questioned

The objection has persisted also despite the fact that the Department of Justice has not to date raised a question as to the legality of any of the 206 simplified practice recommendations promulgated by the Simplified Practice Division in all the 23 years of its existence.

To settle this objection for all time, the division last June, with the cognizance of the Department of Justice, changed the wording of its acceptance form to be signed by each member of an industry. It reads:

"We believe that this simplified practice recommendation constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the (wording is optional depending on whether the signature is by an individual manufacturer, distributor or consumer) production, distribution, use of the commodity. We reserve the right to depart from it as we deem advisable."

This is the only commitment asked of a member of an industry. What it all amounts to is that he is given an opportunity to participate in a move to sim-

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plify the number of stock sizes or varieties of a product which he makes, distributes or consumes, but under which he enters no formal agreement; by signing the acceptance form he assumes no new legal status.

The initiative in developing simplified practice recommendations usually comes from manufacturers, or develops in contacts between the Simplified Practice Division and manufacturers. Occasionally the move starts with distributors who would like to carry fewer stock sizes and varieties of a product. Sometimes desirable simplifications are delayed by one group passing the buck to the other. For example, some of the features of the hardware limitation order L-236 might be adapted to permanent peacetime business. So far, however, this project has been held up because the manufacturers want to leave it to the distributors and the distributors want to leave it to the manufacturers.

The groups with which the Simplified Practice Division now is working most actively are those covered by the hand tool limitation order, L-157, making such products as shovels, spades, scoops, axes, hatchets, adzes, light hammers, saws, garden tools, wood-boring bits and heavy forged tools. This program is rendered easier by the fact that some of these groups had simplified practices before the war; in fact, several sections of L-157 were built up on these prewar voluntary arrangements.

Some of the other industries with which the division is working along similar lines are those making Swiss pattern files, hot air furnace pipes and ducts, various types of valves, materials handling pallets and wire rope.

A new simplification project is that initiated by the steel industry (STEEL, Jan. 22, p. 55) seeking permanent peacetime adaptation of some of the limitations in the L-211 order. Initially the products involved include structural shapes, wheels, axles, pressure pipe, merchant pipe, poultry netting, woven wire fence, barbed wire and nails. At least a few months will elapse before these simplified practices are worked out, it is believed, in view of the necessity of contacting all manufacturers, all distributors and many thousands of consumers.

"There is every indication that many manufacturers and distributors earnestly desire peacetime adaptation of the wartime limitation orders affecting them," says Edwin W. Ely, chief, Simplified Practice Division. There are three good reasons why they should not wait.

"The first is that when the end of the war comes there will be a terrific congestion in our division due to the many requests that will be submitted to us. Today we have time; we can concentrate on the projects before us and translate them into voluntary simplified practice recommendations with minimum delay. The industries that take action now thus will have voluntary simplified practices to take the place of the simplifications which now are mandatory under the L orders. The simplified practice recommendations, in fact, can be so drawn up as to become effective on the expiration of the L orders they will succeed. Those industries that wait until the war is over will be confronted with a period of confusion during which they will have no simplification directive at all.

"The second reason why this is an especially good time to draw up a simplified practice recommendation is that inventories of most peacetime products are either at minimum or entirely nonexistent. Under these arrangements, the manufacturers signatory to them will be able to produce the most desired goods right from the start without any finished product inventory problem.

"The third reason is that product simplification cuts out avoidable waste. It helps to hold down manufacturing and distributing costs. Simplification should help many industries in the postwar period. They will benefit by acting on their simplification programs now rather than at some uncertain time in the future."

For the benefit of manufacturers who are in a position to utilize simplification programs in the postwar period, Mr. Ely stressed the difference between wartime and peacetime simplification.

CORRECTION

Due to a typographical mistake, the caption accompanying the photograph of Robert Heller, author of a report entitled "Strengthening the Congress", on page 60 of the Jan. 22 issue of STEEL, was incorrect. It said Mr. Heller participated in the modernizing of the United States Steel Corp. in 1945. It should have read this was done in 1935.

COMBINED BOARDS CONTINUED: President Roosevelt has announced the Combined Production and Resources Board and the Combined Raw Materials Board which have co-ordinated the wartime economic activities of the United States, Canada and the United Kingdom will be continued until the end of the war. Above are shown members of the combined boards. Front row, left to right: G. C. Monture, Canada; G. C. Bateman, Canada; William L. Batt, United States; Sir Henry Self, United Kingdom; George Archer, United Kingdom; Glyn Roberts, United Kingdom. Standing, left to right: Stanley L. Phraner, United States; R. A. Gordon, United States; Edward Browning Jr., United States; Ogden White, United States; Viscount Strathallan, United Kingdom; H. D. Hooper, United Kingdom; Percy Hayward, United Kingdom. NEA photo

Job Bill Introduced in Senate

Measure designed to establish national policy and program for assuring continuing full employment through concerted efforts of industry, labor and government

WHETHER or not S. 380, the so-called "Full Employment Bill of 1945," is approved by the 79th Congress, its introduction in the Senate last week by Senator James E. Murray (Dem., Mont.), with the sponsorship of Senators Robert F. Wagner (Dem., N. Y.), Joseph C. O'Mahoney (Dem., Wyo.), and Elbert D. Thomas (Dem., Utah), reflects a development in governmental thinking that merits careful thought on the part of the country's business and industrial leaders.

Despite repeated declarations by administration and congressional spokesmen during the past year that we will need about 60 million jobs to maintain satisfactory living conditions after the war, Senator Murray recalled that most people, in recent public-opinion polls, expressed the fear that there would not be enough jobs.

"Who is there," asked the senator in introducing his bill, "who, on the basis of what has thus far been done in the field of postwar planning, would be willing to predict that there will be jobs for all after this war?

"We all know," he stated, "that during the war we have transformed our economy into an economic skyscraper of breath-taking magnitude. We all know that when war production contracts are withdrawn the danger is that the entire edifice will topple over. We all know while the end of the war may bring with it 6 to 18 months of an inflationary cycle, the long-term threat is a deflationary collapse."

Would Establish National Policy

Senator Murray described his bill as a measure "to establish a national policy and program for assuring continuing full employment in a free competitive economy, through the concerted efforts of industry, agriculture, labor, state and local governments, and the federal government."

The American people, he declared, want to preserve the private enterprise system which has contributed more to human welfare and human happiness than any other system. But the system needs strengthening and improvement at times to enable it to keep working.

"Since the beginning of the twentieth century we have enacted maximum wage laws, reduced working hours, created unemployment compensation benefits, provided old-age benefits and we have provided protection to investors. We have made it possible for millions of farmers to co-operate among themselves and with their government in matters of soil conservation, production and prices.

"When these laws were first proposed they were attacked as socialistic and communistic. Thirty years ago, when an income tax was first proposed, the proponent of this measure—a representative from Tennessee by the name of Cordell Hull—was attacked as one who was trying to wreck the foundations of this system. But, once such laws have been enacted, they are invariably recognized as necessary to the strengthening of free enterprise, and no one would dare to propose their repeal," said Senator Murray.

Now it is time to improve and strengthen our economic system, he said, by preventing the violent economic fluctuations which have resulted in periodic mass unemployment. If we can do this, he declared, America will not be converted to socialism, communism, fascism or any other "ism."

Messages Not Studied Together

At present, said Senator Murray, the President reports to each session of Congress on the "state of the union" and on the "budget." The two committees on appropriations study their proposals for individual agencies; the Finance Committee of the Senate and the Ways and Means Committee of the House study the revenue aspects. But there is no arrangement to study the messages as a whole, in relation to the national economy.

The Full Employment bill, explained Mr. Murray, would set up a National Production and Employment Budget which would be charged with the task of appraising the extent to which the total demand for goods and services is sufficient to assure productive employment of all those willing and able to work. The appraisal of "total demand" would include not only investment and expenditures by the federal government, but also investment and expenditures by all groups in the country: Consumers, business, state and local governments, and the federal government.

The President, under the bill, would report to Congress at the beginning of each regular session the extent to which the economy is providing jobs for all, and he would submit a program for assuring full employment "through stimulating private enterprise and through necessary government programs, together with recommendations for such additional legislation as he deems advisable." This program would be received and digested by a new committee of both houses, to be known as the Joint Committee on the Budget, which would prepare and submit to both houses of Congress "a joint resolution setting forth a general policy with respect to the national budget for the next fiscal year." This would bring an annual debate, in both houses, on national economic policy.

"The resolution could then be amended in any manner that the majority of Congress determines is appropriate. As finally agreed to, it would serve as a general policy framework within which the individual committees of Congress could work on individual appropriation acts, revenue acts and related measures."

The bill, stressed Senator Murray, aims at eliminating business uncertainty over the government's fiscal policies.

"Business," he said, "cannot plan effectively for full employment without knowing the government's plans. This requires advance knowledge and open discussion of the government's plans, and reasonable consistency and stability in the administration of the government's program.

"For example, revenue measures are often enacted only a few weeks before they are to become effective. This, I submit, does not give the businessman sufficient time to consider the government's tax policy in relation to his own plans for future investment. Under this bill, it would be easier for Congress to develop its fiscal policies in a unified manner and to enact both revenue and appropriation measures before the beginning of each fiscal year."

The Full Employment bill recognizes that we live in a world of changing conditions and changing requirements in national economic policy, said Senator Murray. For that reason it provides no fixed proportions of the national budget to be supplied by consumers, business or government. In certain circumstances, he said, Congress may find it desirable or necessary to provide: 1—A national budget that emphasizes increases in consumers' expenditures, or 2—a national budget that emphasizes increases in the capital outlays of business, or 3—a national budget that emphasizes increases in government expenditures.

Under the proposed bill, said Senator Murray, "the specific national budget that would result in any given period would be determined not by the operations of any one individual or any one group, but on the basis of that active interplay between all groups and all our political leaders which is the very essence of the democratic process in our democratic America."

The bill, said Senator Murray, is aimed also to implement the insistence upon full postwar employment which featured the demands of both President Roosevelt and Governor Dewey during last year's presidential campaign.

Output of Malleable Iron Castings Off Slightly

Output of malleable iron castings during November totaled 79,579 short tons, compared with 80,505 tons in preceding month and 72,077 tons in corresponding 1943 period.

Steel Leaders Ask Lewis To Bring Forth New Wage Demands Now

Larger producers had average of only 15 days' supply of coal in stock on Jan. 8 and inventories have deteriorated since. Say stoppage when miners' contract expires March 31 would have immediate adverse effect on ingot output

CONCERNED over the dwindling coal supplies, the steel industry has extended to John L. Lewis an invitation to present any new wage demands he may be planning for his United Coal Miners before the miners' contract expires March 31. According to Pittsburgh reports, miners will seek wage increases of as much as $5.50 a day in some cases.

The industry at the same time endorsed "work-or-fight" legislation.

Industry leaders, speaking through the industry advisory committee, said:

"The coal supply of leading producers is down to a point to threaten seriously steel mill operations."

Expressing grave concern over this situation in view of the approaching contract expiration, the committee urged this condition be met head-on.

"Steps should be taken immediately to determine and resolve any demands that may be made upon the mine operators," the War Production Board quoted the committee, "and in this manner prevent a stoppage of the current flow which would be reflected immediately in a severe curtailment in steel production."

The committee was reported to have unanimously endorsed the "work-or-fight" program and recommended on the behalf of industry that appropriate legislation be enacted or that suitable executive action be taken in order that the manpower situation in their industry might be corrected.

Emphasizing the danger of declining coal stocks, the committee reported that as of Jan. 8, eight steel producers representing 51 per cent of the industry's steel ingot capacity had less than 15 days' coal supply on hand. Six other companies, representing 25 per cent of steel ingot capacity, had between 15 and 25 days' supply. These 14 companies representing 76 per cent of the total ingot production have had less than three weeks' supply and since Jan. 8 stocks have deteriorated.

These figures are averages, the committee pointed out, and some producers have only a few days' supply.

A thumbnail forecast on the 1945 manpower and draft situation presented to the committee by J. D. Small, executive officer of WPB, revealed that as a result of the expanded program workers in war industries increased in December, 1944, after reduced schedules had caused a reduction from 10,000,000 earlier in the year to 9,100,000.

Draft requirements will take 255,000 men, in the age group 26 through 29 years, from essential industries in the first half of 1945—out of some 830,000 men occupationally deferred. WPB officials said that while the steel industry was on the critical list recently released by the Office of War Mobilization and Reconversion, it stood to suffer sharp manpower losses along with other critical industries. Asked by committee members what measures they should take to prevent their organizations from being disrupted by the draft, WPB recommended that the steel industry make strong efforts to keep the technical men that are the backbone of any industrial organization. The draft impact will be felt in late February and early March and industry should endeavor to recruit deferrable men and start training them now, WPB advised.

Iron and Steel Export Price Rules Revised

Specific export premiums that can be added to domestic ceiling prices on a number of commodities when shipped to foreign countries will no longer be allowed on shipments to Canada, the Office of Price Administration has announced.

This change applies, in part, to the following export premiums provided in the export price regulation: On iron and steel products, from 6 to 16 per cent; on chrome ore and concentrates, $6 per gross ton. On shipment of these commodities to Canada, sellers are permitted to add export premiums not in excess of 125 per cent of the average premiums charged in the trade during the period July 1 to Dec. 31, 1940, or from March 1 to April 15, 1942, whichever is lower.

Copper Allotments Cut for Certain Civilian Items

Issuance of allotments of copper-base alloys for use in production of common and safety pins, church goods, and "blanks" for silverplated table flatware, recently permitted under the Controlled Materials Plan, will be discontinued beginning with second quarter 1945, War Production Board announced recently.

No allotment of copper-base alloy for manufacture of badges for identification purposes will be issued in the first quarter of 1945.

MRC Authorized To Sell SWPA Aluminum Scrap

Surplus Property Board has issued its first order since taking office early in January, authorizing the Metals Reserve Co. to sell for war production purposes aluminum scrap now being held in storage under Surplus War Property Administration's regulation No. 5.

The price obtained by MRC will be not less than the minimum price specified in SWPA regulation No. 5 for the particular grade, plus each such amount as may be determined by the MRC to compensate for the government's expense of transporting and storing the scrap.

Aluminum Industry Needs 9000 New Workers To Increase Production to Required Level

Deficiency in present production of primary aluminum can be met by drawing upon the existing stockpile, according to J. A. Krug, chairman, War Production Board. Adequate machine capacity exists for production of anticipated requirements in fabricated aluminum products with the possible exception of powder. Manpower alone is the determining factor, he says, estimating needs at 9000 new workers.

Total production of primary aluminum in the first quarter of 1945 is estimated by WPB at 275 million pounds, or about 100 million pounds less than indicated requirements. Aluminum Co. of America is expected to purchase a minimum of 150 million pounds of ingot from Metals Reserve Co. to make up deficiency in its own production and establish a stronger inventory position than now exists at fabricating plants.

The government's stocks of primary aluminum as of Dec. 31, 1944, were about 534 million pounds, equivalent to four and one-half months' consumption, while stocks of secondary aluminum amounted to 31 million pounds.

Inventories of aluminum sheet in the hands of aircraft manufacturers are believed to be at the lowest level since mid-1942. Order acceptances for this product for the first quarter of this year total about 270 million pounds, indicating a deficiency of 50 million pounds when compared with the estimated practical production of the system. WPB estimates that 5000 men will be required in sheet rolling mills to meet war demands.

Next to aluminum sheet, extrusions present the most critical problem and indications are that the heavy presses will be taxed to capacity. The floating bridge program will require 40 million pounds

of extrusions to be delivered by September, of which something over 35 million pounds must be delivered prior to July 1. The immediate manpower requirement to attain this production is at least 2200 men.

No serious difficulty is anticipated by WPB in meeting increased demand for aluminum forgings, although, owing to the nature of the fuze forgings, certain plants are taxed to their productive capacity, and it is estimated 300 men are urgently needed.

A potential demand of an additional 30 million pounds of atomized aluminum powder is being contemplated which would involve the building of new facilities and a manpower requirement of 500 men. If rumored demands for substantially large amounts of powder in flake and paste form develop, 150 men will be promptly required.

Bar, Rod Demand May Rise

A 40 per cent increase in demand for rod and bar aluminum may materialize in the early part of 1945, if forge stock inventories are as low as is suspected by WPB, indicating that an additional 500 to 750 workers will be required as soon as the order loads on the mills actually materialize. Requirements for rolled structural shapes are also increasing and, since these are produced on the same equipment used for rod and bar, there will be considerably less open space in the rod mills to take care of increases in rod and bar requirements.

Shipments of rivet wire have been about 1 million pounds a month less than production during the last quarter, indicating that producers are operating on minimum stocks of wire which must be replenished soon.

First quarter demand for aluminum castings probably will be 10 per cent higher than the fourth quarter 1944 level, but no serious difficulty is expected provided the foundries are able to replace skilled labor, which has been gradually drifting from the industry as a result of the adverse publicity as to the general aluminum situation.

Galvanized Sheet Deliveries Lag Far Behind Schedule

Galvanized ware production is being restricted by the manpower shortage and increased delay in the delivery of galvanized sheets, members of the industry told the War Production Board recently. In some instances, delivery of galvanized sheets has been as much as two or three months behind schedule.

Although production of galvanized sheets has been increased, WPB representatives said, demand has increased beyond the stepped-up production. The shortage of manpower limits further production increases and, they said, deliveries to galvanized ware manufacturers therefore will continue to be delayed. Manufacturers have not been able to meet both the high current requirements and backlog of need built up in 1942-43.

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

L ORDERS

WATER HEATERS: All reference to percentage of base-year production of electric water heaters that may be produced has been eliminated from order L-185. Production now can be increased or decreased in accordance with approved programs without requiring changes in the order itself. Production of non-electric water heaters still is permitted for each manufacturer at a certain percentage of his unit production of the same classification of water heater for 1941 and no more than 25 per cent of this total may be produced in any calendar quarter. Applications from manufacturers who have not previously produced water heaters will be processed on the same basis as all other applications. (L-185)

CONSTRUCTION EQUIPMENT: Twenty-five items of construction equipment have been transferred from schedule A to schedule B of order L-192, permitting these items to be sold without restriction. Only essential needs for schedule B items can be filled, however, and it will not be possible in general to purchase these items without preference ratings.

Certification and other restrictions on sale of repair parts have been removed, although a special certification for purchase of engine repair parts required for emergency use is provided. Schedule D, which listed three items the manufacture of which was prohibited, has been eliminated and these items are transferred to schedule B. Allocation of 75 per cent of critical repair parts to the military now applies to critical repair parts for both schedule A and schedule B items. Equipment purchased from a governmental disposal agency is now subject to provisions of the order. (L-192)

INDEX OF ORDER REVISIONS

Subject	Designations
Construction Equipment	L-192
Heaters, Water	L-185
Lead	M-38
Lighting	U-9
Price Regulations	
Aluminum	No. 2

M ORDERS

LEAD: Further tightening on less essential civilian uses for lead have been provided in an amendment to order M-38. On Dec 27, WPB announced that most 1945 civilian uses for lead had been restri ed to 60 per cent of the 1944 level. Full use of lead was restored for industrial type storage batteries, including batteries for use in planes, railroads, airplanes, radio stations, and commercial boats, but not including batteries for use in gasoline-propelled vehicles.

Principal new restrictions are: (1) Reduction in use of lead for collapsible tubes during the first quarter of 1945 (other than military and medicinal) to 15 per cent of the amount used in the first six months of 1944;

(2) Eliminating use of lead in gutter and leaders on all dwellings; that use of sheet, pipe (including lead-lined pipe), fittings and burning bars be prohibited except for military uses and where municipality and state regulations permit no substitutes for lead; that lead powder use is prohibited for other than military purposes and powder metallurgy while lead plating use is prohibited for other than military use;

(3) That in computing the amount of lead permitted to be used for products in list C for the first quarter, each user include the amount in any end products not fully fabricated on Jan. 1, 1945;

(4) That all products not previously on List A, B and C of the order receive only 30 per cent of the amount used in the first half of 1944 during the first quarter of 1945 and none thereafter;

(5) That the refining of platinum, gold and silver is included in list C with lead use limited to 60 per cent of 1944.

A user may accept an inventory of lead in excess of the prescribed 45-day inventory limit where a minium carload quantity requested by the ODT exceeds these restrictions.

Use of lead is permitted for military requirements and essential uses as follows: Sheet, pipe (including lead-lined pipe), fittings, burning bars and processing equipment for use in chemical and industrial plants to the extent that corrosive or chemical action makes the use of other material impractical; for use under safety regulations or safety equipment prescribed by government authority to the extent that use of any less scarce material is impractical; heat treating and annealing; for repairing of existing plumbing lines; coating of copper wire; for chemicals subject to order M-384; terne plate subject to order M-43; storage batteries for new equipment authorized to be produced under order L-1-e. (M-38)

U ORDERS

LIGHTING: Effective Feb. 1, no electricity may be used for the following purposes: (1) Outdoor advertising and outdoor promotional lighting; (2) outdoor display lighting, except where necessary for the conduct of business ot outdoor establishments; (3) outdoor decorative and outdoor ornamental lighting; (4) show window lighting, except where necessary for interior illumination; (5) marquee lighting in excess of 60 watts for each marquee; (6) white way street lighting in excess of the amount determined by local public authority to be necessary for public safety; (7) outdoor sign lighting, except for: (a) Directional or identification signs required for fire and police protection, traffic control, transportation terminals or hospitals; or directional or identification signs for any similar essential public services the lighting of which is specifically certified to be necessary by local public authority; (b) directional or identification signs using not more than 60 watts per establishment, for doctors and for hotels, and other public lodging establishments. (U-9)

PRICE REGULATIONS

ALUMINUM SCRAP: Maximum charge for converting any lot of scrap aluminum is fixed at a price not to exceed the difference between the maximum price of the lot of processed material redelivered by the processor and the maximum price of the lot of scrap delivered to him for conversion. In the case of the conversion of plant scrap solids into ingots priced under price regulation No. 2, the scrap is figured at cents a pound in place of the applicable imum price established for the grade of scrap by the regulation. The maximum charge for converting any lot of scrap will include melting loss, transportation charges on the scrap and transportation charges on the processed and redelivered materials in accordance with the applicable price regulation. In addition to maximum charges for baling and briquetting aluminum scrap, the processor may make charges for furnishing containers, storage, transportation or other extra services on the basis of charges made in March, 1942. Maximum price of 18 cents a pound is established for reusable aluminum scrap and sellers are permitted to apply for approval of higher prices in appropriate situations. (No. 2)

By A. H. ALLEN — Detroit Editor, STEEL

MIRRORS of MOTORDOM

Declines in man-effort, due to instructed slowdowns, absenteeism and general loafing, chief cause for manpower shortage in war plants. Slight increase in productivity in Detroit plants would eradicate all worker shortages

DETROIT

A CITY bus was bouncing across East Grand boulevard here the other day, loaded with its usual cargo of human sardines, many enroute to jobs at war plants in the vicinity. The driver was a garrulous individual who kept up a constant chatter in a loud voice, urging his fares to step lively, move to the rear, etc. As the bus drew up to a main intersection, a number of the worker-passengers prepared to get off. The driver shouted, "Blank-Blank Company Playhouse—all out." This brought a roar of laughter from the passengers, but a woman war worker sitting near this writer turned to her companion, saying, "He's absolutely right, but at that it is not near as bad as at the X-Y-Z Company."

A young man who had been holding down a routine laboratory job decided to strike out for the big-time money he had been hearing so much about, so he landed a position testing aircraft carburetors in a plant here. He was told the schedule called for testing four carburetors in every ten-hour shift. After two weeks on the job he told a friend, "My buddy and I now can test four of those carburetors in three hours, which leaves us seven hours to fool around, reading books, rolling dice in the washroom and generally horsing about. The union will not let us exceed the four-per-shift schedule, and I'm getting so sick of doing nothing I think I'll quit."

A telegram from Harvey Campbell, executive vice president of the Detroit Board of Commerce, to Senator Ferguson of the Mead investigating committee, reads: "There is no manpower shortage as such. There is a definite man-effort shortage due to absenteeism and instructed slowdowns. Shop slogan too often is 'make the job last' which means 'make the war last.' And that's mass murder."

Mead Committee To Investigate

The Mead committee, after its shocking disclosures at the Norfolk Navy Yard, has announced its plans to continue investigations in Detroit, and it should find plenty to talk about on the score of appalling declines in man-effort.

Looking at the matter realistically, management must accept part of the responsibility for this waste of money and of time, for it has been the accepted function of management to supervise and regulate its working force in the interests of maximum efficiency. Unfortunately this has been difficult to do because labor unions have virtually usurped this power from management. Disciplinary measures are impossible because they are at once converted to grievances and causes for striking.

Conventional method of developing top labor efficiency has been the incentive pay system, but since the labor union upheavals in the motor industry in 1937, incentive systems, with a few exceptions, have been thrown out, unions preferring to level off man-effort at the plane of the least efficient and keep it there.

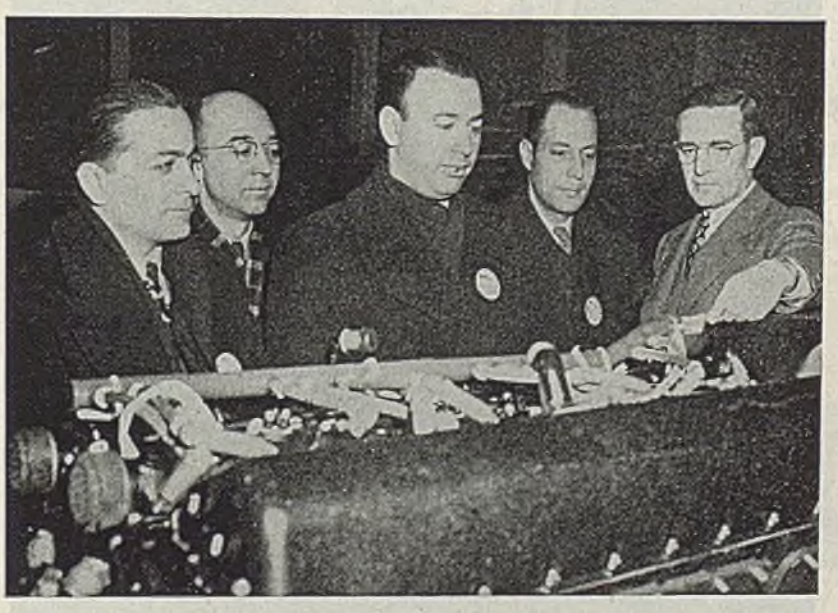
A hopeful sign is the announced plan of Ford Motor Co. to develop a new incentive pay system for the 3000 men in its blast furnace, open-hearth and rolling mill divisions. The company frankly declares that at the present level of efficiency it will be impossible to keep these mills going in peacetime, but that if worker efficiency is raised sufficiently, by means of an incentive pay system, guaranteeing a certain base pay, plus a certain incentive pay for maintaining a norm of production, plus bonus pay for exceeding the normal level, then at least a majority of those now employed can be retained, instead of all being dismissed.

Present pay rates in Ford steel mills vary between $1.10 and $1.90 per hour. Under an incentive system, every job would be carefully time studied and agreements reached on what to consider a normal tonnage figure. Currently, Ford open hearths are producing an average of about 13,500 gross tons of steel per week. A certain percentage of the established normal—say 65 per cent—would be set up as the base pay output rate. The remaining 35 per cent would be output earning incentive pay, while anything over 100 would carry additional bonus.

Henry Ford always has been a firm believer in high wages, but he has also recognized that wages must not be measured in so many dollars and cents, but in the amount of productivity resulting from the workman's effort.

It becomes increasingly apparent the maintenance of a high postwar rate of industrial production is dependent, first and foremost, upon a continuing improvement in the productivity per man hour. If this is not recognized—by management, by government and by labor—then all the talk about 60 million postwar jobs, and a national income guaranteeing peace and plenty is just so much hogwash. Higher wages, paid just to meet competition or union pressure, are both inflationary and suicidal economically, as is being demonstrated today. Higher wages paid for increased productivity represent contributions to a sound and enlarging economy. How can the logic of this reasoning be indoctrinated in the minds of working people.

Last week, military procurement officers and WPB officials, alarmed over "laxness, inefficient workmanship and loafing on the job," told management and labor no new war contracts would be placed in the area if conditions did not take a turn for the better. From now on, no new contract will be placed with any plant until the interested government



LEARN AMERICAN WAYS: To Turkish army officers studying engineering at the University of Michigan, Harold W. Mohr, right, chemical engineer, Packard Motor Car Co., Detroit, explains the Packard-built Rolls-Royce aircraft engine. With him, left to right, are Capt. Enver Algon, University of Michigan Assistant Professor W. A. Spindler, Capt. Rasit Alpan, and Capt. Asim Unayral

agency has called a conference of that plant's executive officers and its labor leaders down through the shop stewards, who in turn will have to provide assurances (in what form is not stated) that every effort will be made to turn out production on schedules, to eliminate work stoppages and to increase efficiency.

There is no quantitative manpower shortage in this area, in fact there are 70,000 fewer people at work than at the peak of war production in November, 1943. Sixty thousand of these are women who have apparently returned to their homes or moved out of the area. At the same time the monthly volume of production is well ahead of November, 1943. E. L. Cushman, state director of the War Manpower Commission, told a radio audience recently total requirements of the USES were 12,000, of which only 25 per cent carried "priority" ratings.

The suggestion has been made that an improvement of only 10 per cent in efficiency of the 700,000, more or less, now working in plants here would wipe out even a trace of a worker shortage and at the same time provide gaps which presumably would have to be filled with new contracts. The whole trouble with this type of dreamy reasoning is that it considers the working force in a lump and assumes the minute a certain number have been displaced they can immediately be put back to work by more contracts. This is decidedly not the case, since even now the picture varies from plant to plant. One may be laying off men, while another may be desperately in need. For a dozen reasons, those laid off cannot at once move over to the short plant and thereby adjust an unbalanced situation.

How an accidental discovery, resulting from processing difficulties, yielded an entirely new type of material which has numerous interesting future possibilities is an engaging story coming from a local plant. Copper tubing was being drawn down to exceptionally fine sizes and to support the tubing during drawing a steel wire was inserted to serve as a mandrel, the theory being that both the tubing and the wire could be drawn down to the required size, whereupon the mandrel could be removed, leaving the finished tubing. Difficulty was encountered, however, in removing the mandrel from the tubing, for in the drawing it had become intimately bonded to the tubing with the result the end product was a copper-clad steel wire instead of a small-diameter copper tubing.

A little study immediately showed scores of uses for a material of this type, where the strength of the steel and the electrical conductivity of the copper made a desirable combination. It was found other dissimilar metals could be processed similarly. Consideration of the plastic flow of two unlike metals, one a wire inside the other, a tube, makes a highly interesting study. It would theoretically be possible to calculate the respective lengths of the two materials required to insure the finished combination "coming out even" after a specified amount of reduction by drawing.

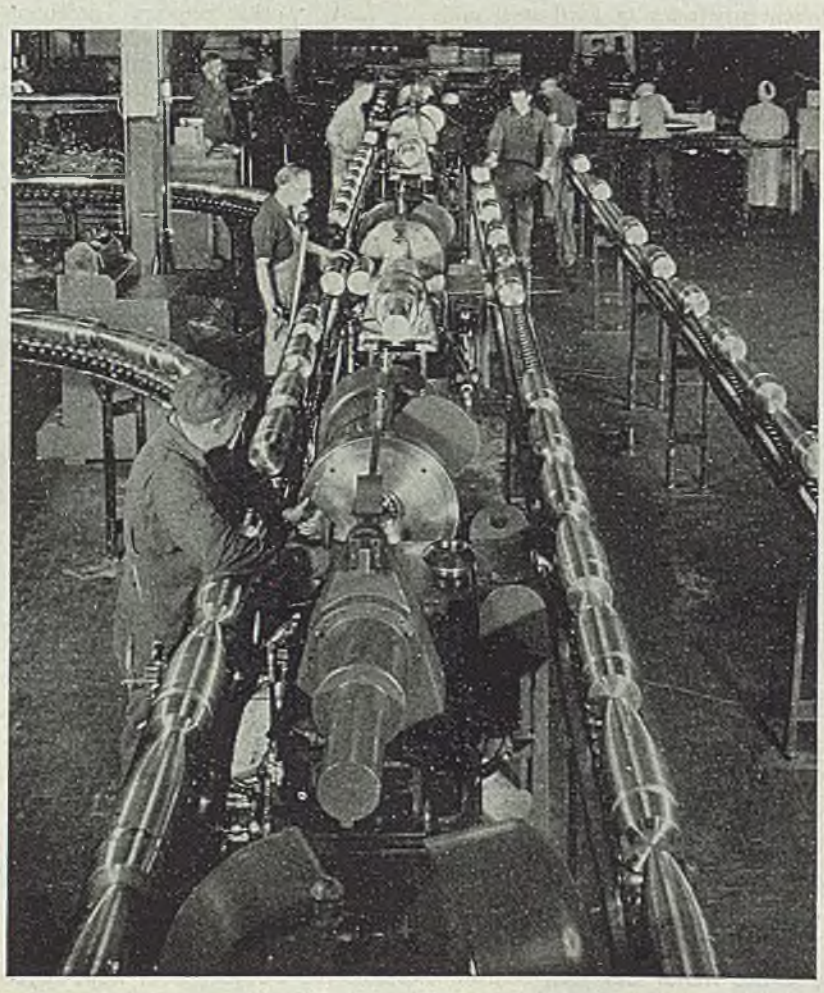
Resignation of Irving B. Babcock as vice president of General Motors and general manager of the GM Truck & Coach Division at Pontiac, to assume the presidency of Aviation Corp. Feb. 1 has some interesting sidelights. The Detroit arm of Aviation Corp. is the Republic Aircraft Products which has two plants busy on aircraft engine parts production. Mr. Babcock apparently will make his headquarters here, but his association with the company is felt to be more of a postwar proposition than any immediate administrative task. It is known Avcorp has extensive plans for postwar participation in consumer goods manufacturing, and for several years has maintained a development staff here working on such projects.

Departure Was Surprise

His departure from GM was something of a surprise, nonetheless, as was the appointment of his successor, M. D. Douglas, formerly associated with the Chevrolet Service Parts Division. It has been customary GM policy to move up executives within divisions and many felt this would be done at the Truck & Coach Division. Insiders say the reason Mr. Douglas was moved over from Chevrolet was to calm differences of opinion which he and W. E. Holler, sales manager of Chevrolet, held over future policies on service parts.

Actually, his experience in service parts production and distribution may be more valuable at Yellow Truck than apparent at first glance. The truck plant is really a glorified job shop in normal times, handling hundreds of orders for limited quantities of trucks and buses from a wide assortment of buyers, all of whom have different ideas on mechanical specifications, colors, trim, etc. Directing an activity of this sort calls for a person familiar with the peculiarities of the jobbing trade.

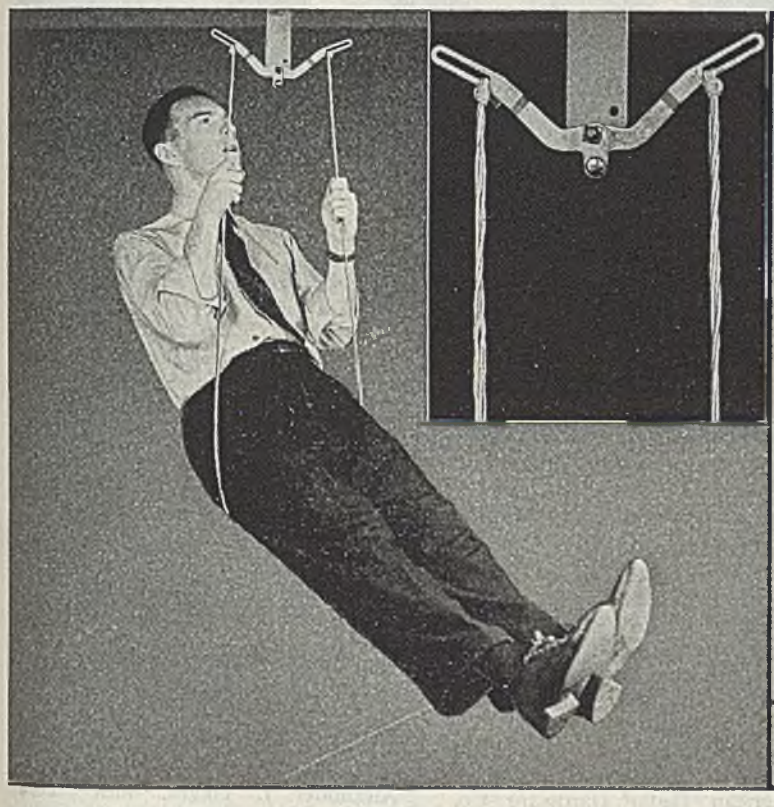
After viewing the tremendous volume of American equipment of all sorts required to implement the Pacific phase of the war, a returning editor expressed the belief there is scant recognition of the contribution of American industry by persons on the scene. The suggestion was voiced it might have been (or possibly still is) a good plan to affix ineradicable nameplates or identification to all such equipment, reading, "made in the U.S.A."

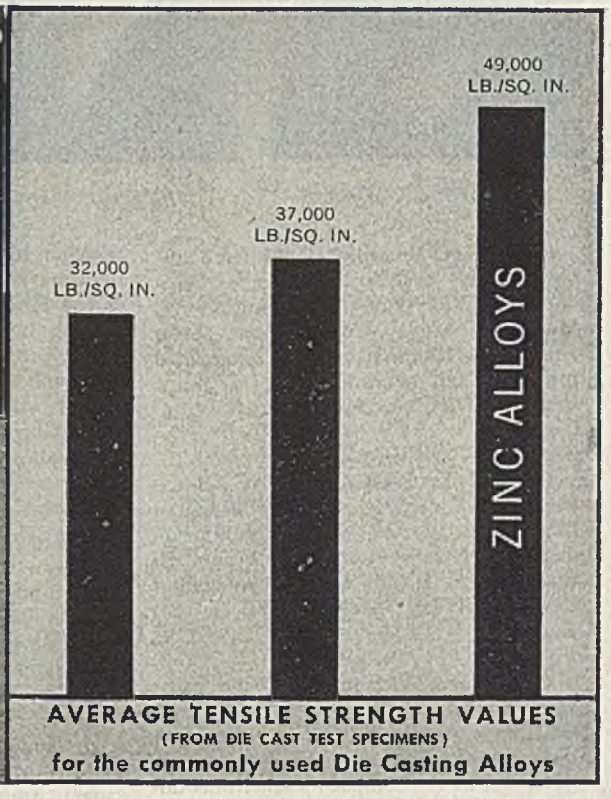


SHELLS FOR THE YANKS: Finishing touches are placed on 155-millimeter shells by workmen at the Grand Rapids, Mich., stamping plant of Fisher Body Division, General Motors Corp. An elaborate system of conveyors routes the shells from one operation to another

TENSILE!

—ZINC ALLOY DIE CASTINGS CAN TAKE A "MAN-SIZED" LOAD





AVERAGE TENSILE STRENGTH VALUES
(FROM DIE CAST TEST SPECIMENS)
for the commonly used Die Casting Alloys

This simple test of a pair of zinc alloy die cast brackets (see close-up) was made to dramatize tensile strength. There was no need for the gentleman's tense expression—the zinc alloy die cast brackets easily sustained his weight without deformation. You may never have a part with equivalent demands for tensile strength, but this test graphically illustrates the physical characteristics of zinc alloy die castings.

Tensile strength is just one of the physical properties of the zinc die casting alloys which is not equaled by either of the other commonly used die casting metals. Zinc alloy die castings are also superior in impact and compressive strength, ductility and hardness.

These strength characteristics, coupled with speed of production, clean-cut appearance and low cost, have made die castings of zinc alloy the most widely used. *Every die casting company is equipped to make zinc alloy die castings,* and will be glad to discuss these advantages with you—or write to The New Jersey Zinc Company, 160 Front Street, New York 7, New York.

ZINC
FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are specified with
HORSE HEAD SPECIAL (99.99+% Uniform Quality) **ZINC**

MEN of INDUSTRY

HERMAN H. BROOKSIEKER

JOSEPH PLASENCIA

CLINTON R. HANNA

ALEXANDER M. HAMILTON

Herman H. Brooksieker has been appointed vice president in charge of manufacturing, Kaydon Engineering Corp., Muskegon, Mich. For the past seven years Mr. Brooksieker has been vice president and superintendent of Pesco Products Division, Borg-Warner Corp., Cleveland.

—o—

Leonard K. Weeks, formerly service engineer, Cincinnati Milling Machine Co., Cincinnati, and **John R. Gough,** formerly tool supervisor for George D. Roper Corp., Rockford, Ill., have joined Kennametal Inc., Latrobe, Pa., as tool engineers.

—o—

C. H. Lang, vice president and manager of apparatus sales, General Electric Co., Schenectady, N. Y., has been given direction of application and service engineering in the company's apparatus department, and **A. K. Bushman** has been named manager of that department's application and service engineering.

—o—

T. J. Wells has been appointed superintendent of blast furnaces, and **A. D. Fisher** has been made superintendent of coke ovens, Steel Co. of Canada Ltd., Hamilton, Ont.

—o—

C. F. Patterson has joined the field engineering staff of Eutectic Welding Alloys Co., New York, to serve the Michigan area, and **John A. Owen** has joined the company as field engineer in North Carolina.

—o—

K. F. Leaman has been appointed works manager of Consolidated Vultee Aircraft Corp.'s Elizabeth City, N. C., division. Formerly he was works manager of the New Orleans division.

—o—

Stanley D. Whiteside has been appointed district engineer in the Michigan area for W. S. Rockwell Co., New York, with offices at 1010 Stephenson building, Detroit 2.

—o—

Walter E. Benoit has been elected vice president, Westinghouse Radio Stations Inc., broadcasting subsidiary of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. Benoit continues as assistant to the vice president, Westinghouse Radio and X-Ray divisions, maintaining headquarters in Baltimore.

—o—

Joseph Plasencia has been appointed export sales manager, Fostoria Pressed Steel Corp., Fostoria, O., and will make his headquarters at 401 Broadway, New York.

—o—

Clinton R. Hanna, inventor of the tank-gun stabilizer, and manager of the electro-mechanical department of the Westinghouse Electric & Mfg. Co.'s research laboratories, has been appointed an associate director of the Westinghouse research laboratories.

—o—

J. Homer Robinson has been appointed vice president and general sales manager, American Radio Hardware Co. Inc., Mt. Vernon, N. Y. Mr. Robinson is former general sales manager, National Union Radio Corp., Newark, N. J.

—o—

A. W. Herrington, chairman, Marmon-Herrington Co. Inc., Indianapolis, has been elected a life member of the Society of Automotive Engineers. Mr. Herrington is a former director of the society and a director of Gar Wood Industries Inc., Detroit.

—o—

Ralph W. Young and **Kenyon Y. Taylor Jr.,** vice presidents of Charles H. Besly & Co., Chicago, have been elected directors.

—o—

Floyd G. Sease has been appointed national business management manager of Nash Motors Division, Nash-Kelvinator Corp., Detroit, succeeding **J. J. Heilwick,** who has become associated with Western Motor Corp., Denver, Nash and Kelvinator distributors. **N. F. Lawler** has been named assistant to **C. D. Wing,** director of advertising and sales promotion, Nash Motors Division.

—o—

Col. A. E. Howse, formerly San Francisco area supervisor for aircraft production for the Army Air Forces, has been appointed regional director of the San Francisco office of Smaller War Plants Corp. He succeeds **Col. F. M. Smith,** who resigned recently to return to private business.

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Alexander M. Hamilton, vice president in charge of foreign sales, American Locomotive Co., New York, has been named president of the newly-formed American Locomotive Export Co. Inc.

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Herbert L. Markham, former vice president, has been elected president of Parker Appliance Co., Cleveland, to succeed the late Arthur L. Parker.

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Harold R. Maag has been appointed regional manager for the West Coast area, R. C. A. Victor Division, Radio Corp. of America, New York.

—o—

Alexander J. Tigges, until recently manager of consulting engineering for Baldwin Locomotive Works at Chester, Pa., has been appointed district technical advisor of Air Preheater Corp., New York.

—o—

William G. Smith has been made general supervisor of the war products service department, Cadillac Motor Car Division, General Motors Corp.

—o—

Westinghouse Electric Supply Co., New York, has announced the following appointments: **Robert E. Burrows,** manager of general radio sales with headquarters in New York; **Charles R. Matthews,** manager of the northern California district, headquarters San Francisco, and **Houston B. Watson,** apparatus and supply manager of the southwestern district, succeeding **W. G. Sterett,** resigned.

—o—

Appointments in the Customer Service Division, Continental Can Co. Inc., New York, are: **C. L. Smith,** acting assistant to the divisional director and temporarily manager of customer service; **H. L. Seaton,** chief crops consultant; **L. G. Petree,** manager of customer service, Pacific Division; **A. D. Gifford,** manager of customer service, Eastern Division; **W. J. Mutschler,** manager, packaging lab-

oratory; **A. G. Skibbe**, supervisor of container evaluation; **M. H. Taras**, assistant to the manager of customer service, Central Division, and **W. K. Neuman**, assistant to the manager of customer service, Eastern Division.

—o—

Continental Can Co. Inc., New York, has announced appointment of three accountants: **N. A. Coan**, chief industrial accountant of the Paper Division, with headquarters in Van Wert, O.; **Gilbert Ormbeck**, division industrial accountant in charge of the Central Division machine shops, and **Charles S. Buck**, plant industrial accountant at the company's McDonald plants.

—o—

William J. Murray has been appointed assistant sales manager, Fence Division, Wickwire Spencer Steel Co., New York. For the past 15 years he has been in charge of the Eastern Division of the fence department, Pittsburgh Steel Co., Pittsburgh.

—o—

James B. Ford, former senior aeronautical engineer for the Civil Aeronautics Administration, and chief engineer, Doak Aircraft Co., Torrance, Calif., has been elected vice president, engineering.

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William R. Hill has been named general sales manager, industrial and commercial sales, Warren Steam Pump Co. Inc., Warren, Mass.

—o—

M. H. Hosmer, Hunt-Spiller Mfg. Corp., Boston, has been elected president, New England Foundrymen's Association. Other officers are: **B. W. Hagerman**, Rice-Barton Corp., Worcester, Mass., vice president; **Arthur W. Gibby**, Boston, treasurer, and **Ernest F. Stockwell**, Barbour-Stockwell Co., Cambridge, Mass., secretary. **A. F. Dockery**, H. & B. American Machine Co., Pawtucket, R. I.; **F. N. Fitzgerald**, Draper Corp., Hopedale, Mass.; **Thomas I. Curtin, Jr.**, Waltham Foundry Co., Waltham, Mass., and **Charles A. Reed**, Rogers-Brown-Lavino Co., Boston, are members of the executive committee, of which Mr. Hagerman is chairman.

—o—

George A. Milton, president, George A. Milton Can Co., Brooklyn, N. Y., has been elected president of the Can Manufacturers Institute.

—o—

Fred D. Beecher has been made director of automotive replacement sales for Thermoid Co., Trenton, N. J.

—o—

David G. Baird, vice president, Marsh & McLennan, New York insurance brokers, has been elected a director of Phoenix Iron Co. and Phoenix Bridge Co., Phoenixville, Pa.

—o—

Paul W. Waters has been named Chicago district representative for Greer Steel Co., Dover, O., and Anderson, Ind. Prior to service as chief of the inspection division of the Cleveland Ordnance office Mr. Waters was associated with

A. R. STARGARDTER

L. E. MacFADYEN

Youngstown Sheet & Tube Co., Youngstown, O., and Republic Steel Corp., Cleveland, in the operating departments.

—o—

A. R. Stargardter has been made chief metallurgist, Ajax Electric Co. Inc., Philadelphia.

—o—

Dr. Martin de Simo, director of research and development, Great Lakes Carbon Corp., Chicago, has been elected vice president in charge of research and development.

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John B. Steen has been appointed operations manager of Amship Corp., Alameda, Calif. The company specializes in emergency repair and conversion work for the Navy and the War Shipping Administration.

—o—

Keith S. McHugh, vice president, American Telephone & Telegraph Co., has been elected a director of Air Reduction Co., New York.

—o—

Howard A. Vaughan has been made president, Vaughan & Bushnell Mfg. Co., Chicago, succeeding **Sanford S. Vaughan**, who becomes chairman. **Edward C. Howe Jr.** has been named vice president and secretary.

—o—

Sara E. Southall, supervisor of employment and service, International Harvester Co., Chicago, has received the first "Award of Merit" given by the National Association of Personnel Directors.

—o—

Four promotions in the Manufacturing Division of Glenn L. Martin Co., Baltimore, have been announced as follows: **Nils H. Lou**, assistant to the vice president, manufacturing; **Robert Young**, factory manager; **Norman Stewart**, assistant factory manager, and **Robert Bounds**, factory superintendent, Army Division.

—o—

A. A. Helwig has been elected president, Standard Railway Equipment Co., Chicago, sales organization of Standard Railway Equipment Mfg. Co., Hammond, Ind. Mr. Helwig succeeds **Arthur A. Frank**, who has become board chairman. Other new officers include: **D. R. Arnold**, senior vice president, and **R. G. Sonquist** and **J. E. Vaughn**, vice presidents. Mr. Arnold and Mr. Sonquist continue to make their headquarters in New York.

—o—

L. E. MacFadyen has been named works manager, Taylor-Wharton Iron & Steel Co., Easton, Pa., in charge of the company's High Bridge, N. J., and Easton plants. Succeeding Mr. MacFadyen as superintendent of the Easton plant is **James M. Sandt. E. O. Swearingen** continues as superintendent of the High Bridge plant.

—o—

F. W. Kateley has been named chief engineer, ACF-Brill Motors Co., and **E. G. Mathauer** has been appointed assistant chief engineer.

—o—

Felix Edgar Wormser has been elected secretary and treasurer of the Metal Powder Association.. Offices of the association have been moved to 420 Lexington avenue, New York 17. Mr. Wormser is also secretary and treasurer of the Lead Industries Association at the same address.

—o—

James D. Glenn, previously assistant general manager of sales, Sharon Steel Corp., Sharon, Pa., has been elected vice president in charge of sales, Eastern Stainless Steel Corp., Baltimore.

—o—

Robert E. Bockrath has been appointed manager of magnesium sales for the Houston, Tex., office of Dow Chemical Co., Midland, Mich., effective Feb. 1.

—o—

Lester E. Lighton, since 1940 manager of the department of development and design, Electric Storage Battery Co., Philadelphia, has been elected vice president of the company in charge of engineering.

—o—

John H. Middlekamp, recently resigned director of the Automotive Division, War Production Board, has been appointed manager of the government department of Mack Trucks Inc., New York.

Robert B. Thomas, secretary and general counsel of the American Institute of Steel Construction, New York, died Jan. 22 in Polyclinic Hospital, New York city. Mr. Thomas, who was 53, had long been prominent in the structural steel fabricating industry as an expert on legal and labor matters. He was executive secretary of the Iron League of New York at one time, and later was with the New York Structural Steel Board of Trade, remaining with that organization until its dissolution in 1925. He joined the American Institute of Steel Construction in 1935 as general counsel and in February, 1943, was made secretary of the organization as well. Mr. Thomas helped in the preparation of evidence in the steel wage case presented before the War Labor Board by the Steel Case Research Committee last year when the labor unions sought to break the Little Steel formula.

—o—

Frank L. Gibbons, 53, sales manager, Alloy Division, Carnegie-Illinois Steel Corp., Chicago, died Jan. 19 in Winnetka, Ill. Mr. Gibbons was a former vice president of Timken Steel & Tube Co., Canton, O., which is now a division of Timken Roller Bearing Co.

—o—

James C. Workman, 76, chief engineer of American Ship Building Co., Cleveland, until his retirement two years ago, died Jan. 22 in that city. Mr. Workman was with Globe Iron Works and its successor, American Ship Building Co. from 1889 until 1942.

—o—

A. P. Steiner, 71, formerly chief engineer and superintendent, Landis Tool Co., Waynesboro, Pa., died Jan. 8. He had acted in the capacity of consulting engineer for the past few years.

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Pvt. W. T. McElwee, 31, who was assistant purchasing agent for the Le Roi Co., Milwaukee, before entering service Feb. 22, 1944, was killed in action Nov. 29 in Germany.

—o—

Edward J. Miller, 81, co-founder and president of the St. Louis Screw & Bolt Co., St. Louis, died Jan. 9 in that city.

—o—

Oswald H. Noble, 44, research engineer for Fosdick Machine Tool Co., Cincinnati, died Jan. 6 in that city.

—o—

George E. Dickson, 77, president, Dickson Weatherproof Nail Co., Evanston, Ill., died Jan. 20 in that city.

—o—

William S. Meikle, 80, founder and retired president, Advance Tool Works, Chicago, died Jan. 20 in that city. He had retired 15 years ago.

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George W. Keller, 67, who was a consulting engineer in Pittsburgh for ten years prior to his retirement in 1943, and formerly associated with Vilter Mfg. Co., Milwaukee, died Jan. 20 in Milwaukee.

—o—

Eugene Colburn Ward, 60, former assistant general sales manager for the Passaic, N. J. office of Continental Can Co. Inc., New York, died in Passaic Jan. 20.

—o—

Cyril P. Deibel, 50, founder and president of General Dry Batteries Inc., Cleveland, died Jan. 22 in that city.

—o—

Chester W. Zimmerman, 55, retired engineer, died Jan. 12 in Milwaukee. Mr. Zimmerman, who was born in Milwaukee, received training as a mechanical engineer in Hamburg, Germany, and was then sent to Russia as a representative of International Harvester Co., Chicago. Later he represented Four Wheel Drive Auto Co., Clintonville, Wis., in Russia, returning to this country in 1932. Until his retirement in 1940 he was employed as an engineer for the government at the Picatinny arsenal in New Jersey.

—o—

Sir Reginald Clarry, 62, British industrialist and Conservative Member of Parliament, died Jan. 17 in London. Sir Reginald had served since 1931 as a consulting engineer, director of several British companies, and managing director of Duffryn Steel & Tinplate Works, Morriston, Glamorganshire, S. W.

—o—

Howard L. Bennett, 67, assistant secretary and treasurer, Calumet & Hecla Consolidated Mining Co.'s Boston office for more than 30 years prior to his retirement in 1943, died Jan. 16 in Winchester, Mass.

—o—

Robert F. Carr, 73, chairman, Dearborn Chemical Co., Chicago, died Jan. 22 in that city. He had been associated with the company 50 years, serving as its president from 1907 until last year.

—o—

Edward Morris Buckius, 74, founder and until 1938 president of Los Angeles Valve & Fittings Co., Los Angeles, died there Jan. 16.

—o—

John W. Pauling, 55, vice president, Minneapolis-Honeywell Regulator Co., Minneapolis, died Jan. 17 while on a business trip to Chicago.

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Benjamin G. Smith, 59, senior member of the law staff of Union Carbide & Carbon Corp., New York, died recently in that city.

—o—

Joseph C. Skobis, secretary-treasurer, Skobis Co., Milwaukee, which company he helped organize, died recently in Milwaukee.

—o—

Ralph Gregory, president and treasurer, Goodwin & Gregory Co., Providence, R. I., died recently.

—o—

Warren B. Huther, 87, co-founder of Huther Bros., Rochester, N. Y., died there Jan. 19. He founded the firm in 1876 with his brother, Angus E. Huther.

—o—

James G. Tattersall, 65, assistant to the vice president, Ramapo Ajax Division, American Brakeshoe & Foundry Co., New York, died Jan. 16 in Buffalo.

—o—

Sidney Dunn Waldon, 72, treasurer, General Machinery Co., Hamilton, O., and former vice president and general manager, Packard Motor Car Co., Detroit, died Jan. 20 in Hamilton, O. Mr. Waldon was one of the principal designers of the Liberty airplane motor developed during the first World War.

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Vance R. Hood, 50, head of the Vance R. Hood Co., New York, died Jan. 20 in that city.

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George J. Weber, 59, engineer of tests, Association of Manufacturers of Chilled Car Wheels, Chicago, died there Jan. 20.

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Arbin J. Stieglitz, 50, manager of priorities, Milcor Steel Co., Milwaukee, since the beginning of the war, died recently in Milwaukee.

—o—

Miss E. Jean Oram, 70, who succeeded to the presidency of the John S. Oram Co., Cleveland, 30 years ago following the death of her father, heading the business ever since, died Jan. 18 in Cleveland.

—o—

William M. Myers, 72, board chairman, Highland Iron & Steel Co. Inc., Terre Haute, Ind., died there Jan. 19. Mr. Myers also was president of the First National Bank, Terre Haute.

—o—

Murray Tucker, 47, treasurer, Radio Inventions Inc., New York, which is engaged in electronics work for the armed forces, died recently in Orange, N. J.

—o—

Everett Parker Lesley, 70, aerodynamics engineer who retired as head of Stanford University's Aeronautics Department in 1939, died Jan. 17 in Palo Alto, Calif. During his last year at Stanford, climaxing 32 years of teaching and research work, Prof. Leslie was hailed for his developments in the propeller field.

—o—

Floyd H. Miller, 44, secretary and treasurer, Firestone Tire & Rubber Co., Akron, O., died there Jan. 20.

—o—

Cortlandt F. Ames Jr., 50, manager of residential building materials for Johns-Manville Corp., New York, died Jan. 18 in Absecon, N. J.

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Stuart Wellington Lyon, 44, for the past several years an engineer for American Machine & Metals Inc., East Moline, Ill., died Jan. 24 in Moline, Ill.

—o—

John H. Sanders, 60, secretary, Appleton Mfg. Co., Batavia, Ill., died Jan. 16 in Aurora, Ill.

Draft Demands, War Production Given Attention

New England tool and die manufacturers hear Army and Navy officers discuss expectations for 1945

ACCELERATED demands of Selective Service and war production were emphasized by high-ranking officers of the Army and Navy at a conference of New England tool and die shop owners last week in Hartford, Conn. Sponsored by the National Tool and Die Manufacturers Association, the meeting was attended by more than 250 manufacturers from every state in New England.

Brig. Gen. Alexander G. Gillespie, commanding officer of the Watervliet Arsenal, Watervliet, N. Y., spoke on "What the War Department Expects of the New England Tool and Die Industry in 1945."

Lieut. Com. John F. Robinson, director of Selective Service for Connecticut, warned industry that it can expect further inroads into its personnel.

General Gillespie, citing battlefront figures of two-and-a-half tons of metal thrown against the Germans every minute since D-Day and eight million projectiles every month, said "there must be no let-up in war production. The needs are increasing and it is becoming more difficult to determine what is sufficient."

Commander Robinson told tool and die shop executives that anyone now in a war plant will find the door locked if he tries to change his job without predetermining through his local board whether this is in order.

"I doubt that anyone will ask you to give up your vital men," the Connecticut Selective Service director added. "We recognize that certain skills are irreplaceable in every industry. But there are still men in personnel and white-collar jobs because management lacks the fortitude to call them nonessential. You will have to sacrifice these men to keep your skilled men."

George E. Eaton, executive secretary of NTDMA urged every tool and die shop owner to file occupational deferments for all skilled men up to 38 in anticipation of increased draft calls.

New Methods for Handling Materials Discussed

Seventy delegates attended a materials handling machinery manufacturers conference held in Pittsburgh recently under sponsorship of Westinghouse Electric & Mfg. Co. Represented were 36 materials handling equipment producers and two domestic and foreign government departments.

Papers presented dealt with new ideas for materials handling, production increases possible through engineered materials handling, selection of motors for electric hoists, alternating current crane control schemes and selection of electric traveling crane equipment.

The two-day session was opened by C. B. Stainback, industrial sales manager of Westinghouse.

Predicts Use of Magnesium Will Be Deterrent of War

Broadened use of magnesium in the civilian economy after the war will have a strong deterrent effect on a third World War, E. W. Rouse, chairman, Revere Copper & Brass Inc., New York, asserted at a meeting of the Magnesium Association recently at Cleveland.

Presenting a report of the association's postwar planning committee of which he is chairman, Mr. Rouse pointed out that the present war is one of motion, strongly emphasizing the use of planes, rockets and other high-speed devices, as will be any succeeding conflict.

"Magnesium is essentially the metal of motion because of its levity, and when other nations see that America is supreme in its application of magnesium to the war machine, they will hesitate to enter into another war with us," Mr. Rouse predicted.

N. H. Simpson, chief chemist, Consolidated Vultee Aircraft Corp., San Diego, Calif., discussed the importance of magnesium in improving household furnishings.

The meeting was opened by Edward S. Christiansen, president, Magnesium Co. of America Inc., Chicago. Other speakers were W. S. Loose, metallurgical department, Dow Chemical Co., Midland, Mich., and R. T. Wood, chief metallurgist, American Magnesium Corp., Cleveland.

Predicts Steel Will Relieve House Shortage

Industry executive says welding and use of light steel plates will be major developments in housing program

STEEL will help to relieve the most acute housing shortage in the history of the United States, Bennett Chapple, assistant to the president, American Rolling Mill Co., Middletown, O., predicted at a conference of the Middle Atlantic Lumbermen's Association recently at Atlantic City, N. J.

The main postwar need, Mr. Chapple said, will be low-cost but not shoddy housing.

Contributing to the housing shortage, he said, are 6,600,000 marriages in the last four years, a million more than normal.

Welding and the use of light steel plates developed during the war will be major developments in the nation's postwar housing program, Mr. Chapple predicted.

"Steel looks to the building industry as a major outlet in the postwar period. Because of war needs, new light steel plates have been developed that represent 50 per cent of our present steel plate production. We have advanced further in the last three years than in a previous lifetime," he asserted.

"The wider use of steel in home construction means that to the hammer and saw must be added another tool, the arc welding machine."

He called stainless steel the "fair-haired child" of new building developments and predicted extensive use of porcelain enamel steel and aluminized steel sheets.

New engineering developments and practices are discussed by experts at meetings at Sharon and East Pittsburgh, Pa., plants of Westinghouse Electric & Mfg. Co. for its engineers from district offices

WING TIPS

Aircraft standardization activity, spurred by wartime developments, still has broad future to be explored. Managements must be sold on the necessity for continuation and expansion of program

By Arthur Nutt*

ABOUT four years ago when the aircraft industry was faced with the colossal job of producing astronomical numbers of aircraft and their component parts almost immediately the weakness of the industry on standardization, in almost every form, began to be realized. The builders of the airplanes had depended for years on Army-Navy standards and specifications. These standards and specifications were originally set up for procurement purposes to protect the government in its competitive bidding system and were not designed to accelerate production or to create standards for simplification primarily although some attainment in this direction was achieved.

Needless to say the existence of these government specifications was a lifesaver to the airplane industry and the nation because of the lack of better and more applicable specifications, but without question this war and production job has revealed the necessity for better organization and planning for the future.

Industry soon saw the need for pooling the supply of tools and dies with the inevitable result that a maze of avenues for standardization was opened up to those responsible for production, avenues which had always been there but which appeared to industry apparently in the past to be blind alleys or useless byways. What time savers and short cuts these avenues would have been had they been discovered and had they been explored fully before the emergency! Money invested in industry standards before the war would have saved millions of dollars in man-hours and time.

Another chapter in history will be written after the war about the air transportation job which has been performed by the airlines and the armed forces. This history will reveal the extent of this activity and will show the possibilities for future development of commercial airlines. The importance of detail standardization cannot be overemphasized as applied to world-wide operation. A reduction in the number of different parts to be stocked for maintenance is essential for both military and commercial operations. It is hoped that this nation has learned a lesson from the lack of preparedness experienced in this war. With oceans shrinking each year as a result of air transportation the need for continued military development in the aircraft field is apparent.

It is obvious to those who have been engaged in aircraft standardization work over a good many years that the one thing lacking is standardization of the standardizing body. However, realizing the impossibility of getting even one industry united in its effort, the compromise by some of the more far-seeing men in the government agencies concerned with this problem was to allocate certain types of standardizing to the various groups available. The standardization of aircraft structural components, hardware, power plant installation and accessory and equipment installation was assigned to the National Aircraft Standards Committee, a group sponsored by the Aeronautical Chamber of Commerce of America.

The design and dimensional standardization of aircraft engines, propellers, accessories and equipment, and the materials and processes used in these items and in the airframe was assigned to the Society of Automotive Engineers. There are 72 SAE committees and subcommittees working on aeronautical standards of all kinds, including advice to the armed forces on government standards when requested to do so. These committees cover so many different items that they are too numerous to list. The aeronautics division of the SAE general standards committee has been authorized by the SAE council to expand its activities into the sponsorship of research and special investigations which may lead to eventual practices or standards. Members on these committees are picked for their technical knowledge of the subject rather than for their company connection. There are those who feel this system is not correct as the man might have a tendency to be too academic in his selection of a standard.

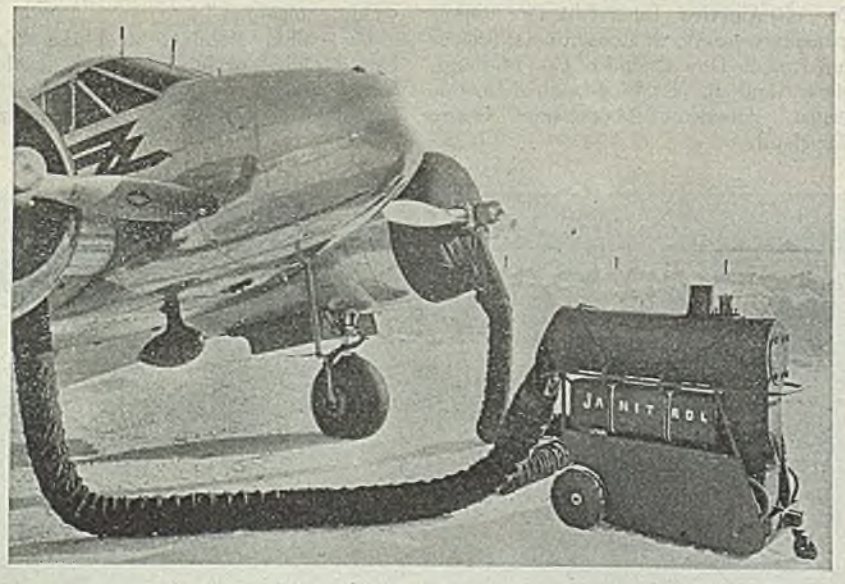
Developed by Practical Experts

However, standards are not made by long-haired professors without industrial experience but by hard working practical experienced engineers and metallurgists with the expert knowledge of the designers' and manufacturers' problems ever present. Too much praise cannot be given to these men who have given of their time and effort far beyond the requirements of their jobs to see that a thorough and conscientious job was performed on these standards.

No standard promulgated by SAE is compulsory. In fact so-called mandatory standards for the most part do not work. Voluntary standards as dictated by practical and economic conditions are the only real standards in the final analysis. Any attempted standard which has not considered all the important aspects is doomed to an early death if it ever lives.

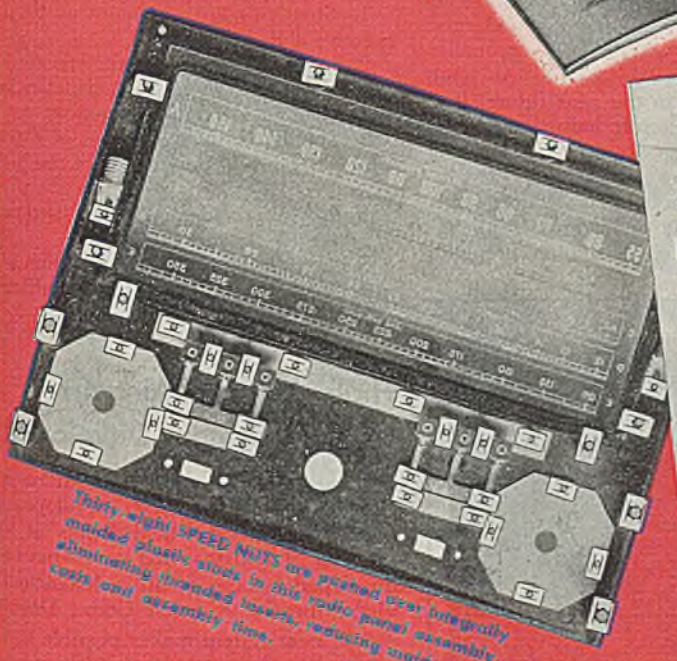
Before and during the war there has been continued co-operation between government agencies and industry on standardization. The government realizes that there are many technical experts in the design and manufacturing fields who can give valuable advice to them in the writing of their procurement specifications. This co-operation results in the creation of government specifications which more nearly meet the requirements of the product and are more practical and economical within the limitations of

*From the vantage point of 28 years' experience in the aircraft engine manufacturing industry, Mr. Nutt is well qualified to review the importance of standardization. He is director of engineering for the Aircraft Engine Division, Packard Motor Car Co., Toledo, O., and the accompanying remarks are digested from a recent presentation before the Society of Automotive Engineers.

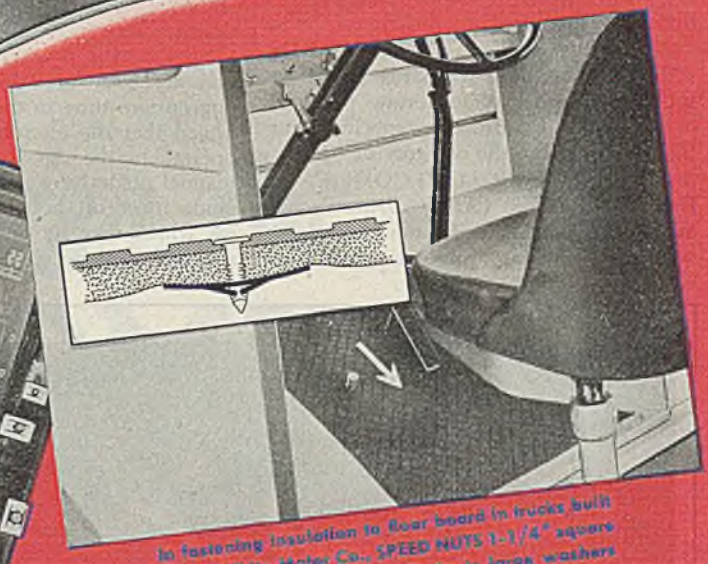


HEAT'S ON: Arctic-like weather made preheating of airplanes advisable at Toledo, O., airport, and so this portable heater of a type used by Army Air Forces was borrowed from Surface Combustion Corp., Toledo, which developed the unit for wartime aviation, and is heating engine nacelle and cabin simultaneously.

THE NUT THAT *Locks* ON UNTHREADED STUDS!



Thirty-eight SPEED NUTS are pushed over integrally molded plastic studs in this radio panel assembly, eliminating threaded inserts, reducing mold costs and assembly time.



In fastening insulation to floor board in trucks built by the White Motor Co., SPEED NUTS 1-1/4" square pushed over No. 11 nails eliminate large washers or retaining strips.

THE BASIC PRINCIPLE
of Spring-Tension Lock is
Embodied in all Speed Nut Designs

● Just a push and it locks! It's just as simple and easy as that! For this unique spring steel fastener needs only to be *pushed* over rivets, nails, tubing, wire, integral die cast or plastic studs to lock parts firmly together. Threads are unnecessary because the spring prongs of the nut provide a friction *lock* on even the smoothest of chrome surfaces.

But easy attachment is not the only advantage gained by using Push-On type SPEED NUTS. Costly threaded inserts, drilling and tapping are eliminated—molding costs reduced—assembly speeded up—and vibration loosening prevented. These fasteners are available in many sizes and shapes . . . rectangular, square, round, or they may be specially designed to fit your particular requirements.

If you want to improve the attachment of name plates, emblems, trim strips, grilles, or other light-weight parts, write now for samples of Push-On type SPEED NUTS, giving *stud diameter* and any other pertinent assembly details.

TINNERMAN PRODUCTS, INC.
FULTON ROAD, CLEVELAND 13, OHIO

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London

Speed Nuts PATENTED

* Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

government rules and regulations, which are very necessary.

Specifically, SAE has built its standardization activities on the policy that the society should be equipped to (1) sponsor the development of industry standards and specifications and (2) advise on technical problems of broad industrial concern.

In carrying on this activity, industry has found a need for the following types of standardization:

1. AERONAUTICAL MATERIAL SPECIFICATIONS (AMS)—This identification is used for standard specifications for materials and processes conforming with currently established engineering practice.

2. AERONAUTICAL STANDARDS (AS)—Dimensional standards based on sound established engineering practice, or for other performance specifications that do not fall in the category of AMS.

3. AERONAUTICAL RECOMMENDED PRACTICES (ARP)—Dimensional and performance specifications based on sound engineering principles and intended as guides towards standard engineering practice.

4. AERONAUTICAL INFORMATION REPORTS (AIR)—Engineering data, usually bearing a close relationship to Aeronautical Standards or Aeronautical Recommended Practices, that are of sufficient value to warrant publication, but whose nature does not warrant their classification as recommended practices.

The "Manual of Aircraft Engine Drafting Room Practice," developed through the co-operation of the aircraft engine manufacturers, may be considered in the category of the Aeronautical Standards, even though it is based on the standardization of drafting room practices. This drafting room manual is being enlarged to include the practices of the propeller and accessory manufacturers. At some appropriate time in the near future, it is hoped that the aircraft industry will cooperate in the development of a single manual of drafting room practices, to include those of the airplane manufacturers which may be different in some respects than those of the engine, propeller and various accessory manufacturers.

Rapid strides have been made in standardization in the last three or four years. But the field is only scratched. The progress which has been made is a credit to the men actively engaged in the work and to the foresight of the financial supporters. As a professional engineer, every person should do his part in selling his management the fact that activity on standardization should continue on the same scale as or greater than during the war.

It has always been my strong belief that the success of standardization can be achieved only by selling management on the necessity of:

1. Standardizing agencies in the respective industries.

2. Standardizing under the sponsorship of professional engineering societies free from political or trade influences.

3. Standardizing by groups of experts who will consider all phases of the problems.

4. Providing standards to be used on a voluntary basis only.

5. Continuing to give the program adequate support by furnishing sufficient technical experts and finances.

EYE OF THE ARMY: A 24-inch vertical cone camera is installed in the camera mount of a photo-reconnaissance version of North American Aviation's P-51 Mustang, the only single-seater which can carry its full load of machine guns and bombs on such missions. The Army Air Forces identifies the airplane as the F-6

High Altitude Aircraft Ignition System Developed

New low-tension aircraft ignition system—one of the first developments toward making practical flights at altitudes of 50,000 feet and over—has been developed by the Scintilla Magneto Division, Bendix Aviation Corp., Detroit.

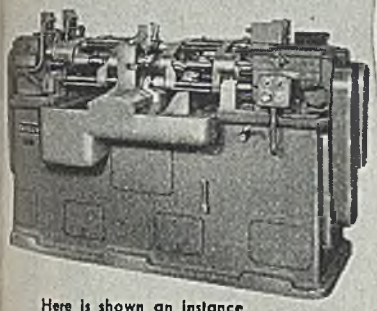
The new system makes possible higher voltage sparks at the spark plugs while replacing a high tension current of more than 12,000 volts with a low tension current of comparatively few hundred volts. It makes possible efficient operation at higher altitudes than ever before, easier control of the electric current, less interference to radio reception, and greatly increased resistance to moisture and other atmospheric conditions, the announcement revealed. Low tension ignition is expected to find wide use in aircraft of the larger types.

Manhour Savings Reflected In Lowered Plane Costs

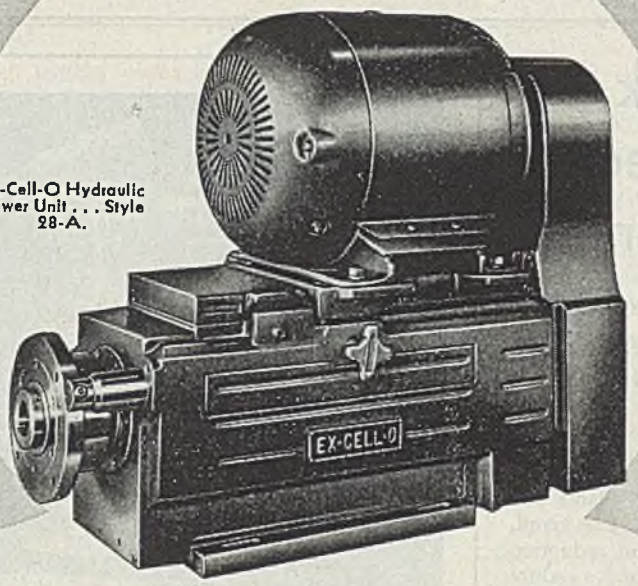
How aviation manufacturing costs have been progressively lowered is shown strikingly in a report from Republic Aviation Corp., Farmingdale, N. Y., noting the cost of producing a P-47 single-engine Thunderbolt fighter airplane had dropped from $68,750 in 1942 to $45,600 as of last fall. Principal explanation for the reduction lies in the savings effected in man-hour requirements—22,927 per ship in 1942, and 6290 when the 10,000th plane was completed last September. Cost reductions since first orders were received are estimated to have resulted in overall saving of more than $100 million.

XLO

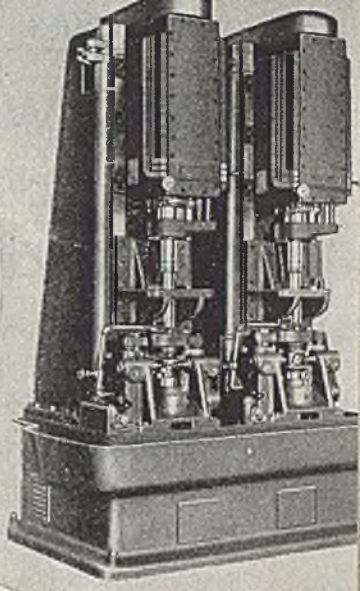
EX-CELL-O *for* PRECISION



Here is shown an instance where the Ex-Cell-O Small Hydraulic Unit (Style 21) is used on a machine for the accurate drilling of holes in oil pump bodies.



Ex-Cell-O Hydraulic Power Unit . . . Style 28-A.



On this Ex-Cell-O double drill press, two Style 25-A Ex-Cell-O Hydraulic Units are mounted on the columns in vertical position. This has definite advantages on certain classes of work.

Design for

ECONOMICAL PRODUCTION!

Production Machines equipped with Ex-Cell-O Hydraulic Units have numerous advantages

For the machine you build, or the machine we build, the use of Ex-Cell-O Hydraulic Power Units provides these features:

They are compact, for proper design.
They are self-contained, for ease in installation.
They have infinite feeds, for proper cutting.
They have gear change, for proper speeds.
They have ample power, for multiple-head operation.
They have variable stroke, for greater flexibility.

Ex-Cell-O Hydraulic Power Units are standard and produced in quantities, but in nearly every case where the unit is used it becomes a part of a special, high production type machine for a specific operation. These units are economical because, as applications change, the units can become a part of the new machine even though entire base is redesigned.

The units can be mounted on any plane—horizontally, vertically, or angularly—on a temporary or a permanent base, and they can be arranged so that it is possible to use them in connection with guide bars and multiple drill heads.

Find out today how Ex-Cell-O Special Machines and Ex-Cell-O Hydraulic Power Units can fit your program for today's and tomorrow's production.

Where high production, accuracy, and economy through multiple operations are required—consult EX-CELL-O now

EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

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

Safety Work by Republic Steel Cuts Accidents

Severity rate is reduced 46.4 per cent and frequency rate is cut 20.03 per cent in 1944, company reports

INTENSIFIED safety work and improved working conditions in plants and mines of Republic Steel Corp., Cleveland, brought about a 46.4 per cent reduction in the accident severity rate and a reduction of 20.03 per cent in the accident frequency rate in 1944, according to C. M. White, vice president in charge of operations.

Leaders in the company's 1944 safety competition, in which all plants and mines participated, were also announced.

First place in the Steel Plant group was won by the Warren district, Warren, O., with a severity rate of .93 and a frequency rate of 3.34.

The Berger Mfg. Division, Canton, O., took first honors in the manufacturing divisions, with a record of no accidents, and a greater number of man-hours worked, while the Southern Coal Mine Division, Birmingham, Ala., ranked first in the coal mining operations. The Northern Ore Mines, Duluth, won top honors in the Ore Mine group.

Republic Safety Awards, emblematic of the corporation's slogan, "Production with Safety," will be presented each of these leaders.

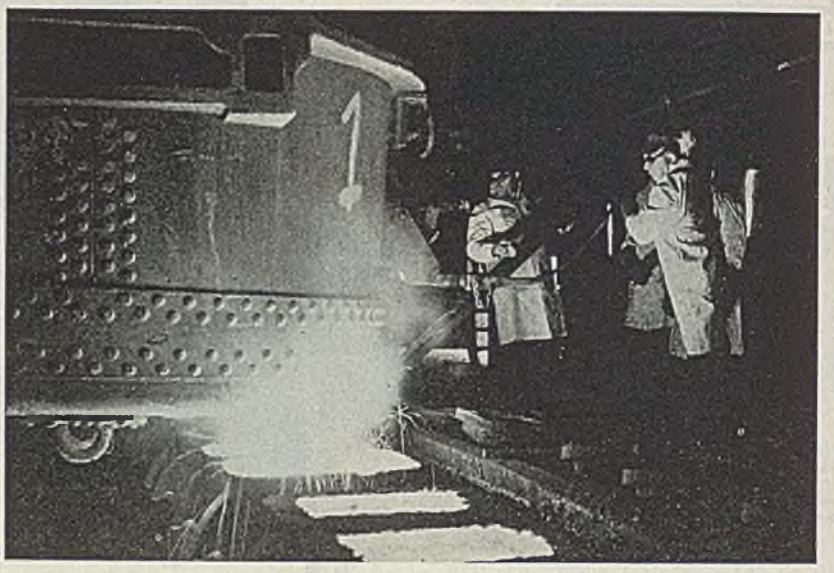
Recognition was also given the seven individual plants and mines in Republic Steel which operated during the entire year without a lost-time accident. These operations to be honored are: Bolt and Nut Division, Gadsden, Ala.; St. Paul-Day Ore Mine, Keewatin, Minn.; Lake Erie Limestone Co., Hillsville, Pa.; Truscon Steel Co., Gadsden, Ala.; Warehouse Division, Youngstown, O.; Culvert Division, Canton; and the Truscon Erection Division, Youngstown, O.

All awards will be presented during ceremonies, the dates of which will be announced later.

Contracts for Amphibious Tanks Awarded by Navy

Two new contracts totaling $32,677,950 for production of "Water Buffalo" amphibious tanks have been signed by the Navy Department and Food Machinery Corp., San Jose, Calif.

These contracts extend the "Water Buffalo" program through September, 1945, at the present rate of production in the corporation's plants at San Jose and Riverside, Calif., and Lakeland, Fla. They bring the firm's backlog of unfilled orders to more than $207 million.



70 MILLIONTH TON: At Clairton Works, Carnegie-Illinois Steel Corp., the 70 millionth ton of steel produced by this United States Steel Corp. subsidiary since Pearl Harbor is teemed into an ingot mold

BRIEFS . . . .

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

Cincinnati Milling Machine Co., Cincinnati, and Cincinnati Grinders Inc., are serving their customers in the Baltimore and Washington territories through their sales subsidiary, Cincinnati Milling & Grinding Machines Inc., with an office in the Washington building, Washington.

—o—

American Car & Foundry Co., New York, has received additional orders for especially designed hospital cars, 50 each for the Navy and Army.

—o—

Hewitt Rubber Corp., Buffalo, announced its expansion program will permit increased production of conveyor belts, transmission belts, and many types of industrial hose. The company will enter the field of latex foam and molded rubber articles for industry.

—o—

Mall Tool Co., Chicago, has been given a fourth Army-Navy "E" award.

—o—

Detroit Mold Engineering Co. has moved its general offices to its recently-expanded factory, 6686 East McNichols road, Detroit.

—o—

American Meter Co. recently honored 56 employes who have been with its D. McDonald & Co. Works, Albany, N. Y., 25 or more years.

—o—

General Electric Co., Schenectady, N. Y., announced that five of its diesel-electric locomotives, ranging in size from 44 to 80 tons, are operating almost 24 hours daily, seven days a week, at the U. S. Naval Supply Depot, Oakland, Calif.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, has available free of charge a color sound film of the construction of the Alaskan highway.

—o—

Super Tool Co., Detroit, has acquired the "Cal-Cutter" line of standard and special carbide tipped milling cutters formerly manufactured in Los Angeles.

—o—

Bendix Radio Division, Baltimore, of Bendix Aviation Corp. has appointed the Florida Radio & Appliance Corp., Miami, as distributor for Florida, except the extreme northwest portion, and the Kelly How Thomson Co., Duluth, as distributor for Minnesota, North Dakota, Montana, northern Wyoming, western Wisconsin, northwestern Michigan, and western South Dakota.

—o—

Detroit Tap & Tool Co., Detroit, reports a rapid and consistent gain in demand by industry for standardized thread milling cutters produced from standard blanks carried in stock.

—o—

Acheson Colloids Corp., Port Huron, Mich., has developed a number of new dispersions of dag colloidal graphite in various fluids.

—o—

Detroit Diesel Engine Division, General Motors Corp., is now set up with its own engineering, distribution and maintenance departments to meet direct-

ly the need of diesel engines for essential marine uses, the division's business relationship with its distributor, Gray Marine Motor Co., Detroit, having expired.

—o—

National Association of Manufacturers, New York, has issued a booklet, "Get Set To Sell," a top management view of postwar distribution planning and organization.

—o—

Maryland Precision Instrument & Optical Co., Baltimore, has moved from 3 N. Carey street to 1232 W. Baltimore street where it is completing a department for the production of special instruments for the Signal Corps.

—o—

Standard Wholesale Phosphate & Acid Works Inc., Baltimore, has completed a new sulphuric acid contact plant with a daily capacity of 300 tons of oleum.

—o—

Kennedy Corp., Baltimore, has been acquired by McConway & Torley Corp., Pittsburgh, producer of railroad and other castings. Arthur L. Byrd is the new president of the Kennedy Corp.

—o—

Conlan Electric Corp., Brooklyn, N. Y., has acquired a three-story building at 117 South street, Baltimore, into which it is moving from smaller quarters at 300 Water street, Baltimore.

—o—

Continental Can Co., New York, has voted to acquire the plants, assets, business and war contracts of the Owens-Illinois Can Co., Baltimore, a subsidiary of Owens-Illinois Glass Co., Toledo, O.

—o—

Bodin Electric Co., Chicago, has broken ground for a two-story addition which will enlarge its present capacity by 50 per cent for production of fractional horsepower motors.

—o—

United States Rubber Co., New York, is producing a flexible hydraulic hose, braided with wire, that sends out a stream of water powerful enough to rip bark off a log.

—o—

Whiting Corp., Harvey, Ill., announces appointment of Mullaney & Campbell, Seattle, as its exclusive sales representative in the Seattle territory.

—o—

Shaw Sales & Service Co., Los Angeles, has been appointed distributor for Marion Steam Shovel Co., Marion, O., in southern California and parts of Nevada and Arizona.

—o—

Surface Combustion, Toledo, O., has purchased the building adjacent to its Columbus, O., factory in preparation for substantial increases in postwar employment and production on heating equipment.

—o—

Industries Counsel Associates Inc., New York, has been organized to service industry in the fields of public relations, engineering analyses of plant facilities, market research, product research and design, development of sales and distribution systems, and labor relations, with offices at 280 Madison avenue, New York.

—o—

Precision Steel Warehouse Inc., Chicago, announces that its new location is at 4409-4425 W. Kinzie street, Chicago.

—o—

National Bureau of Standards, Washington, reports printed copies of simplified practice recomendation R6-44, files and rasps, are now available.

—o—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has announced that it has found methods for plating beryllium and tantalum from fused bath salts.

—o—

Jones & Laughlin Steel Corp., Pittsburgh, announces contract renegotiation for the calendar year 1943 has been completed and that it has been determined no excessive profits were realized for the year.

—o—

The Chicago, Burlington & Quincy railroad is preparing to install radio communications to direct switching operations in its Chicago and other large yard terminals.

—o—

The Enamelist, Cleveland, has issued a booklet, "Refresher Course in Porcelain Enameling," edited by J. E. Hansen, service director of Ferro Enamel Corp., Cleveland, and editor of *The Enamelist.*

—o—

American Bosch Corp., Springfield, Mass., is constructing a test laboratory for diesel engine and carburetor parts, under a Defense Plant Corp. authorization of $500,000. With equipment the unit will cost approximately $1,000,000.

—o—

Graham-Paige Motors Corp., Detroit, has produced its 1000th "Alligator," an amphibious tank, and has completed new assembly lines and expanded facilities to double production of the vehicle.

—o—

The United States Bureau of Mines at its Boulder City, Nev., plant is producing high grade chromium from California chrome ore and is converting California manganese ore into almost pure manganese.

—o—

General Motors Corp. will award $55,000 in prizes in an architectural competition for design of automobile dealers' places of business. Entrants are to register with the *Architectural Forum,* 350 Fifth avenue, New York 1.

—o—

Electric Machinery Mfg. Co., Minneapolis, has announced that its "R" Division has received the Maritime Commission's "M" award for producing marine motors.

—o—

Crosley Corp., Cincinnati, has appointed the following as distributors: Legum Distributing Co. of Baltimore, for Maryland and parts of West Virginia, Virginia, and Delaware; the Modern Distributing Co., Cincinnati, for Cincinnati, southern Ohio, northern Kentucky, and southeastern Indiana; Joseph E. Vaughn, El Paso, Tex., for western Texas and most of New Mexico; and Norman-Young Appliance Co., Dallas, Tex., for northeastern Texas.

AWARDS . . . .

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

The already long list of firms which have won the coveted Army-Navy "E" award for excellence in manufacture of war materials has been lengthened by addition of the following:

Adam Black & Sons Inc., Jersey City, N. J.

American Stove Co., George M. Clark & Co. Division, Harvey, Ill.

Capital Machine & Welding Works, Sacramento, Calif.

W. R. Case & Sons Cutlery Co., Bradford, Pa.

Caterpillar Tractor Co., San Leandro plant, San Leandro, Calif.

Chrysler Corp., Amplex Division, Detroit.

Connors Steel Co., Birmingham, Ala.

Durasteel Co., Lindell plant, Hannibal, Mo.

General Motors Corp., Fisher Body Detroit Division, Ternstedt Mfg. Division, main plant, Division No. 3 and Plant No. 16, Detroit.

Hansen Machine Works, Sacramento, Calif.

Haynes Stellite Co., Kokomo, Ind.

Frank Holton & Co., Elkhorn, Wis.

Jamestown Metal Equipment Co. Inc., main plant and Blackstone plant, Jamestown, N. Y.

Kohler Co., Kohler, Wis.

Karl Lieberknecht Inc., Laureldale, Pa.

McGlynn, Hays & Co., Belleville, N. J.

Robert McNairn Machine Works, Sacramento, Calif.

Marathon Battery Co., Wausau, Wis.

Michigan Power Shovel Co., Benton Harbor plant, Benton Harbor, Mich.

John T. Lyman Co. Inc., Montclair, N. J.

The Ross Carrier Co., Benton Harbor plant, Benton Harbor, Mich.

Sparks-Withington Co., Plants No. 1, 2, 3, 4 and 5, Jackson, Mich.

Clark Equipment Co., Buchanan plant, Buchanan, Mich.

Dorsey Bros., Elba, Ala.

The General Tire & Rubber Co., Bluff and Union streets division, Akron, O.

The Mercury Mfg. Co., Chicago.

National Slug Rejectors Inc., St. Louis.

F. H. Nable & Co., Chicago.

Pacific Sound Equipment Co., Los Angeles.

United-Carr Fastener Corp., Aircraft Parts Division, Binney street plant, Cambridge, Mass.

Waltham Watch Co., Waltham, Mass.

Wiedemann Machine Co., Philadelphia.

The Wilcolator Co., Elizabeth, N. J.

L. A. Young Spring & Wire Corp., plant No. 1, Detroit.

Lagging War Programs Show Production Gains

PRODUCTION trend in lagging war programs has tended to advance in recent weeks and on the basis of present schedules will continue upward through the first half, barring early termination of the European conflict. Reflecting the constantly changing war requirements some programs recently have been revised upward, while others were reduced. Total war output is expected to hold relatively stable through the first half.

Encouraging increases were registered in petroleum production, revenue freight carloadings, bituminous coal output, engineering construction awards and truck assemblies during the latest week. Handicapped by growing manpower shortage, overtaxed production facilities and inadequate flow of coking coal and steel scrap to the mills, the steel industry is currently operating near the lowest levels of the war period. During the latest period the national steel rate declined one half point to 93.5 per cent of capacity.

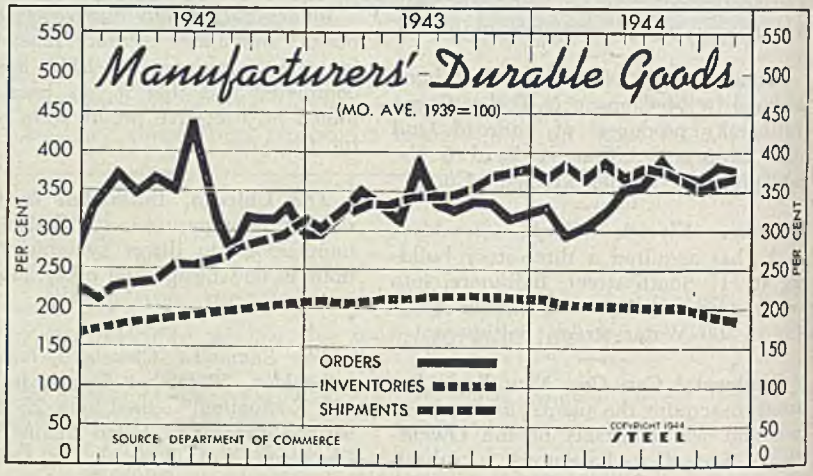
CONSTRUCTION—Preliminary estimates of new construction volume in the United States during 1945, based on the assumption war on both fronts will continue throughout the year, indicate an activity volume of $3,250,000,000. This would represent the lowest construction volume since 1935, would be equivalent to 82 per cent of the 1944 total and would be only 24 per cent of the construction peak reached in 1942.

Construction activity generated by purely military requirements is expected to be about one third less in 1945 than in 1944, both for industrial and non-industrial work. Activity in the construction categories for essential civilian and indirect war purposes this year will likely continue at about the 1944 rate.

MANUFACTURERS' SHIPMENTS — Mixed trends are discernible in the record of durable goods shipments over most of last year, in response to varying emphasis on particular parts of the war program. Shipments of the metal producing industries remained practically constant, while those of the electrical machinery and the automobile and equipment industries were definitely upward. Deliveries of the transportation equipment industry, other than automobiles, and machinery, other than electrical, dropped significantly during the year.

Manufacturers' inventories in November continued the declining trend which has been apparent since the beginning of last year, latest Department of Commerce figures show. However, this trend is believed to have been reversed throughout December and to date this month in line with the revised war production schedules developing out of the prolongation of the European war.

Value of new orders received by manufacturers in November was equal to the high October rate and exceeded the new business placed in the like 1943 month by about 15 per cent. A still further gain in orders is believed to have occurred during December and so far this month.



Index of Manufacturers' Durable Goods

(Mo. Ave. 1939 = 100)

	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	209.6
March	309.7	349.2	369	330	207.2	210.7
April	325.0	329.8	357	338	204.9	213.5
May	351.6	313.0	369	338	204.0	213.5
June	358.9	392.7	378	343	203.6	212.5
July	392.7	338.7	375	346	201.9	211.4
August	366.9	319.4	368	354	200.9	213.4
September	350.0	339.5	370	356	198.8	214.9
October	366.9	339.5	381	371	197.1	214.0
November	374.2	316.1	376	374	194.6	213.3
December	....	324.2	...	380	....	212.8
Average	....	332.3	...	339	....	212.7

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	93.5	94.0	96.0	99.0
Electric Power Distributed (million kilowatt hours)	4,588	4,614	4,617	4,532
Bituminous Coal Production (daily av.—1000 tons)	2,020	1,763	1,668	2,125
Petroleum Production (daily av.—1000 bbls.)	4,734	4,723	4,729	4,389
Construction Volume (ENR—unit $1,000,000)	$27.7	$22.9	$20.2	$25.5
Automobile and Truck Output (Ward's—number units)	20,720	19,830	21,100	19,000

*Dates on request.

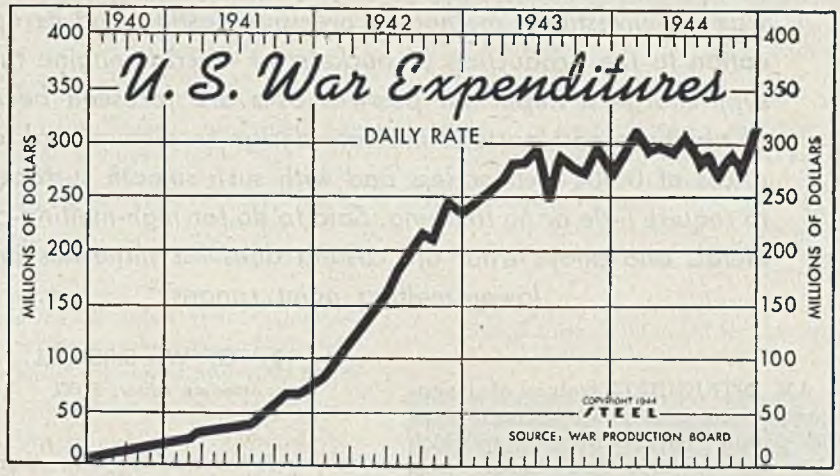
TRADE				
Freight Carloadings (unit—1000 cars)	785†	782	762	799
Business Failures (Dun & Bradstreet, number)	16	25	33	23
Money in Circulation (in millions of dollars)‡	$25,209	$25,257	$25,280	$20,408
Department Store Sales (change from like week a year ago)‡	+2%	+12%	+23%	−3%

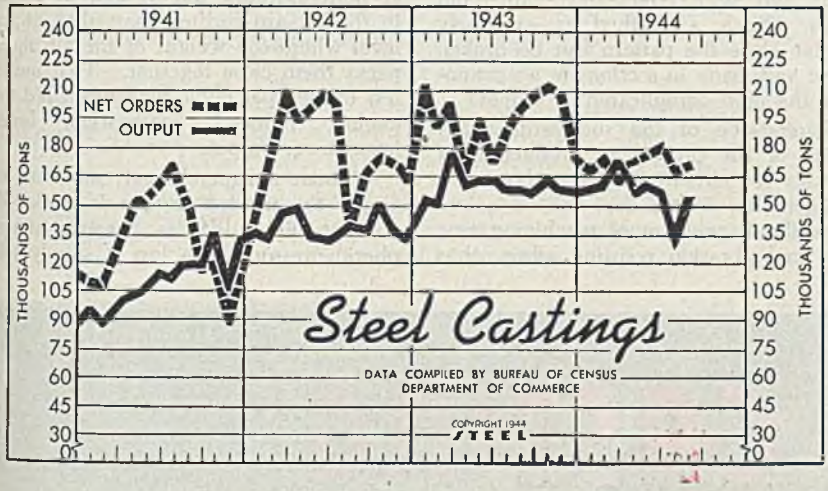
†Preliminary. ‡Federal Reserve Board.

War Expenditures

(millions)

	1944 Monthly Expenditures	1944 Daily Rate	1945 Monthly Expenditures	1945 Daily Rate
Jan.	$7,416	$285.2	$6,254	$240.5
Feb.	7,808	312.3	6,081	253.4
Mar.	7,948	294.4	7,112	263.4
Apr.	7,493	299.7	7,290	280.4
May	7,918	293.3	7,373	283.6
June	7,957	306.0	7,688	295.7
July	7,355	282.9	6,746	249.9
Aug.	7,798	288.8	7,529	289.6
Sept.	7,104	273.2	7,212	277.4
Oct.	7,447	286.4	7,105	273.3
Nov.	7,095	272.9	7,794	299.8
Dec.	7,835	313.4	6,951	267.3
Total	91,174	Ave. 292.2	Tt'l. 85,135	Ave. 272.9





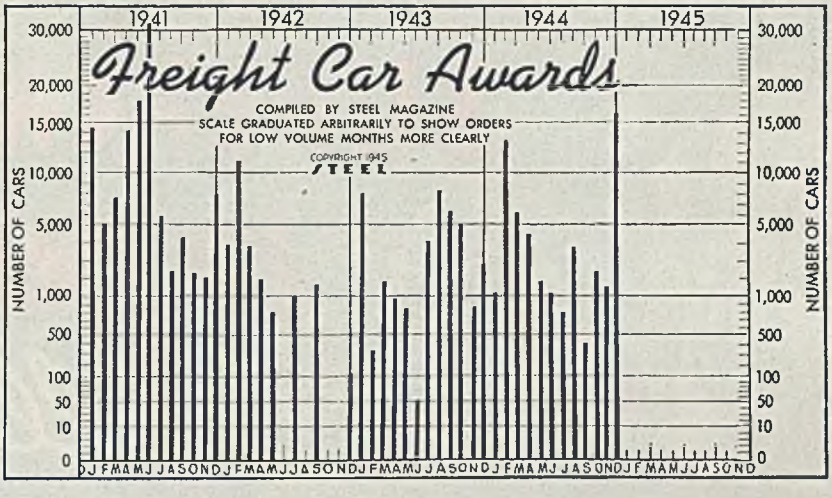
Commercial Steel Castings

(Net tons in thousands)

	Orders 1944	Orders 1943	Production 1944	Production 1943
Jan.	167.7	213.1	159.8	154.7
Feb.	173.6	191.2	161.4	151.5
Mar.	162.6	202.7	174.6	176.5
Apr.	175.1	165.8	155.8	161.4
May	177.0	192.5	161.8	163.8
June	181.8	171.8	157.4	163.9
July	169.9	187.3	131.9	158.8
Aug.	171.3	200.6	154.9	158.8
Sept.	....	214.1	....	157.8
Oct.	....	211.3	....	163.9
Nov.	....	209.3	....	158.8
Dec.	....	173.6	....	158.6
Total	....	2,333.4	....	1,928.6

Freight Car Awards

	1944	1943	1942	1941
Jan.	1,020	8,365	4,253	15,169
Feb.	13,240	350	11,725	5,508
March	6,510	1,935	4,080	8,074
April	4,519	1,000	2,125	14,645
May	1,952	870	822	18,630
June	1,150	50	0	32,749
July	795	4,190	1,025	6,459
Aug.	3,900	8,747	0	2,668
Sept.	400	6,820	1,863	4,470
Oct.	2,425	5,258	0	2,499
Nov.	1,065	870	0	2,222
Dec.	16,245	2,919	135	8,406
Total	53,221	41,355	26,028	121,499



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,371	$11,543	$12,517	$9,625
Federal Gross Debt (billions)	$233.1	$232.8	$231.4	$170.9
Bond Volume, NYSE (millions)	$68.7	$112.5	$61.8	$80.4
Stocks Sales, NYSE (thousands)	9,124	11,099	6,508	4,336
Loans and Investments (millions)†	$59.6	$59.9	$59.5	$49.5
United States Government Obligations Held (millions)†	$44,138	$44,323	$43,551	$36,044

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$56.73	$56.73
All Commodities†	104.7	104.6	104.4	103.0
Industrial Raw Materials†	115.6	115.4	115.1	112.3
Manufactured Products†	101.4	101.3	101.3	100.4

†Bureau of Labor's Index, 1926 = 100.

A significant wartime development is perfection of the "lost wax" or investment method of precision casting and its application to the production of buckets for aircraft engine turbo-superchargers. Important postwar uses are foreseen because of ability to cast parts of intricate design to dimensional tolerances of 0.001-inch or less and with such smooth surfaces as to require little or no finishing. Said to do for high-melting-point metals and alloys what die casting does for materials in the lower melting point ranges

By G. W. BIRDSALL
Associate Editor, STEEL

AN INTRIGUING feature of investment casting is that parts so made show no "parting" line, for the mold in which they are cast is a single solid piece. Parts are removed by breaking the mold away from them and their connecting gates and risers. In making the mold, no provision has to be made for removal of the pattern because the mold is made around a wax pattern which is subsequently melted out. The wax pattern, in turn, is made by assembling various sections cast in metal dies. Parting lines in the pattern are removed by cutting and trimming the wax pattern itself, as it is assembled with other patterns and with connecting gates and risers. Such a method is extremely flexible since the pattern can be broken down and made in sections to accommodate the most complicated of shapes.

Significance of the successful application of the process to production of buckets for aircraft engine turbo-superchargers lies in the fact that it solves the difficult problem of machining new heat and abrasion resisting alloys, thus permitting improvements in superchargers said to add another 5000 feet to the service ceiling of our fighting aircraft.

And the importance of the aircraft engine supercharger can be judged from the fact that it will raise the service ceiling from 25,000 to 40,000 feet—same plane, same engine—thus contributing heavily in giving our fighting aircraft the ability to outperform and outmaneuver the enemy at high altitudes.

One of the first turbo-superchargers, when tested in 1918 on Pike's Peak (elevation 14,109 feet), is reported to have raised the output of a Liberty engine from 230 to 356 horsepower. Normally rated 350 horsepower, the engine could only deliver a fraction of that value without the supercharger because at high altitudes the oxygen molecules in the air are further apart than at sea level where the weight of the air above packs them close together. That means less oxygen per cubic inch of air fed the engine, reduced combustion, lower horsepower output.

Without a supercharger, more air to supply the needed oxygen is not available at high altitudes because atmospheric pressure is so low it simply will

not push into the engine the air it requires. Thus the supercharger is one of the aircraft engine's most important accessories.

Superchargers are either driven directly from the engine through gears or indirectly by the engine exhaust operating a small turbine.

Today's demand for performance at still higher altitudes with still thinner oxygen supply is being met by use of two and even three-stage superchargers, first stage or stages being gear driven, followed by a turbo unit.

In 1917, the National Advisory Committee on Aeronautics called on General Electric Co. to develop a turbo-supercharger for aircraft. Early work helped to push the "ceiling" of fighting planes up from around 24,000 feet to over 40,000 feet. Present ceiling is still higher. Dr. S. A. Moss of G. E. has been responsible for much of the development work that has resulted in the General Electric turbo-supercharger, now widely employed by our air forces and being built in huge quantities by plants of Ford Motor Co. and Allis-Chalmers Mfg. Co. as well as G. E.

Like other superchargers, this unit employs a centrifugal compressor, a many-bladed fan or impeller sucking in raw air near the hub and whirling it at terrific speed against the diffuser, a stationary unit resembling a pinwheel that transforms the high velocity to pressure.

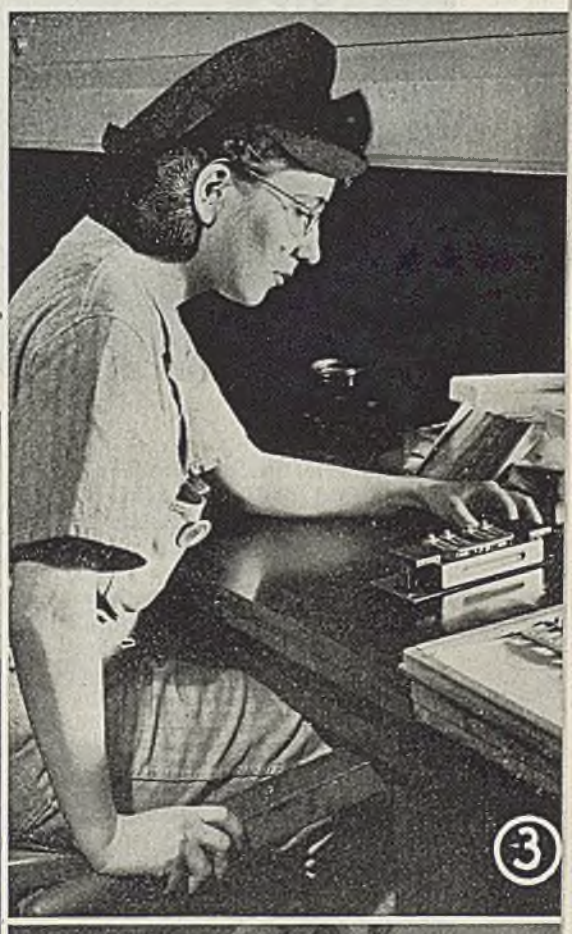
The impeller is driven by a direct connected turbine mounted on the same

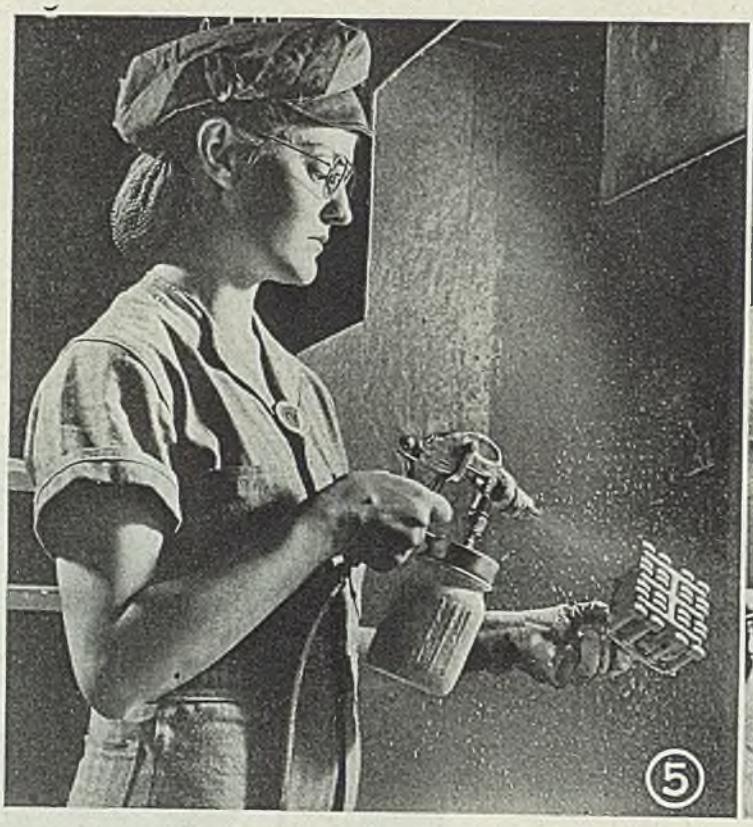
Fig. 1—One of early setups for molding four-bucket group of wax patterns. Hand operated hydraulic system exerts 10-tons pressure on mold which operator is shown inserting. Wax at 140 degrees Fahr. is inserted into mold under pressure of 65-85 p.s.i.

Fig. 2—Assembling bucket groups, runners, risers and sprue with crucible pouring head to make completed pattern for 24 buckets (six groups of four buckets). See Fig. 9 for details of assembly. Metal tool tips are heated in shielded gas flame for ease in working the wax. Note use of match plate for base to assure proper spacing

Fig. 3—Operator works lever connected to drive pins which move eight ejector pins in the mold to push wax pattern free. This is group of four buckets with connecting branch riser, see Fig. 9

Fig. 4—Any defective bucket patterns are cut from the riser and good ones substituted. Work is done on a match plate to assure proper dimensions and alignment of assembly





shaft. Between the two is an oil pump that lubricates the unit. A number of metallurgical problems are involved in such a unit where the compressor may be operating at 60 to 70 degrees Fahr. below zero with the turbine only a few inches away operating at the extremely high temperature of 1600 degrees Fahr.

This discussion will be confined to the turbine end of the unit and the practice employed by Allis-Chalmers engineers in manufacture of the turbine wheel buckets at the Allis-Chalmers supercharger plant, a unit built especially for this work a short distance from the main plant in Milwaukee.

This new plant is completely air conditioned including the foundry, welding and heat treating departments. It is a pleasure to work there, for ideal conditions are found throughout. Being a "blackout" plant, its fluorescent lighting system is operated 24 hours a day. White tile walls, cedar block flooring, convenient canteen service and the like, help account for the excellent attendance records here. More than 80 per cent of the workers are women.

Started in the spring of 1941 on ground formerly the farm where the famed "Billy" Mitchell was raised, construction was completed that fall and the plant was soon in full operation under the direction of Works Manager Fred Mackey and a staff of Allis-Chalmers engineers. In discussing production of the turbo-supercharger, Mr. Mackey pointed out some of the problems involved in manufacturing this unit:

Metallurgy Difficult: Operating speeds up to 25,000 r.p.m. as found in turbo-superchargers create enormous centrifugal forces in the turbine wheel and the turbine buckets. Not only must the turbine wheel and buckets be able to withstand these forces, which are calculated in tons, but they also are subjected to a number of other factors that greatly complicate the problem.

Possibly most important of these is the extremely high temperature of the exhaust gases and products of combustion employed to drive the turbine. Although there is a considerable temperature drop from the engine cylinder through the manifolds and entry vanes, gases striking the turbine blades are hot enough to raise its working temperature to around 1600 degrees Fahr.

Also the gases do not reach the turbine blades in a smooth continuous flow but in a series of closely spaced blasts. While they largely overlap to nearly approach a continuous flow, they tend to induce tremendous vibration and pulsation from the succession of pressure peaks.

The exhaust gases also are chemically corrosive. And the high flow speeds produce a mechanical erosive action as well.

Rigid Requirements: These factors require a turbine wheel of great mechanical strength to withstand the centrifugal forces, and this strength must be available at working temperatures up to 1600 degrees Fahr. Too, the structure must be stiff enough to resist vibration induced by exhaust gases, be corrosion resistant and have high surface hardness to avoid eroding.

Few metals or alloys possess this combination of characteristics, the hot strength requirement being the most difficult. It is met by going to that class of alloys embodying cobalt as the base, with chromium and molybdenum (or tungsten) as the other constituents. Stellite (44-55 per cent cobalt, 30-35 per cent chromium, 12-17 per cent tungsten) is one of these alloys well known for its high hardness at elevated temperatures.

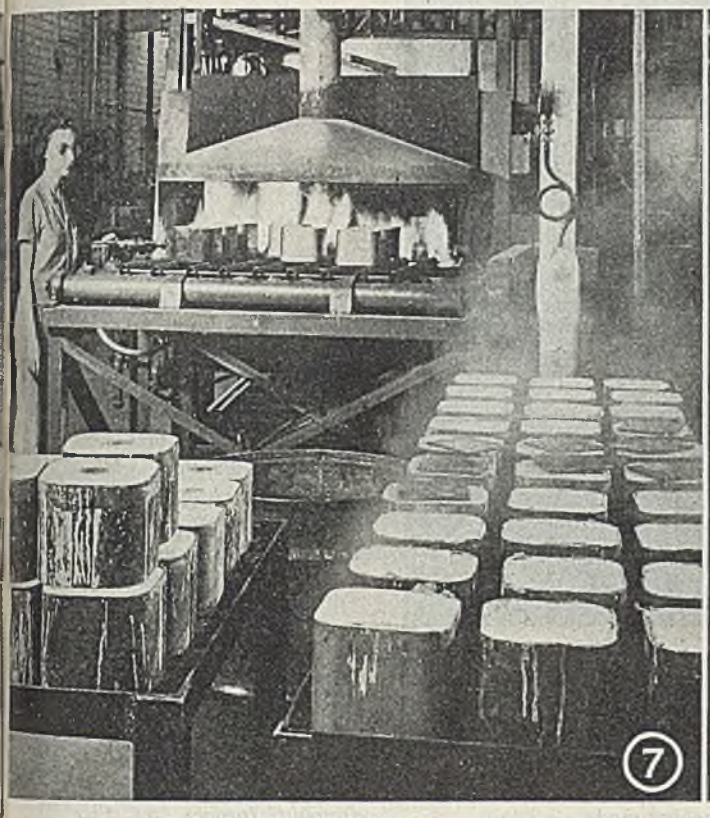
After using other materials, including Cyclops alloy 17W, buckets were cast from Vitallium, an alloy developed and patented by Austenal Laboratories, Inc., New York. It contains approximately 65 per cent cobalt with 30 per cent chromium and 5 per cent molybdenum. Melting point is about 2800 degrees Fahr.

At room temperature, Vitallium shows a tensile strength (ultimate) of some 100,000 p.s.i. with an elongation of 8-13 per cent. Yet at 1500 degrees Fahr., tensile strength is still more than 65,000 p.s.i. with elongation of 20 per cent.

Solves Machining Problem: The turbine wheel bucket is a small part, being only about ¼-inch thick, an inch wide and some 3 inches long (approximate values). However, it is an intricate shape in that the surfaces over which the exhaust gases flow are curved to a definite design. Too, the overall dimensions must be held rather closely in order to permit accurate assembly and mounting on the wheel.

Since Vitallium is extremely hard and can be machined only by use of abrasive wheels or belts, the method of manufacturing the buckets must minimize machining as far as possible. Thus a method that permits casting the buckets to the exact shape and size wanted within tolerances of 0.001-inch or less, is an extremely valuable aid in production of turbine wheels for superchargers.

Making Wax Patterns: The investment casting process starts with production of the wax patterns. Here we are describing practice as employed by Allis-Chalmers Supercharger Plant, Milwau-



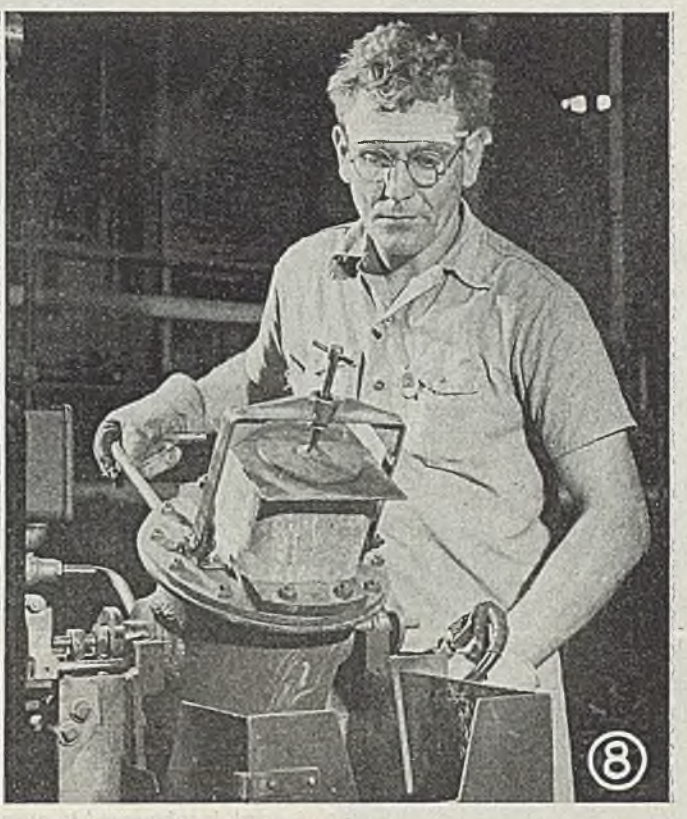


Fig. 5—Completely assembled pattern, seen here from bottom side, is dipped in a silica flour suspension and sprayed with extremely fine sand. After drying thoroughly, pattern is then mounted in flask or case

Fig. 6—Here case, with pattern mounted upside down and waxed to bottom plate, is being filled with the investment which is a mixture of finely ground refractories in a liquid binder

Fig. 7—After jogging investment to pack it against mold and letting investment harden, bottom plate is melted off, left, and flasks inverted over steam table, right, while wax pattern melts out. Molds then go through heating furnace at rear to vaporize remaining wax and preheat mold

Fig. 8—Accurately weighed charge of Vitallium is melted in individual electric arc furnace which tilts to pour into preheated mold clamped to top of furnace as shown here

Fig. 9—Here is diagram indicating arrangement of bucket groups, risers, runners and sprue assembled for the casting of 24 buckets

kee, in its use of the Austenal Microcast process, developed by Austenal Laboratories Inc., New York.

The special wax is made by mixing rosin, neutral wax, red bulk or vegetable wax, and Canuba wax from South America. Since the wax is melted out before casting, recovered wax is available. However, only new wax is used for the bucket patterns, the reclaimed wax being employed for sprues, runners, gates and risers.

The bucket patterns are molded in groups of four with individual risers and a common branch riser molded integral. See Fig. 9. Molding is done in soft metal die sets made from a steel "master" machined to the exact shape of the bucket, plus shrinkage allowance when that is necessary. Here no shrinkage allowance is required due to the small cross section of the bucket blade itself. A small wax plug is preplaced in the mold at the base end of each bucket. This acts to offset shrinkage of the wax as it cools in the mold. Molds last for months, there being very little wear on them even though they are made from a comparatively soft material.

Four-Bucket Groups: The group of four buckets is molded on setups that have been modified from time to time to improve the operation. Fig. 1 shows one such setup. Here the molds are clamped together under about 10 tons of pressure by the hand operated hydraulic system shown. Before being placed in the clamps, the dies are carefully cleaned, any wax stuck in the molds from previous use being removed by dissolving in carbon tetrachloride applied with a brush. Then a lubricating solution with a wetting agent is sprayed on the molds to facilitate the removal of the wax pattern from the mold.

After clamping in the fixture, wax is injected into the mold under a pressure of 65-85 p.s.i. The wax in the machine is kept at a temperature of 140 degrees Fahr. by automatically controlled electric heaters immersed in the material. Chamber holding the wax is lined with copper.

Molds Cooled: After injection of the wax, the molds are opened and the wax

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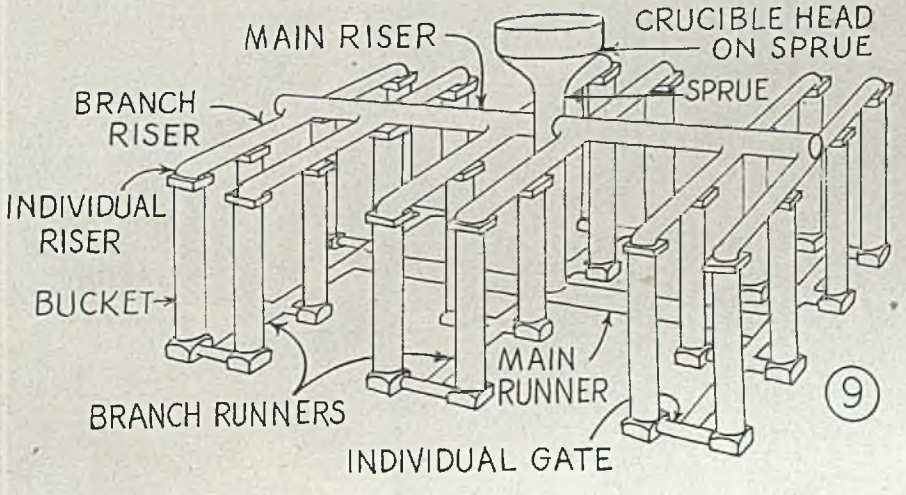

Heat

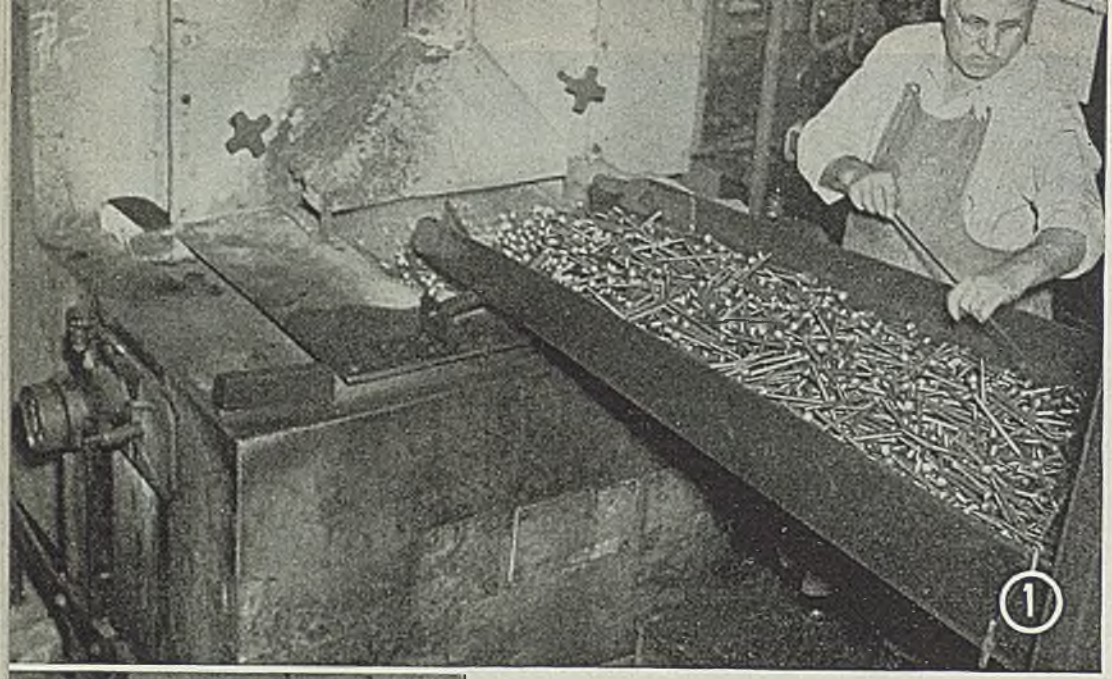

Fig. 1—Bolts enter the continuous chain-belt electric furnace for the first heat treating operation. Minimum supervision required because heat and reducing atmospheres are automatically controlled

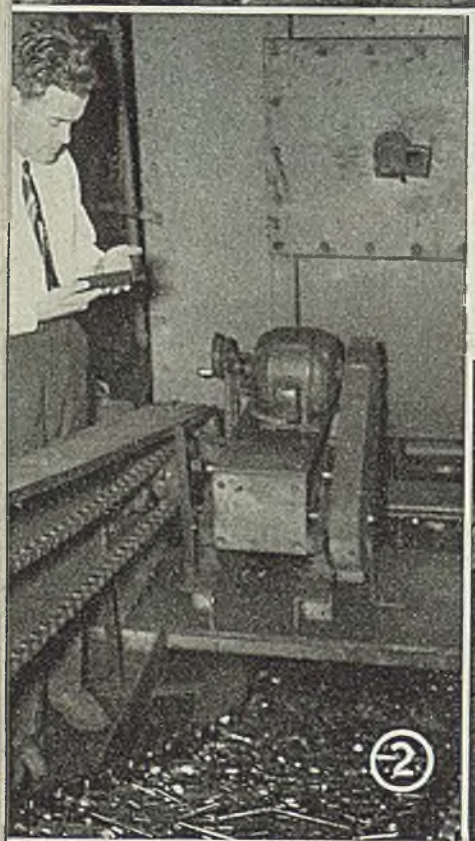

Fig. 2—Foreman inspects bolts as they emerge from quenching oil. Scaling of surface is prevented because work is submerged in quenching medium before being taken out of the controlled atmosphere

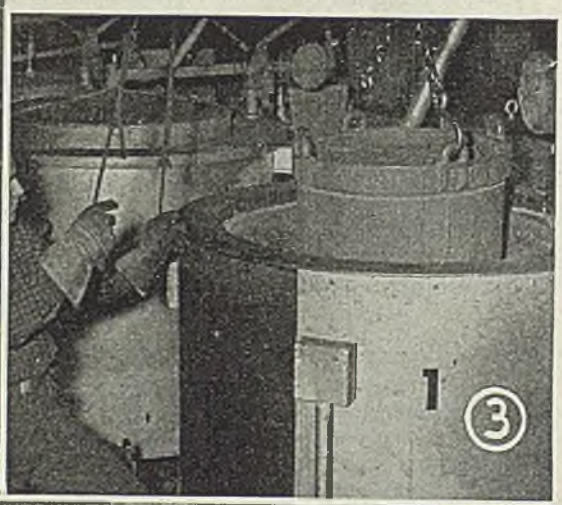

Fig. 3—Fasteners are removed from electric Homo drawing furnace of the dense-load type. Second operation in heat-treating cycle is performed at a predetermined temperature, usually 800 to 1000 degrees Fahr.

Fig. 4—Salt-bath installation consists of preheat, high heat and quenching pots and is operated so all types of high-speed steel can be satisfactorily hardened to any tooling requirement

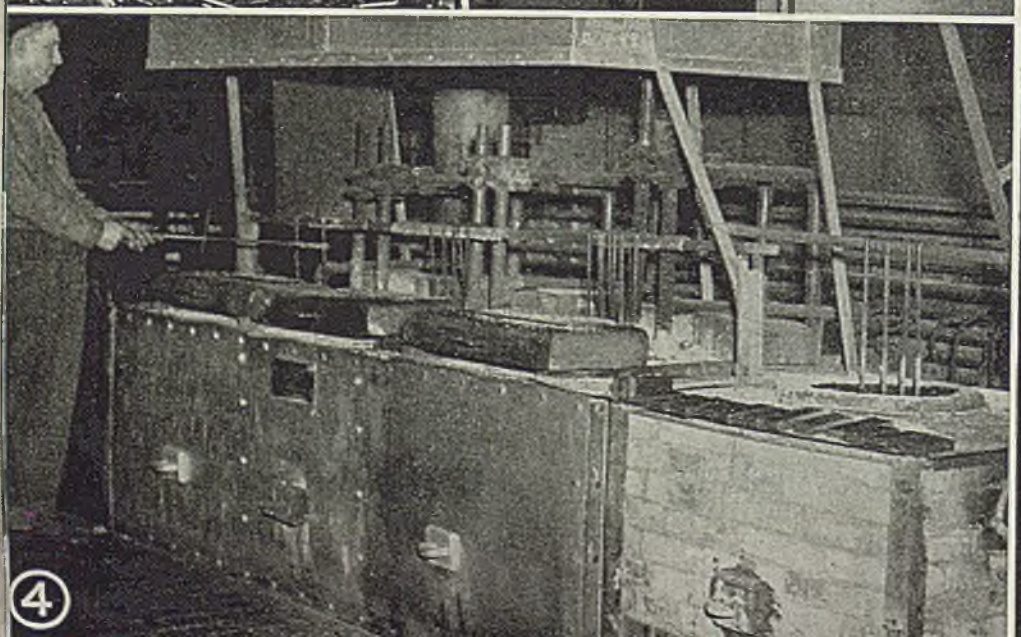

Fig. 5—Women inspect completed fasteners with two Magnaflux machines to detect cracks, seams, or other faults which may be present

Treating Fasteners

National Screw & Mfg. Co. uses continuous chain-belt electric and other types of furnaces in imparting desired physical characteristics to some 15,000 standard and 25,000 special types of bolts, cap screws, other fastening devices. Automatic temperature controls minimize individual attention to each furnace

WHEN mechanized equipment for the armed forces is assembled in the nation's war plants, it must be built to withstand the severe strain which battle conditions impose upon it. Bolts, nuts, rivets, screws and cotter pins which bind such equipment together must be able to resist the tremendous force of a plane's power dive, the "beating" a truck receives in hauling supplies and munitions across rough country, and the punishment a tank undergoes in plunging through heavy obstacles and over rugged terrain. Strength and ductility in fasteners is obtained only by heat treating them with the most meticulous methods.

At the plants of National Screw & Mfg. Co., Cleveland, many types of steel are used, including C-1038, carbon steel, and such alloys as 2330, 3135, 4140 and their equivalent NE steels. As the material is received, it is given a complete chemical analysis before it is fabricated. This aids in maintaining extremely accurate control during heat treatment. A chemical analysis test is taken on each heat of material and this analysis accompanies the stock through all fabrication operations. Reference to results of the pilot test helps to maintain the desired high quality and uniformity of all parts fabricated from a specific heat.

During the wartime emergency, National Screw & Mfg. Co. has fabricated about 15,000 standard items as well as 25,000 special items. These cover a complete range of fasteners for aircraft, Army, Navy and other ordnance material. Over 3000 machines are used to properly shape and form these items. When the machining or fabrication is complete, they are sent to the heat treating department so the necessary physical characteristics can be imparted to the steel.

The National Aircraft Standard close-tolerance bolt used on the B-29 Superfortress, for example, must pass through 20 different operations before it is ready for shipment. One of the most important of these is heat treating.

The items usually are delivered from the thread rolling department. These high quality fasteners are given what is commonly referred to as a double heat treatment. The material is heated uniformly above the critical range, oil quenched to impart strength and hardness, then reheated to a lower temperature and held for the required length of time, thus giving the metal the necessary toughness and ductility at some moderate sacrifice of hardness.

Minimum Supervision Required

First heat treating operation is performed in one of three identical, continuous chain-belt-type electric furnaces which are 22½ feet long, 6 feet wide and 10 feet high. Minimum supervision of the furnace is required because the heat and reducing atmosphere are controlled automatically. Only one worker is required to load the conveyor and maintain the furnace operation at maximum efficiency.

The exterior fabricated steel shell of the electric-conveyor continuous furnace is lined with suitable insulating material. The conveyor carries the material through a tunnel which heats the material to the required temperature. The entire conveyor belt is heated at all times to minimize the radiated heat loss. Because it is not subjected to extreme temperature changes, life of the conveyor belt is relatively long.

Heavy cast nickel-chromium grids, forming the electric heating elements, are divided into two sections and each half is regulated by a pyrometer, affording dual control of the furnace temperature.

Furnaces are heated by electric resistance heating elements with a connected load of 140 kilowatts. The charge or preheat end brings the temperature of the work to desired temperatures in about 15 to 20 minutes. The short heating-up time is possible because heat is conducted through conveyor belt to work, as well as being radiated from the top heating elements.

The work is held at temperature for about 20 minutes. Automatic control maintains furnace temperature to plus or minus 10 degrees Fahr. Most heat treating is performed at 1550 degrees Fahr. When special properties are to be obtained from certain heats of steel, the temperature can be varied from 1500 degrees to 1625 degrees Fahr.

A separate automatic temperature-control mechanism continuously maintains and records the heating of both the charge and discharge of the furnace. A meter is connected to the leads so the record of the power consumed may be available for cost references. These curves give the company a complete record of the operation of the furnace at all times and can be used for future reference.

The protective atmosphere eliminates the possibility of the formation of scale during the heating operations. It is also used to control the tendency toward surface decarburization which normally occurs. The atmosphere can be varied from one which will produce a small amount of decarburization to one which will add carbon to the surface of the steel. The atmosphere is maintained by burning measured quantities of natural gas and air in the presence of a suitable catalyst. The dew-point of the gas is lowered so moisture content or water vapor can be removed. This prepared gas is injected into the furnace through three openings.

The furnace design is of suitable construction in order that gas may be retained without any loss. At the discharge end of the conveyor the work is dropped through a sealed chute into the quenching oil. The excess gas atmosphere is permitted to burn as it escapes from the charging end of the furnace. Scaling of the surface of the fasteners is prevented because the work is submerged in a quenching medium before it is taken out of the controlled atmosphere.

Three separate atmosphere generators, one for each of the three electric belt

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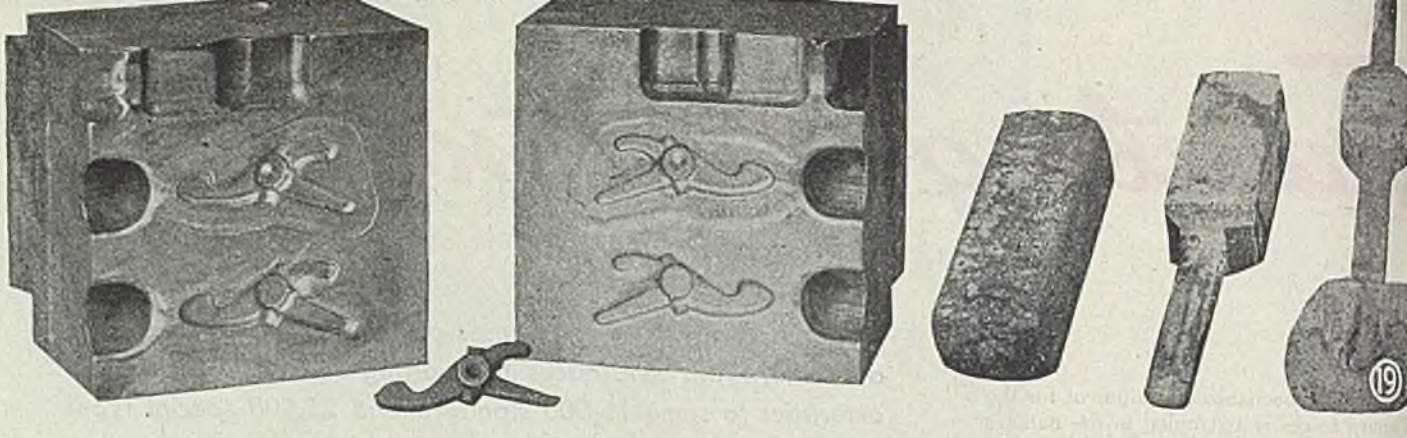

Recent Developments in FORGING PRACTICE

Second article in series presents data on tools and equipment for forging, individual steps followed and the effect of composition on forgeability. General Electric's five classifications of forgings will be discussed next week

By W. W DYRKACZ
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MODERN hammer forging equipment is in reality an outgrowth of the old blacksmith with his sledge hammer, anvil, and shaping tools. While the blacksmith still plays an active part in modern industry, practically all the production work is now done on power hammers.

In the power hammer, the *base* has been substituted for the blacksmith's anvil. The base on some of the larger hammers approaches 100 tons in weight and is mostly buried underground to serve as a firm foundation for the hammer. The *ram* takes the place of the blacksmith's sledge and is really a heavy weight which transmits the blow to the metal being forged.

The *dies* take the place of the special shaping tools the blacksmith sometimes uses. These may be either flat or have an impression machined to the shape of the article being forged. The lower die is locked into the base by means of keys and wedges, and the upper die is similarly affixed to the bottom of the ram.

The extent to which these dies can be matched and lined up determines to some extent the quality of the finished forging so far as shape and size are concerned. For drop forging work, perfect alignment is necessary and the ram is guided (by grooves in the sides of the hammer) along the entire path of its descent to the lower die.

Several different sources of power have replaced the manual labor of the blacksmith. Hammers are classed according to the type of device used for lifting the ram, i. e., steam, air, or board drop hammers. They are rated according to the combined weight of the ram and lifting device, e. g., the weight of the ram, piston rod and piston classifies the steam hammer as to size.

While the hammer and most of its stationary equipment is usually manufactured by large companies specializing in this type of product, it is the task of the forge shop to make the wide variety of intricate drop forging dies which are used. Most forging companies employ a staff of experienced tool and die makers for this work. The die maker's job calls for precision machining and grinding and requires very highly skilled workers. Also, the designing of the dies necessitates careful engineering technique.

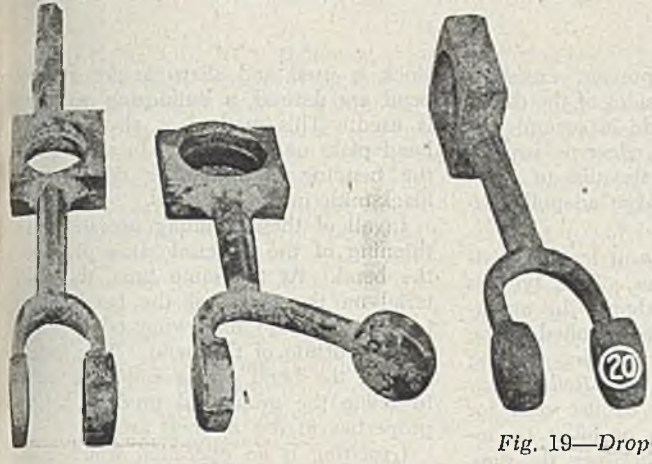
The blank die block is usually purchased from a concern specializing in the manufacturing of tool and die steels. Factors to be considered in selecting a die block include size, shape, and weight of the forging, and material from which the forging is to be made. The type of forging equipment being used must also be considered. Surface resistance between the hot metal and the die results in abrasion of the die material and, therefore, affects the choice of die blocks for any particular application. It depends upon the area of contact and upon the shape of the impression.

For the best combination of maximum abrasion and shock resistance, nickel-chromium-molybdenum die blocks in the oil quenched and tempered condition are superior for drop forging work. Vanadium is sometimes added to give a fine-grained dense structure. The proper heat treatment depends on operating conditions. The harder tempers are used where abrasion resistance is of primary importance, whereas the softer tempers are sometimes used for intricate dies with deep impressions to prevent checking.

The die steel is usually purchased in the annealed or soft condition to provide less difficulty in machining. However, in some cases, where it is possible that the semifinished die might be damaged in heat treatment, the die steel is purchased in a heat-treated condition hard enough for limited use and soft enough to allow machining work to be done.

On small dies, the entire die block is made of alloy die steel, while in the case of some of the large dies, the alloy die steel is used only as an insert while the body of the die block or "sow block" is made of carbon steel or of some material less expensive than the die steel itself.

After the part is properly designed as a forging, the contour is laid out in such a way that it will be well centered on the die block. The impression is then rough machined with the aid of a



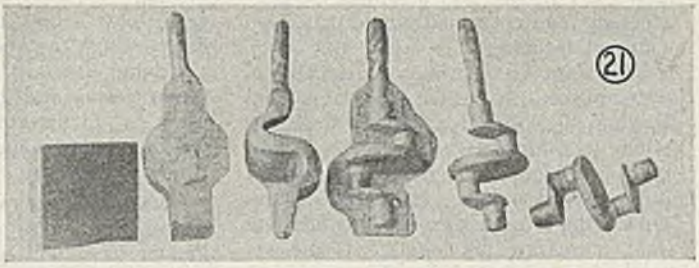


Fig. 21—Illustration of various steps in the forging of a small crankshaft

Fig. 19—Drop forge die used in making a catch for circuit breaker

Fig. 20—Marine engine connecting rod. From left to right, forging slug; tong hold drawn out; fullering of center and upsetting of end section; drop forged in die and hole punched; tong hold removed and bend performed, and final twisting operation

template. If the die is not in the heat-treated condition, it is hardened at this point. The final operation consists of grinding and polishing operation, such as buffing or hand stoning, to remove grinding marks. These operations call for extreme skill on the part of the die maker.

In production work, where large quantities of forgings are continually made to the same design, it is generally more economical to install duplicating equipment. In this case, a master die is made up by skilled die makers and is reserved for use as a pattern in the duplicating machines. With the aid of these machines, less skilled labor can be used in copying the master. With some of the larger duplicators, it is possible to make several identical dies in the same operation.

When the die is finished, the die maker checks his work by casting a sample part in his die with molten lead or other low melting alloy. This is very carefully checked for size and shape, and any imperfections in the die are corrected before it is put into use.

The design is so drawn up that there will be a draft or taper (usually 7 degrees), allowing the metal to be easily removed from the dies after forging. In use, the dies are generally lubricated by the operator between blows by means of a long handled dauber covered with heavy oil or grease. When the heated metal is deformed by the dies, the oil or grease burns and a thin layer of vapor and burning gases is formed between the metal and the die, which exerts a small amount of pressure and thus aids in forcing the forging out of the dies.

In using steam drop hammers, the waste steam is sometimes conducted through a hose or pipe to blow loose scale off the dies, thus preventing further wear to the dies and pitting of the forging. Compressed air is similarly used with board drop and air hammers.

In designing the dies, maximum use is made of the available space on the die block and sometimes several impressions are machined in. In this way, several successive operations may be done without changing the dies. This may include several of the special forging processes described below. A machined die block is shown in Fig. 19.

Individual Steps Used in Forging

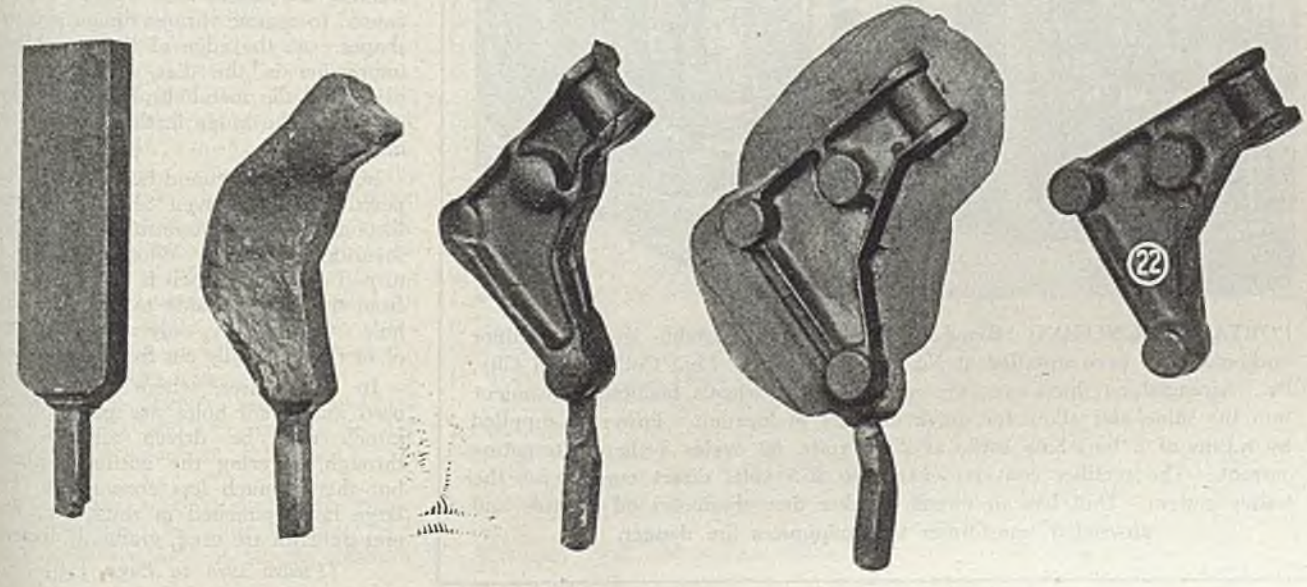
In making any kind of forging, the raw material is usually available in the form of a bar or a billet. In order to change this shape to the definite form required in the finished forging, a number of separate operations are used, depending on the difference in size and shape between the raw material and the finished part. These steps may be used individually or in combination as the situation demands.

Before any forging work is done, the material must usually be cut to the desired weight of the forging. This is done in a number of different ways, depending on the size, shape and composition of the raw stock. Cutting methods include sawing, hot and cold shearing, and use of abrasive cutting wheels.

In some cases, such as certain upsetting machine and drop forging operations, the long bar is heated on one end and this end forged while it remains intact with the bar. The forging is then separated from the bar hot, and thus cutting becomes part of the forging operation.

Dies are generally designed so as to include provisions for carrying out such of the following operations as apply to the manufacture of the part being made. If possible, several impressions are machined into the same die block so that all operations may be carried on successively on the same hammer without changing the dies. Several of the names of the following operations overlap in

Fig. 22—Various steps necessary in forging a bracket for electric motor



meaning, and colloquially used may have different meanings.

The *drawing* operation is sometimes accomplished on the flat sides of a drop forging die, and for larger stock, or where considerable reduction is necessary, it is done on a hammer equipped only with flat dies. It consists of reducing the cross section and, at the same time, increasing the length. If the operation is continued on the same surfaces of the piece, it results in flattening.

Fullering is essentially a drawing operation which is performed in such a manner that the result is a thin elongated section between two heavier sections. In drawing against the shoulder, the fullering tools or dies are rounded in order to prevent sharp corners and, at the same time, produce the most desirable grain flow. The actual distribution of the stock in the fullering operation depends for its accuracy on the ability of the hammer operator.

Edging is an operation frequently used in conjunction with fullering, but it is also widely used for many other purposes. The cupper, or oval-shaped dies generally used gather the metal at one end of the previously fullered stock toward the center of the die cavity and distribute its volume in such a way as to meet the requirements of the particular shape being formed. This gathering operation causes the metal to form a bulge in the center part of the die, but it is restricted or pinched together at the ends. As the sides of the edging die are open, the metal is free to flow plastically in this direction, but is limited by contact with the dies in all other directions. The forging is usually rotated one quarter turn after each blow so as to prevent excessive flow through the open sides of the die.

Edging dies are made in several different forms and the edger is usually used as an intermediate die to form the metal into some shape adaptable to future operations.

Some edging dies are at least partially confined on all sides. This type is known as a rolling edger. In operation, the stock is constantly rolled in the die. Generally the resulting forging has a circular cross section. *Rolling* may also refer to the use of flat dies for rounding a square bar or billet by inserting a sizing block between the dies, so that they can come no closer together than the diameter of the desired round bar. Then, by alternate hammering and rotation of the bar, the corners are flattened and the bar is rounded.

A similar edging or rolling operation consists of striking the edge of a disk or wheel-shaped forging between flat dies while rotating to remove square corners or flat edges. At the same time, the structure of the metal is improved by the additional working in this direction.

In cases where the axis of the various sections of the stock requires altering before the blocking or finishing operation bending dies are used. Edging, or fullering and edging are usually accomplished previous to bending. It is sometimes used as a final operation. While bending is sometimes accomplished with one blow of the hammer, causing the straight length of forging stock to assume the curves and angles imparted by the dies, it is sometimes complicated and may even necessitate two or more elaborate sets of dies.

In some cases where relatively heavy stock is used and sharp angles at the bend are desired, a bulldozing machine is used. This method is also used to bend plate or bar stock. In small lots, the bending is sometimes done by a blacksmith using his anvil.

In all of these bending operations, a thinning of the material takes place at the bend. At the same time, the material on the inside of the bend tends to spread, while narrowing takes place at the outside of the bend. This metal flow at the bend causes sufficient work to refine the grain and produce better properties in the finished article.

Upsetting is an operation which consists of axial deformation of bar or billet. The stock standing on end is stuck between two dies in such a way that it "pancakes," in other words, reduces in height, and the unrestricted metal following the path of least resistance, spreads out.

Because the ends of the stock are in contact with the relatively cold surfaces of the dies, the friction and chill restrict metal flow here and cause the metal to bulge in the center of the upset disk. In upsetting a square bar, the square shape is further distorted by these conditions because the chilling and frictional effect is even greater at the corners.

While the "bulge" is located near the center of an upset disk made on a slow-moving hydraulic press, where heavy cold dies are held in sustained contact with both the top and bottom surfaces of the disk, the "bulge" occurs nearer the top when upset on a hammer, due to increase in impact near the top and decrease of chilling effect because of only momentary contact with the upper die.

Because the unrestricted metal being upset tends to "snake", twist, or buckle, if too drastic an upset is attempted, the practical limit in upsetting is a length not more than three times the diameter.

Another type of upsetting gathers the metal together into a thicker section, or bulge, in the desired location along the length of the bar. It is accomplished by striking the hot metal between dies which contain cupped impressions. By rotating the stock, the "bulge" may be caused to assume various dimensions and shapes. At the edge of the cup-shaped impression in the dies, fullering takes place and the metal displaced in fullering forms the bulge in the depth of the impression.

In *punching* a round hole, a blunt, tapered plug is driven about half way through the stock, deforming rather than severing the stock. When the piece is turned over, the punch is driven through from the opposite side to meet the first hole. In this way, only a small coupon of metal is actually cut from the forging.

In some cases, where thin stock is used and small holes are punched, the punch may be driven all the way through, severing the entire punching, but this is much less economical. For large holes punched in rings, etc., several punches are used, gradually increas-

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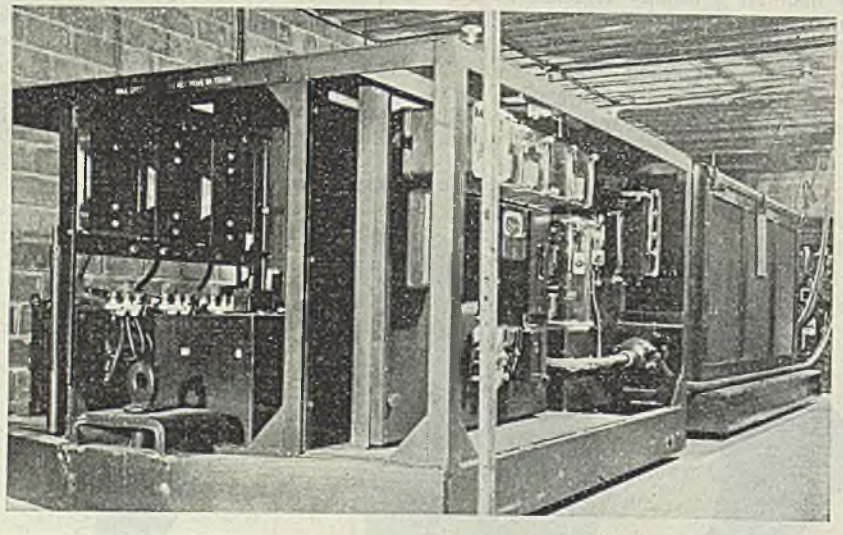

PORTABLE IGNITION: Rated at 300 kilowatts, portable ignition rectifier equipment has been installed at No. 3 mine of Reitz Coal Co., Central City, Pa. Arranged on three cars, the mine-car type wheels facilitate movement into the mine and allow for quick changes in location. Power is supplied by means of a bore-hole cable at 2300 volts, 60 cycles 3-phase alternating current. The rectifier converts energy to 275 volts direct current for the trolley system. Unit has air circuit breaker that eliminates oil hazards and air-cooled transformer that minimizes fire danger.

Hearing Before Federal Communications Commission Reveals Phenomenal Advances in

INDUCTION HEATING

HIGH-FREQUENCY induction heating has become a metalworking and general industrial tool of first importance, a group of electronics engineers declared at a recent hearing held by the Federal Communications Commission in Washington. In order that the American public may benefit fully from it, particularly in the postwar period, adequate radio frequencies must be provided, the commission was told.

The hearing constituted part of the proceeding of the commission in its reexamination of the entire radio spectrum from 10 to 30,000,000 kilocycles. Faced by many new demands for frequency allocations in the immediate postwar period, the commission is studying all the possibilities of the spectrum. It expects to issue at least a preliminary report on proposed allocations and reallocations prior to the end of February.

Asks for Frequencies—On behalf of a committee of engineers interested in the use of high-frequency induction heating in the fields of industry, medicine and science, Dr. Alexander Senauke, Amperex Electronic Products Inc., Brooklyn, N. Y., petitioned the commission to assign the following frequencies to these fields: 225 and 450 kilocycles and 1.707, 3.415, 6.84, 13.66, 27.32, 40.98, 81.96, 163.92 and 491.76 megacycles. He also asked for future experimental use the frequencies 1000, 2500, 5000, 10,000 and 20,000 megacycles. Because industrial equipments must operate long periods without the frequency monitoring accorded radio transmitters, he asked for broad band widths, ranging from 0.1 per cent for the lower frequencies to 0.5 per cent for the higher.

Separate frequencies must be assigned to these uses, said Dr. Senauke, for the reason that adequate shielding is not practicable.

"Induction heating equipment generally," he said, "is most valuable as a production-line tool. A simple means of bringing work to the unit and removing it with a continuity of flow inherent to production lines is demanded. This is usually accomplished by conveyors or carriers. Use of shielding enclosures here introduces extreme difficulties because efficiency of shielding is largely dependent upon completeness of enclosures."

Explosive Rivets—As an example, Dr. Senauke cited explosive rivets which are detonated by high-frequency generated heat; it is not practical to shield entire areas in which these important units must be used. He cited electrotinning as another type of installation where it would be necessary to shield an enclosure of great size.

To indicate the importance of industrial induction heating, Dr. Senauke estimated that two to three times as many industrial installations as radio broadcasting stations are now in operation, and that the kilowatt capacity of industrial installations is four to five times as great as that of broadcasting stations.

New Circuits—A mild hornet's nest was set off when George F. Russell, president, Northwest Syndicate Inc., Tacoma, Wash., held that when more recently developed circuit designs are used the allocation of frequencies for industrial heating will not be necessary. When all the input energy of a vacuum tube oscillator can be accounted for in one type of energy or another there is none left to radiate and cause interference, he said. Dr. Senauke arose to say he was "astounded," and that he was unable to picture the mechanism described by Mr. Russell. It was agreed that the commission would send some of its Radio Intelligence Division field men to conduct tests on Mr. Russell's equipment. John Dryer, Emporer Corp., who also disagreed with Mr. Russell's contentions, was invited to have a representative present at the tests at Tacoma.

Machine Tool Advances — High-frequency induction heating has made phenomenal advances in the machine tool field during the past few years, in such operations as hardening, brazing and joining, forging, and annealing, testified Frank W. Curtis, Induction Heating Corp., Springfield, Mass. It is bound to have a very marked effect on future process planning methods, as well as on the design of mechanical products, he declared.

"In many instances," said Mr. Curtis, "induction heating has definitely simplified heating problems that by any other means presented difficulties, such as high expense, due largely to spoilage. Still further, induction heating has handled jobs which could be processed in no other way.

"Some of the economies offered by induction heating equipment are: 1—Better control of hardening with less spoilage; 2—elimination of scale and cleaning operations; 3—reduction or elimination of straightening, which is often expensive; 4—a fast rate of heating, which often results in a better product; 5—better working conditions from the operator's health standpoint."

In the postwar period manufacturing costs will have a direct relation to distribution, said Mr. Curtis. The lower the selling price of a commodity, the greater will be its acceptance and the wider will be the public benefit. In this respect, induction heating will play an important role.

"To illustrate," he said, "a certain gear, cut integral on a shaft, formerly required carburizing, cleaning and straightening; these operations are eliminated as a result of induction heat treatment, resulting in a 25 per cent saving in the manufacturing cost. A sprocket, formerly requiring copper plating, carburizing, cleaning, and grinding, now is made at a saving of 32 per cent by means of induction heating. There is also the fabricating of parts in two or three pieces by means of induction brazing, which saves anywhere from 20 to 50 per cent or more, in cost. . . .

"It appears, therefore, that any restrictions that might be placed in this field would have a tendency to retard progress."

Spot Frequencies Necessary—Spot frequencies above the broadcast band are necessary for industrial heating, testified V. W. Sherman, manager, Industrial Electronics Division, Federal Telephone & Radio Corp., Newark, N. J. It has been found necessary on many industrial jobs, as a matter of practical expediency, he said, to use frequencies such as 3, 6, 13 megacycles and higher in order to meet one or both of these prime requirements: 1—A physically small heating coil capable of inducing energy at a high rate, and 2—metallurgical requirements involving extreme temperature gradients and control of physical changes which are a time function.

The requirements for small heating coils, he said, is typical of many jobs, such as "the hardening of small bearing surfaces, the hardening of selected areas, as on the inside faces of a clevis of an

aircraft engine rocker arm; or again by internal hardening of tapped bolt holes as small as ⅜-inch inside diameter and where heat gradient must be sufficiently high to produce self-quenching by the cold mass of surrounding structure at instant heating energy is removed. There are hundreds of similar applications requiring conductor coils physically small yet capable of inducing energy at a rate of 1 to 15 kilowatts per square inch of surface to be heated."

Use High Frequencies—The physical space limitation of an application leads to the use of higher frequencies in the following manner, Mr. Sherman explained: "Induction heating is accomplished by simple transformer action, wherein the magnitude of the currents induced into the work piece can be increased by means of increasing the inductor ampere-turns, or alternately by increasing frequency and retaining a fixed value of ampere-turns. Increase of inductor ampere-turns can be exploited only so far as space or conductor current carrying capacity will permit. When this limit is reached, the next and necessary avenue of attack is use of one of the higher frequencies."

Metallurgical requirements, he explained, are perhaps principal proof of service value of frequencies in megacycle range for induction heating purposes.

Better Performance, Less Material—"From the practical viewpoint," said Mr. Sherman, "metallurgy is concerned with the physical properties of metals and with the means by which desirable properties can be produced. One goal in metallurgy might be paraphrased 'better performance from less material.' In numerous cases the use of a frequency in the megacycle range has made a very real and sometimes a spectacular contribution toward this goal."

Vacuum tube induction heating units operated at frequencies in the megacycle range have produced cases with controllable thicknesses of 0.003 to 0.030-inch or more, and so rapidly is the electrical energy transmitted from the inductor coil into the surface of the steel that a temperature rise from 70 degrees Fahr. to 1800-1900 degrees Fahr. has been accomplished over appreciable areas in as little as 0.1-second, Mr. Sherman explained, and he cited a number of fabricating operations in which these phenomena are a regular thing.

Case Harden SAE-1090—"On a particular production line," he said, "1-inch outside diameter hydraulic piston rods of SAE 1090 steel are being case-hardened to a depth of 0.025-inch at the rate of 140 feet per minute and with the use of less than 25 kilowatts of radio frequency energy. In another application an internal spline made of a high-chromium steel has an inside diameter of approximately 4 inches and is being contour-hardened along the surface of the spline teeth in a heating time of less than 0.5-second. This spline is an integral part of a supercharger clutch disk which cannot tolerate the spread of this heat for more than a fraction of an inch away from the spline surface, due to the nature of the coating material on the clutch face."

He cited also a case where shafts have been made hollow to save weight. "These shafts require a hardened bearing surface, but cannot tolerate a hardened core, since this latter would mean a serious loss of the impact strength and toughness which are vital to the safety of operation of the part. A thin case of fully hardened metal was developed on a variety of such parts without any measurable tempering of the softer and tougher internal core material. Jobs were done on 6-megacycle energy."

Fewer Restrictions—It should be emphasized, said Mr. Sherman, that this case-hardening as accomplished with high-frequency induction heating is in many cases a unique process, since it is free from the chemical and thermal restrictions of case-hardening by other methods.

The kind of metallurgical results which have been demanded from high-frequency induction heating, he continued, have depended upon controllable temperature gradients much higher than heretofore possible; they also have depended upon drastic reduction in the time of heat treatment so as to obtain full control of the tempering action.

"It has been found," he said, "that samples treated at high frequencies had thin cases in which over 90 per cent of the structure was martensic and distinctly nodular in form. This nodular structure is in contrast to the asicular type of structure which is obtained from normal furnace heat treatment." The nodular structure, he said, affords increased wear resistance, and has ability better to resist the stress of either tensile strain or shear. It also has been noted, he pointed out, that the nodular structure has a negligible balance of undissolved ferrite or carbide.

"From this it has been concluded," he said, "that high-frequency induction heat has provided a new and extremely valuable industrial tool capable of heating steels so rapidly as to obviate almost all changes other than that of transformation of alpha iron to gamma iron.

Core Unaffected — "Industrial metallurgists in the past were vitally concerned with the possibility that the thin case-hardening of steel might result in a tempering or softening of the adjacent internal layer. However, hardness measurements taken progressively from the surface in toward the core show, over a wide variety of steels and shapes, that the fully hardened case will blend into a narrow transition zone of perhaps 0.002 or 0.003-inch depth in which an intermediate or half-hard condition will be found, and that just below this internal transition layer a completely unaffected core metal is encountered. This is the long-sought-for metallurgical ideal; namely, the ability to have fully hardened metal on the surface of a completely normalized core.

"The heat is in a form which is so rapid and so free from chemical contamination as to permit the surface hardening of selected areas on fully machined and finish-ground parts. It has insured that such parts can have a hardened surface free from oxidation, free from warpage, and possessing for the first time controllable surface hardness together with a pre-set core toughness."

A more extended discussion of Dr. Senauke's contention that complete shielding of the work circuit in a high-frequency induction heating unit is impracticable was entered by Carl J. Madsen, Western Electric Co. electronics engineer.

Access to Work Coil Needed—Under the various methods employed for

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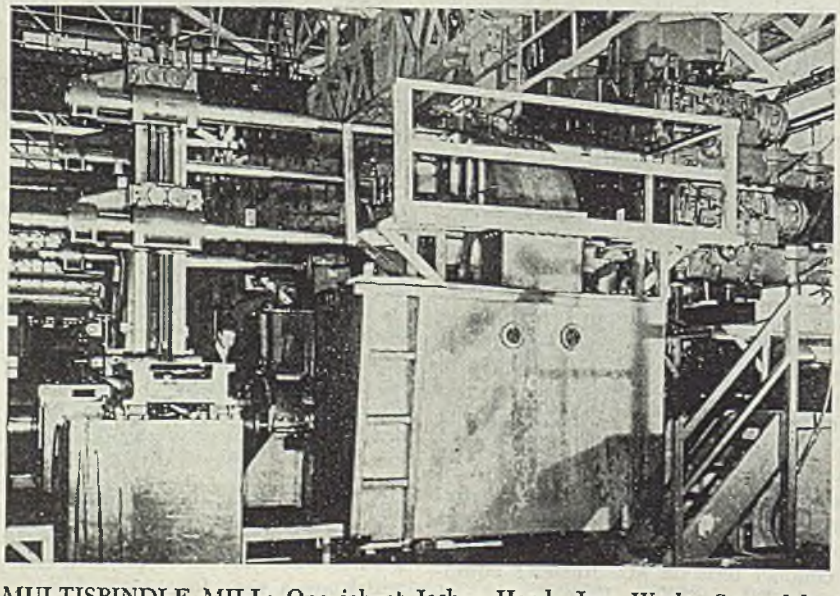
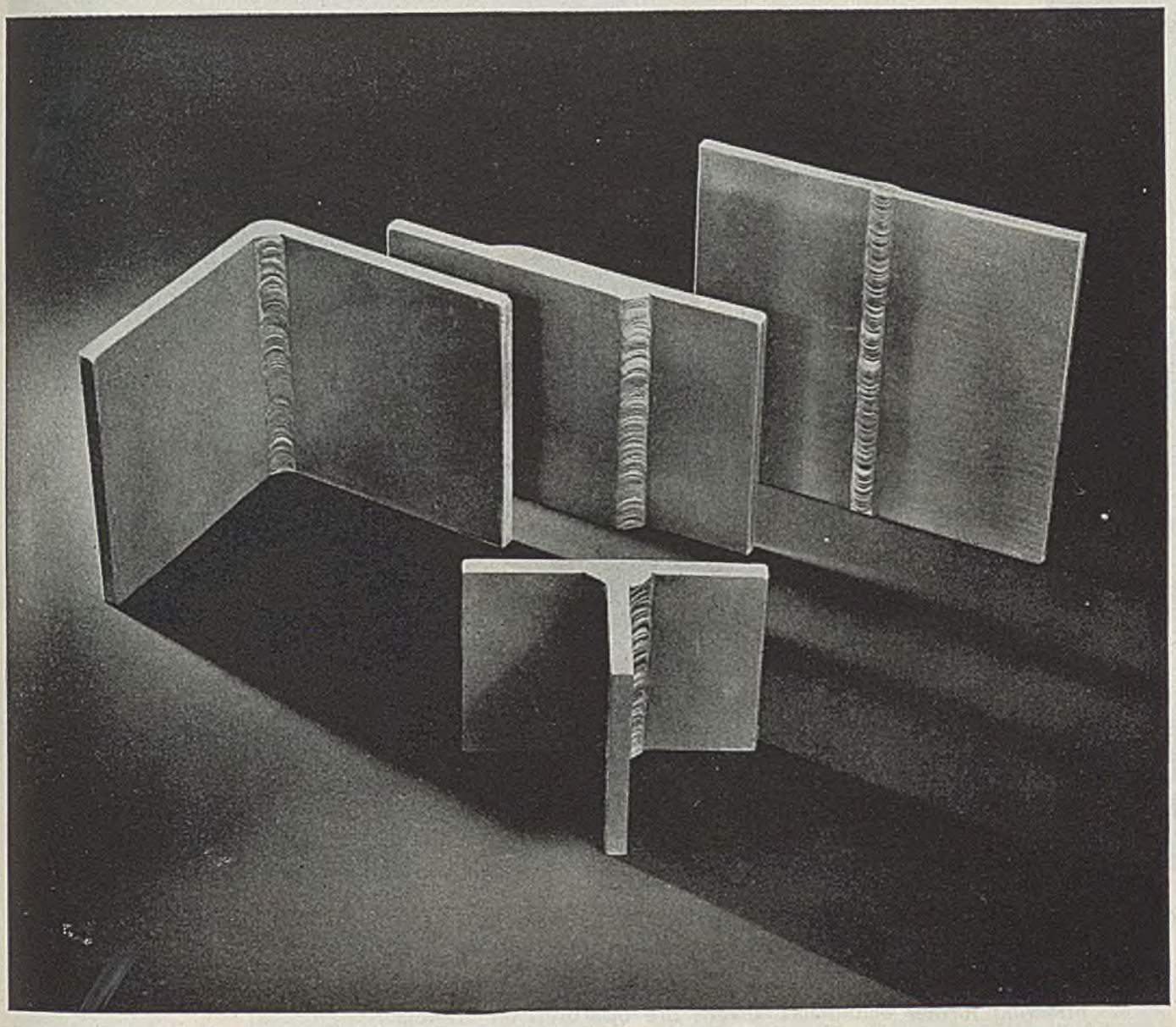


MULTISPINDLE MILL: One job at Joshua Hendy Iron Works, Sunnydale, Calif., was cut 85 per cent, from 3 weeks to 3 days, by adding two spindles to a specially built 3-spindle Giddings & Lewis mill. Three gear-center bearing holes and two pinion shaft bearing holes are bored and faced simultaneoutly



Yes, Magnesium can be welded . . . Easily

Revere magnesium alloys can be successfully joined by any of the conventional methods, such as resistance and fusion welding, bonding cements, rivets, screws, bolts and nuts.

The sections above illustrate some of the fusion welds being made daily with magnesium. The average welder can make uniform, high-quality welds after short practice. The strength of the joint may vary from 70% to 100% of the parent material, depending on the alloy and the welding conditions. All types of joint are possible—lap, butt, tee, corner, fillet and angle. Under proper conditions there is no fire hazard whatever.

Magnesium, the lightest of commercial metals, is freely available today from Revere in several alloys. Through our war work we have gained much valuable experience, and will be glad to work with you on problems in selection, welding, machining, forming, drawing, forging. This cooperation is offered without obligation. Write Revere Executive Offices.

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Cokes Utah Coal in PACIFIC COAST BY-PRODUCT OVENS

These two batteries of 45 ovens each, provide coke for the 1200-ton stack of Kaiser Co. Inc., Fontana, Calif.

Low-temperature char, petroleum coke and tamping of coal charge in oven are under investigation as a means toward effecting further economies. Ovens are operated on 18-hour coking time. Full line of by-products are recovered in modern equipped plant

By G. ELDRIDGE STEDMAN

CONTRACT for the construction of a 90-oven by-products coke plant was signed by the Kaiser Co. Inc. with the Koppers Co. in April, 1942. The ovens were completed, and heating by propane was started Oct. 1, 1942—a world's record!

Coke at Fontana is a luxury because of the cost of freighting coal by rail approximately 800 miles. This acknowledged economic penalty is compensated by efficiencies in other phases of the coking process. The company is intensifying its research to further develop these economies.

Experiments are being conducted in the processing of Utah coal from such angles as low-temperature char, hoping to improve quality and reduce breeze. This tends to produce a greater yield of blast furnace coke and lower coal requirements per ton of pig iron.

Work is going on in an extensive range to improve the coking process. Among the considerations are the disposal of additional by-products, from low-temperature char distillation, particularly low-temperature tar. Though "high-temperature tar" operators say this tar is off-grade, a large Eastern railroad is now using it. Plastics, creosote oil, fuel oil and pitch offer some opportunity for disposal of this low-temperature tar.

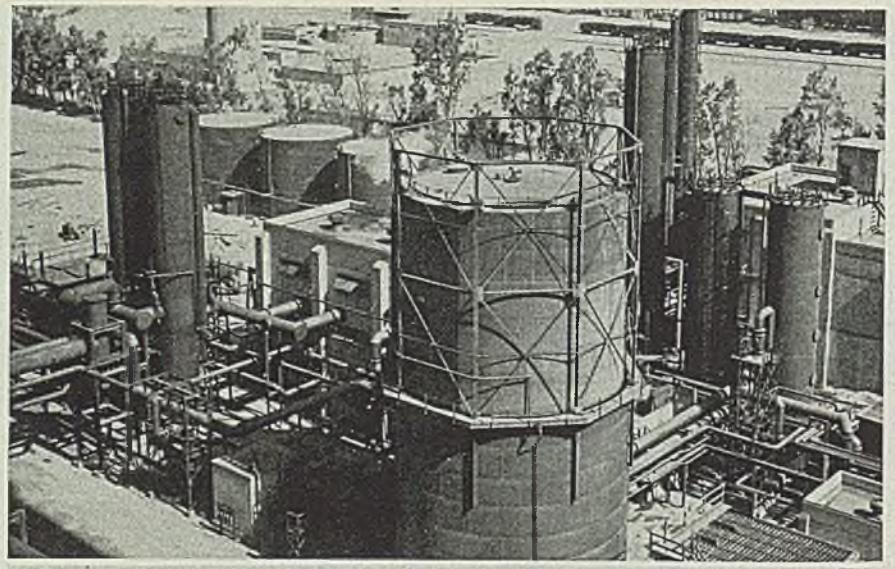
Another consideration under long-range investigation is that of petroleum coke. This raw material is immediately available at low freight rates and a reasonable price. It has possibilities of being developed into a metallurgical quality coke.

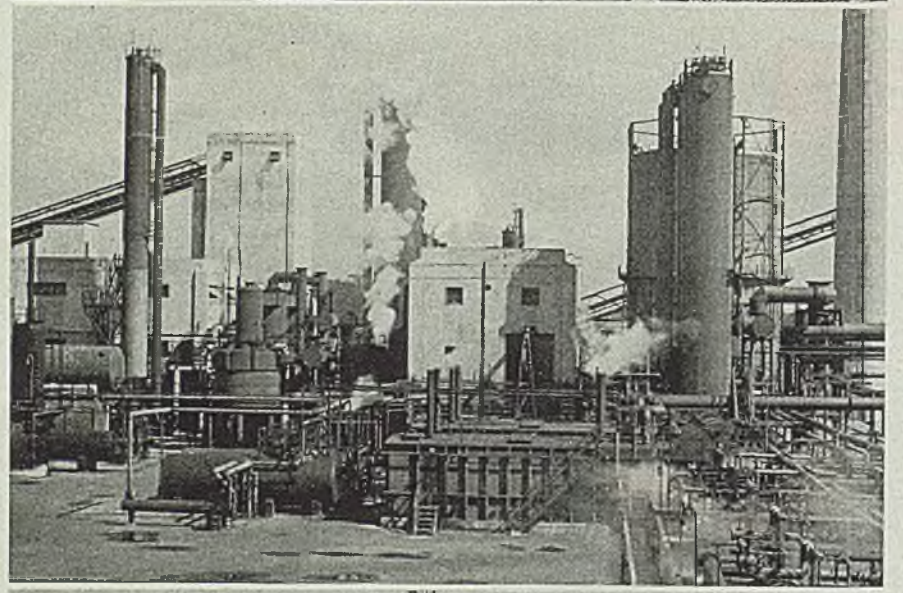
Some consideration has been given to tamping the coal charge in the oven as a means of improving coke quality, but the tamping problem is too severe in relation to time, labor, mechanics, and oven size. Another possibility arises from the foundry coke market of the Pacific Coast, but this has the hazard of competition from ballast imports. Its Chicago price is now $22 per ton delivered at Fontana, while before the war Germany was laying it down on the West Coast at $8, shipping it as ballast.

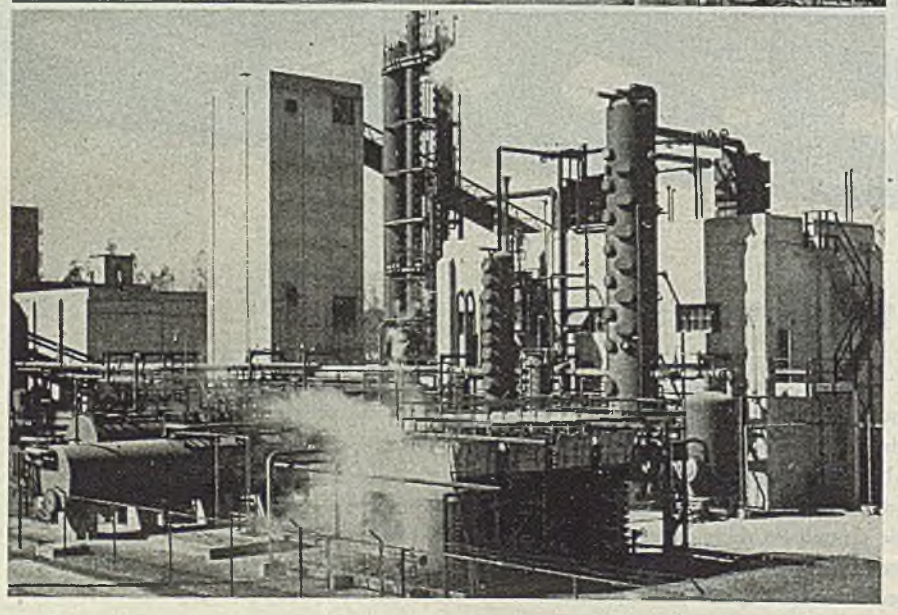
Upon arrival at Fontana, the coal from the company's Sunnyside, Utah, mines is track-hoppered and carried by continuous belt to the main coal bins, or to the 20,000-ton stock pile.

A 50-50 mix of newly arrived and stocked coal is used, since excessive aging is detrimental to the coke structure. The 20,000-ton stock pile is completely rotated in less than 60 days. Coal goes to stock by continuous belt and the reclaiming belt is loaded by tractor crane. New coal is split into two streams before the stocking belt, one stream being joined by stock coal returning from stock and the other stream flowing to stock. The coal is handled by equipment having a 250 tons per hour capacity.

The blend of new and stock coal travels through a Bradford breaker, removing bone and slate refuse, and is then carried by continuous belt to the hammer-mill for final crushing—such that at least 50







(Top to bottom)—

Booster building in left background and gas holder in center

By-products plant showing ammonium sulphate building in left background, saturators and gas booster building in central background, tar cooling apparatus in central foreground, and ammonium liquor cooling coils in right foreground

General view of benzol plant in by-product area

per cent of it will pass a ⅛-inch screen. By continuous belt, it then moves to the 1800-ton main storage bin, whose three sections have six rows of three bottom-slide gates for discharge into the charging larry. Each row is automatically opened for gravity flow into the three larry hoppers. This charge weighs 14.4 tons. At normal operating schedule the individual ovens are charged and pushed at 12-minute intervals through the 24 hours, for a total of 120 ovens per day.

The ovens consist of two batteries of 45 ovens each of Koppers-Becker under-jet combination type, capable of using either coke oven or blast furnace gas. They are of the low differential type with arrangements for automatic internal hot waste-gas recirculation to assure best vertical heating.

Recirculation of waste gases insures uniform temperature from bottom to top of both the flue and coal charge. Recirculation is used when underfiring with coke gas only, and is not used with B.t.u. blast furnace gas. Oven dimensions are as follows:

Width	
Oven chamber—pusher side	13″
Oven chamber—coke side	15½″
Oven chamber—average	14½″
Oven taper	2½″
Oven capacity	576 cu.ft.
Center to center of ovens	3′ 7½″
Length	
Inside of oven door lining	40′ 5½″
Face to face of brickwork	43′ 2½″
Inside of generators	41′ 4½″
Height	
Oven floor to oven roof	13′ 0″
Oven roof to top of battery	3′ 8⅜″
Top of oven pad to oven floor	12′ 1″
Top of oven pad to top of battery	28′ 9⅜″

The ovens have gas offtakes at each end, which lead into dual collecting mains on each battery. These dual mains unite into a common suction main leading to the by-product department. Oven roofs have three charging holes, and the ovens have self-sealing doors. The latest-type pusher machine performs three functions —removal of pusher side door, leveling of coal charge and pushing coke after carbonization is completed. Equipment includes two coke-side door machines which remove and replace the coke-side doors. These carry a coke guide, to conduct the hot coke across the coke-side bench, and into the quenching car.

Moving along the top of the batteries to the proper oven (from which the charging lids have been removed), the 14.4-ton charge of coal in the larry flows by gravity through the three charging holes; approximately 10 per cent of the last of the coal is leveled in the oven by the leveling bar. This leveling is through a chuck-door at the top of the pusher-side oven door.

During charging, steam is ejected through jets in the two gas standpipes, creating a partial vacuum on the oven proper, thus making the process smokeless. The larry then is removed, chuck-door closed, oven lids replaced, standpipe steam shut off, and carbonization begins. The charge remains in the oven

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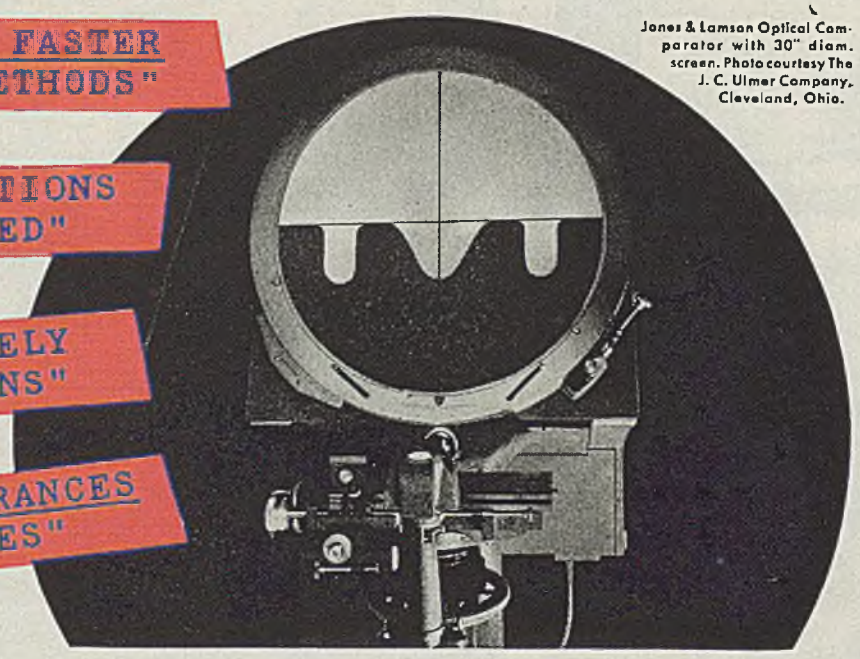

Jones & Lamson Optical Comparator with 30" diam. screen. Photo courtesy The J. C. Ulmer Company, Cleveland, Ohio.

This, in brief, is what a manufacturer of precision tools and gauges has to say about *his* Jones & Lamson Optical Comparator. The record speaks for itself, but it is just one of hundreds of instances where the use of these Comparators has resulted in inspection economies, better products and satisfied customers.

Form tools, gauges and other products with complex or multiform contours can be checked and measured in all dimensions with the standard measuring attachments of Jones & Lamson Optical Comparators.

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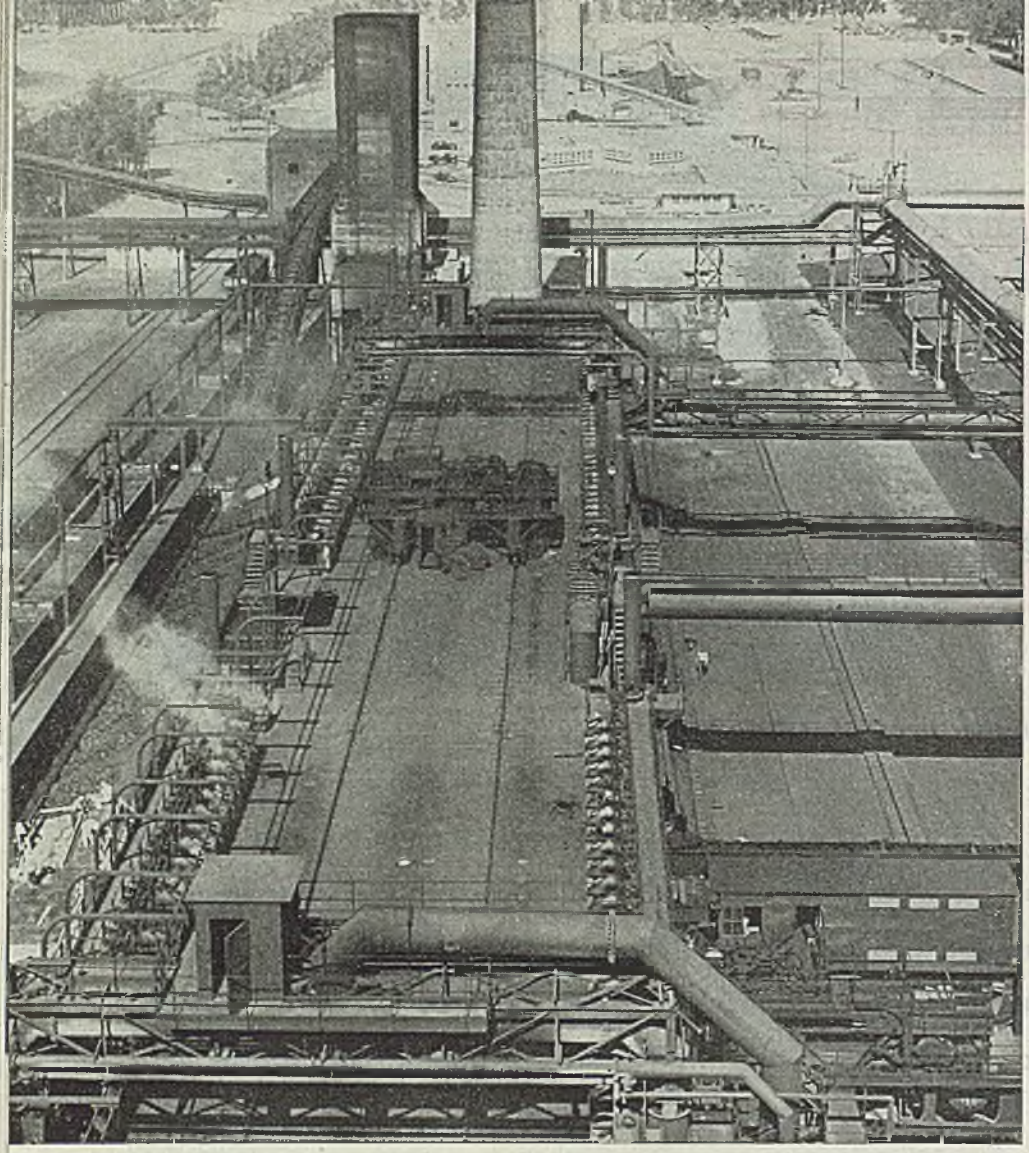
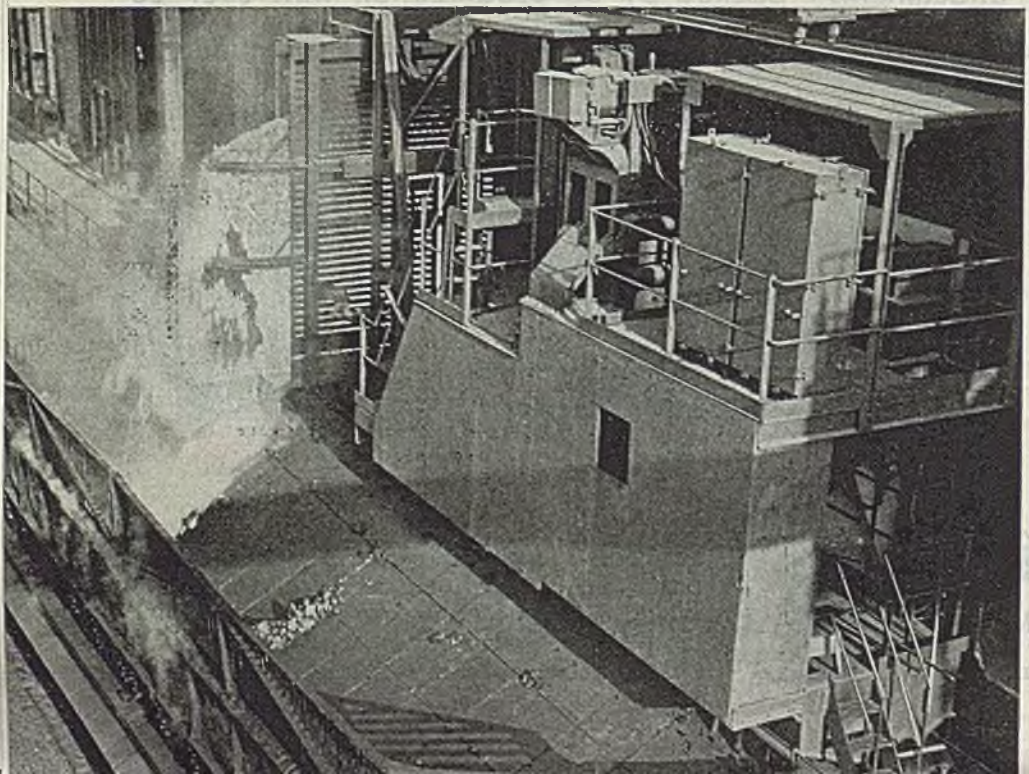
Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.



Top — Looking down on top of ovens showing larry car in midst of charging

Below—Coke being pushed from an oven into the quench car shown in foreground



for 18 hours at the end of which pe
riod gassing has entirely ceased and th
coke is ready to push. The gas pas
ing into the standpipes and then int
the collecting mains carries all by-proc
ucts to the by-product section for proc
essing. The only material in the ove
at this point is the basic coke itself.

When the coke is ready to be pushe
the oven is isolated from the mains b
means of liquor-sealed dampers, an
opened to the atmosphere; both doo
are then removed. The coke guide
placed in position and the coke is pushe
into the quencher-car by the pusher ra
and is then tracked to the quenchin
station and immediately sprayed wit
2000 gallons of water. The coke the
goes to the coke wharf where it
dumped,and allowed to cure for abou
20 minutes. It travels to the blast fu
nace storage bins by continuous bel
The coke is then drawn out of this bi
and conveyed by belt to the blast furnac
skip screens. At this point it is screene
over a ¾-inch screen. The oversize feed
directly into the skip; the undersize i
returned by belt to the coke oven screen
ing station and rescreened to ½ x ¾-inc
nut coke and minus ½-inch breeze. Eac
ton of coal produces 62.0 per cent o
1240 pounds of furnace coke; 1.7 pe
cent or 34 pounds of nut coke, and 4.
per cent or 96 pounds of breeze. Th
daily capacity is 1050 tons of furnac
coke, 29 tons of nut coke, and 82 ton
of breeze.

Temperature Softens Coal

Oven chambers are maintained at 210
degrees Fahr. by heat transferenc
through oven walls, no air being admit
ted into the oven chamber during th
18 hours of carbonization. This tem
perature softens the coal and causes th
evolution of all volatile matter, such a
tar, ammonia, phenol and light oils. Th
gases travel through the coal mass, u
the oven sidewalls, passing over the coa
top to either of the offtakes, and arrive
at the collecting main at a temperatur
of about 1200 degrees Fahr. Here the
are immediately sprayed with ammoniaca
liquor, which lowers the temperature t
about 190 degrees Fahr. About 75 pe
cent of the tar is chilled out and 50 pe
cent of the ammonia is thus scrubbed ou
in the collecting main by these sprays
These by-products are removed here
through sealed outlets into drain tanks.

DeLaval exhausters, having a capacity
of 22,900 cubic feet per minute suc
the gas from the collector mains int
primary coolers where the gas is agai
washed with ammoniacal liquor. Thes
coolers are direct contact, wooden-hurdl
type, providing intimate contact betwee
cool liquid and hot gas. Most of th
remaining 25 per cent tar is removed her
and some of the remaining ammonia i
scrubbed out, both flowing into the drai
tanks.

After passing through the exhausters
the gas in the system is under pressur
and is forced through Cottrell electri
precipitator to remove the remaining tar
fog. The gases then pass to a lead

FRED called on you as the representative of your *Industrial Supply Distributor. Today he's manning a gun or flying a plane. It may be nasty work, but he's doing it well because he has been trained for the job.

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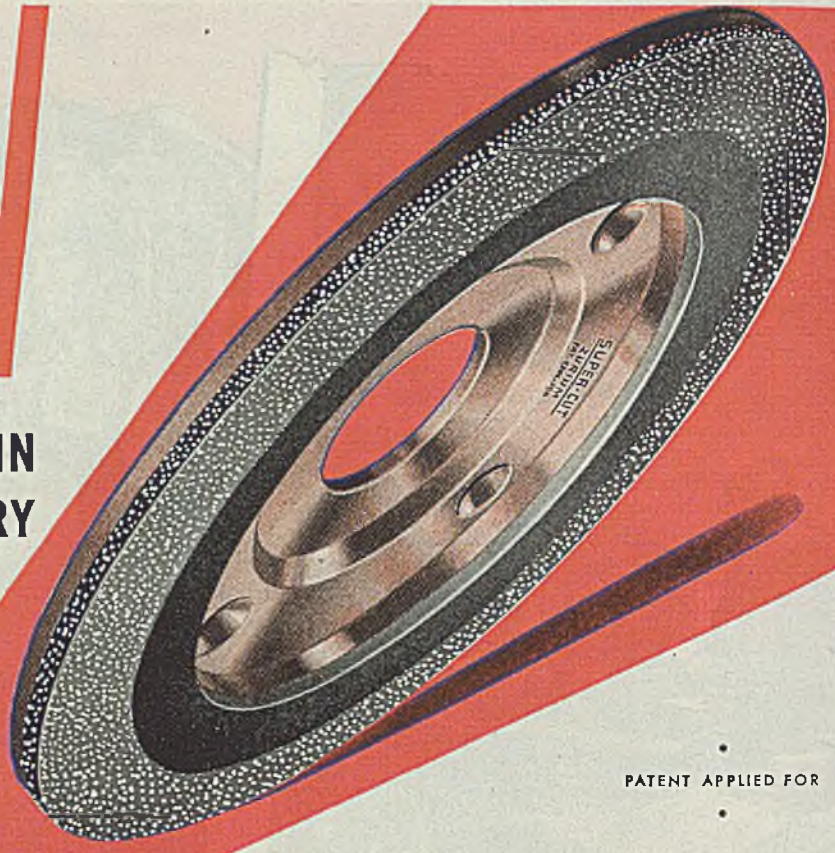

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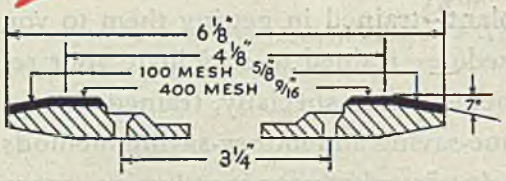

Note the two separate grinding surfaces, each for a different operation. The outer beveled surface contains layers of coarse diamonds. The inner flat surface is built up of fine diamonds (30 micron). By merely slight angling the side or point of a tool it can be rough ground and super fine finished without changing wheels, or without shifting position of the operator.

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You readily can appreciate how this innovation in diamond wheels will simplify and speed up your tool grinding and finishing operations—how it will save change-over time, machine space, AND HELP YOU DO A BETTER TOOL GRINDING AND FINISHING JOB.

Industrial Abrasives INC.

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lined, cone-bottomed circular 14-foot diameter pot containing a 5 per cent sulphuric acid bath which then removes the ammonia, thus producing ammonium sulphate. A continuous stream from the saturator bath carrying this crystallization is pumped into the slurry tank from where it is drawn into a Ter-Meer rotary drier and the ammonium sulphate solids are removed. About 27 pounds of ammonium sulphate per ton of coal is obtained. Standby saturator and drier equipment are provided.

The drier dehydrates the ammonium sulphate to a 1.5 per cent water content and the salt is carried by screw conveyor to an Air-Veyor system which conveys it to storage. The sulphate is conveyed entirely by air through tubes. Another adaptation of it removes this salt from storage to shipping cars, or to bagging machines.

Gas Is Cooled

The residual gas passes through a final cooler, similar to the primary cooler which fixes the temperature for light-oil removal and partially removes naphthalene. It is equipped at its base with a hot-tar reservoir. The cooler water circulates here in a closed cycle, passing through the gas and hot tar, giving up naphthalene, then being aerated and returned to the cooler proper.

The gas then passes through the two 12 x 60-foot benzol scrubbers operated in series. These have four banks of steel spirals resting on grating, each being 8½ feet high. Wash oil through 11 nozzles is sprayed from the cooler top down through the spirals and out through a seal at the base. Gas comes in through the base and passes out of the top. Intimate wash oil-gas contact is thus created and the light oils are absorbed. The benzolized wash oil is then pumped to the benzol plant for light-oil stripping. The gas (now stripped of tar, ammoniacal liquor and light oils) passes into a 50,000 cubic foot holder and is drawn by a 19,800 cubic feet per minute capacity booster for distribution throughout the mill. The yields from this process per ton of coal are:

Tar	10.0 gallons
Ammonium sulphate	27.0 pounds
Gas	11,400 cubic feet
Light oil	3.8 gallons

Removal of tar, ammonium sulphate and light oil leaves a clean gas of 560 B.t.u. per million cubic feet serving many plant facilities. That part of the gas to be consumed at the open hearth is desulphurized by a standard Koppers-Seaboard process just before the point of consumption. The sulphur removed from the gas in this process is burned in the power plant as hydrogen sulphide.

Ammonia liquor and tar are decanted from where they are collected originally in the suction mains, primary coolers and drips. Separation is done by gravity, the tar being removed through weirs in the bottom of the decanter tank and the ammonia liquor being pumped back to facilitate the sprays at the collecting mains; the surplus liquor goes to storage which serves as a reservoir for feeding the ammonia still. A portion of this liquor, pumped through a series of cold-water sprayed coils is returned to primary coolers for gas cooling. Excess liquor from the primary coolers returns to the decanter tank.

Ammonia liquor from the storage tank is fed into the ammonia still, a cylindrical tower 5 x 40 feet 10 inches, built entirely of cast iron and accommodated with 21 bubble-type trays, the top ten being for the liberation of free ammonia. The still is equipped with a lime-leg attachment to provide a "milk of lime" mix. This mixture overflows into the 11 bottom trays where it is met with live steam; the reaction frees the ammonia, leaving a still waste of calcium chloride and other soluble salts. The ammonia vapors and steam rise through the varied top-section trays of the still where the heat removes the free ammonia from the incoming liquor. The ammonia vapors pass off the top and join the main gas stream ahead of the primary coolers.

The ammonia liquor contains phenol which is not removed in the still; the liquor is pumped from the bottom of the free-still to the top of the phenol tower, where, treated with caustic soda and steam, the phenol is removed as sodium phenolate. The residual liquor flows back from the bottom of the phenol tower into the lime-leg of the ammonia still. Efficiencies of 90 per cent or better are obtained in the tower with a caustic conversion of 50 per cent.

Tar Acids Separated

Phenolate is pumped to a springing plant where the phenol is sprung from the phenolate solution by passing flue gases of high carbon dioxide content through the solution. The tar acids separated out are of good quality and command a ready market. Carbonate from this process is used in Kaiser gas purification plant for sulphur removal.

Crude tar is pumped from storage to the distillation plant operated by the Barrett Division (Allied Chemical & Dye Corp.), and distilled into creosote oil (5.9 gallons per ton of coal), heavy residue oil (1.2 gallons per ton), and pitch (52 pounds per ton). The pitch is chilled on a rotary flaker and returned to the coke plant, being added to the main coal stream after the Bradford breaker operation. This material beneficiates the raw coal.

The benzolized wash oil leaving the scrubbers passes through a heat exchanger and final heater to the wash-oil still, where the light oils are stripped; the wash oil is continuously recirculated. The light oil contains benzol, toluol, xylol, and heavier solvents. The light oil receives a preliminary rectification where the heavy ends are removed and pumped to an intermediate storage. These heavy ends are fractionated in a crude still into heavy solvent and crude residue—both salable products. The lighter vapors containing benzol, toluol and xylol (referred to as secondary light oil) are condensed and go to storage for further processing.

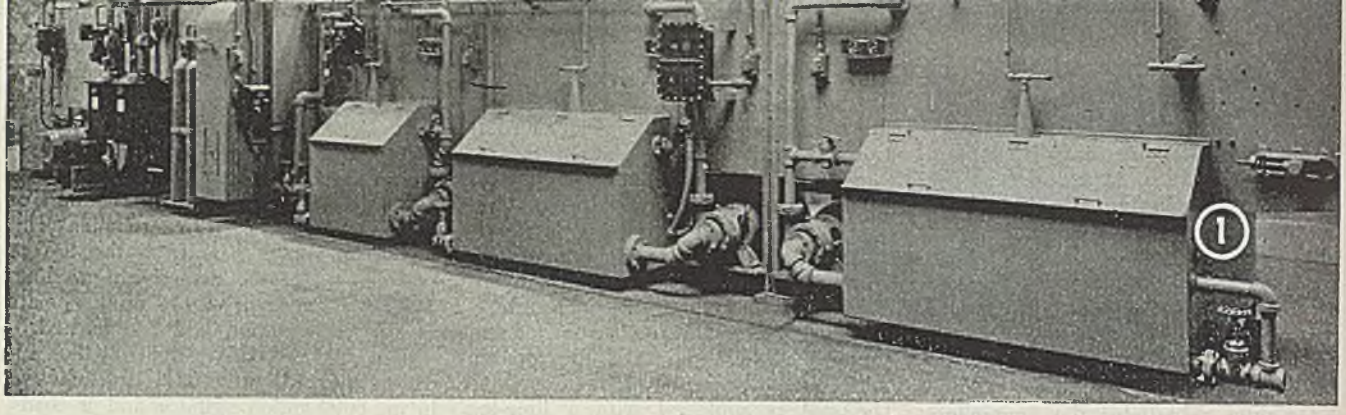
In order to remove the light-boiling forerunnings, such as carbon disulphide and other noncondensibles, the secondary light oil enters a continuous column of the bubble-cap type with a reboiler. The undesired vapors pass from the top of this column to the main clean-gas line. They then find their way to various points of gas consumption and are burned.

The crude secondary light oil then receives an acid, water and caustic wash in an 8000-gallon agitator and is ready for fractional refining. It is pumped to a motor-fuel column of the bubble-cap type and pure benzol distilled off and dropped to storage. The higher-boiling toluol-xylol mixture, which is the bottom product from the column, is run to storage, the toluol-xylol mixture is charged into the pure batch still where it is refined to pure toluol and xylol.

Production is summarized as follows:

Materials	Per Day
Coal charged, tons	1,700
Blast furnace coke produced, tons	1,050
Nut coke produced, tons	29
Breeze produced, tons	82
Gas produced, cu. ft.	19,500,000
Ammonium sulphate produced, lbs.	46,000
Light oil produced, gals.	6,400
Tar produced, gals.	17,000
Phenol produced, lbs.	900
From the light oil:	
Benzol produced, gals.	3,600
Toluol produced, gals.	1,100
Xylol produced, gals.	340
Solvent produced, gals.	180
Non-condensibles, gals.	150
Residue and losses, gals.	450
From the tar:	
Creosote oil produced, gals.	10,000
Heavy residue oils produced, gals.	2,040
Pitch produced, lbs.	88,000

Thomas M. Hart, assistant general superintendent of the plant, has 23 years of coke plant experience. J. H. Thompson, coke plant superintendent, from a long experience after his University of Washington and Carnegie Tech training, did notable work, particularly for Colorado Fuel & Iron Co. and the Koppers Co. Inc. He was in charge of the experimental ovens for Koppers at New Haven, Conn., helping to develop a new type underfired recirculating battery as a major war development. He put refinery gas in coke ovens for the Philadelphia Gas & Electric Co. which is the first coke oven installation to employ this type gas for heating. Under him is a hand-picked crew of general foremen: L. G. LaTronico, chief chemist; Charles Benninghoff, research technician, formerly of Colorado Fuel & Iron Co.; George Morlock, general oven foreman, formerly of Koppers; Bill Schultze, general by-product foreman, formerly of Weirton Steel; Sam Vaughan, master mechanic, and Bill Brown, in charge of coal handling. No technical article on Kaiser coke oven practice would be complete without acknowledgment of the teamed abilities of these men.



Carbon Dioxide Extinguishing Systems Provide

Safety in Degreasing

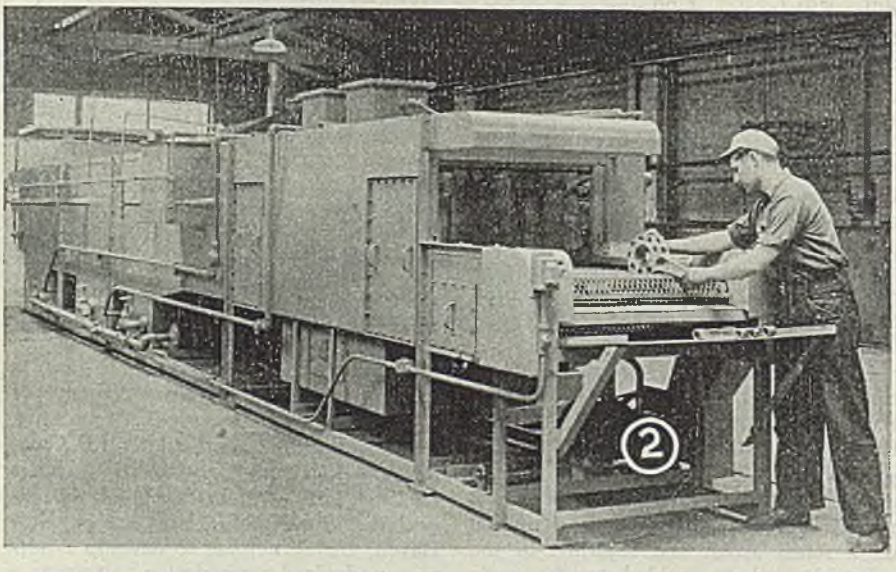
Units forming integral part of various automatic mass-production washing machines protect vital output

LARGE-SCALE production of war materials has been speeded up greatly with the development of self-contained units which automatically wash, slush, rinse and dry machine parts and equipment components of every type. Complete removal of oil, grease, lapping and drawing compounds, drying of parts and even coating them with a rust-proof finish, with small or large parts carefully protected from injury, characterize the developments which have proved the solution of a vital problem in speeding up assembly lines.

Interposed with manufacturing processes, this quick and dependable means of efficiently cleaning vast quantities of parts facilitates the inspection of machined parts for wear, abrasion, fatigue, fracture and proper gaging, augmenting each step in manufacture.

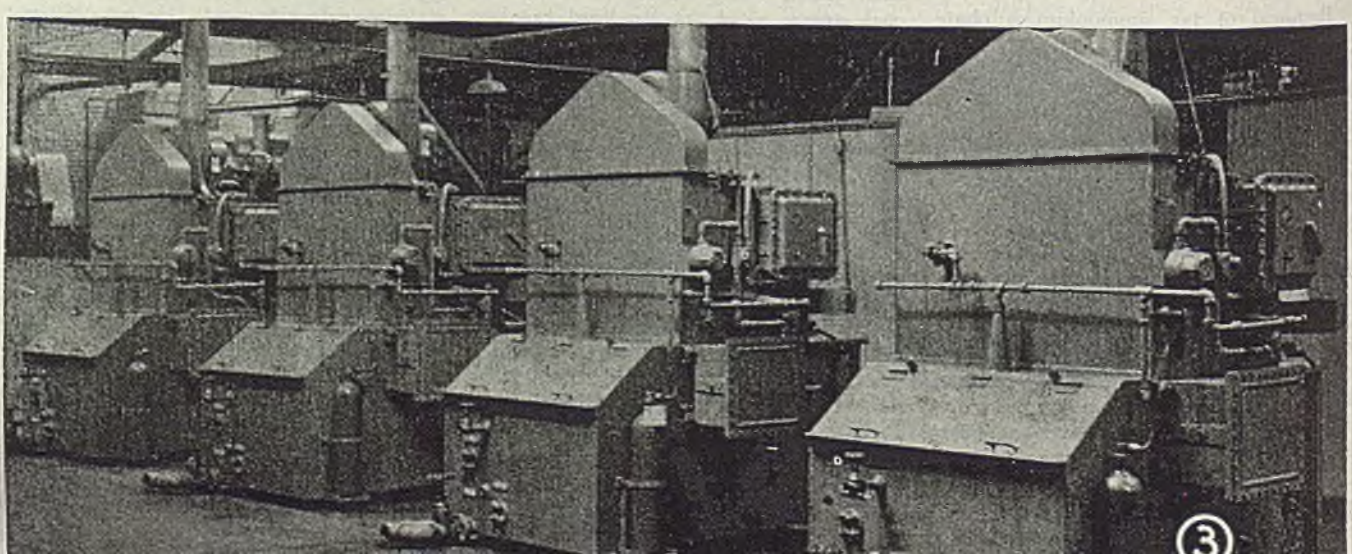
But, as is often the case, the solution of one problem only poses another. In the case of volume parts cleaning, the increased quantity of flammable liquids used by these machines represents an increased fire hazard requiring special fire-preventive measures. Plant, personnel and the uninterrupted production of vital war materials are all at stake. Only by building into the washing machines an automatic fire protection which will snuff out flames at their

Top—The two cylinders mounted on the side of this machine provide enough high-pressure carbon dioxide to smother any fire within the machine itself. Thrown into action by heat actuators installed inside the cover, carbon dioxide expands to 450 times its stored volume, gushing to the seat of the flames through cone-shaped built-in nozzles



Left — Built-in system on this washing machine automatically protects it from fire. Parts placed on mesh conveyor are given two baths and a rinse and appear degreased and dried at washer's unload end

Below—Smaller degreasing units each have their cylinder of high-pressure carbon dioxide which automatically fills the machine and kills fire within a few seconds



Engineering NOTES

No Interference

Circuits have been developed for induction heating equipment, it is reported, which absorb all the input energy of vacuum tube oscillators in such a manner that there is none left to radiate and cause interference with other equipment. The new circuit is being checked by the Radio Intelligence Division of FCC. Those acquainted with the development are "astounded" by it.

° ° °

Bigger and Bigger Steel Coils

One of the automotive parts makers placed a high speed continuous welded tube mill in operation about a year ago to make power transmission tubing for mobile equipment such as tanks and trucks. The company has urged steel mills to produce longer coils of strip as a means of cutting down on scrap loss where the coils are joined together. Suppliers now are rolling larger coils than ever before and even have gone so far as to install new equipment to provide them. The parts maker now is getting coils weighing 2500 pounds and has the ultimate goal of 7500-pound coils.

° ° °

Wet Brick for Patching

In hot patching the lining of open hearth furnaces, it has been found that the use of wet silica brick is most effective. Soaking the brick in water for 36 to 48 hours before using it on the patch, practically eliminates spalling.

° ° °

New Gadget

One of the newest gadgets on the market is an electronic tester for instantaneously detecting the presence of mercury-vapor concentrations in the atmosphere. The detector is designed especially for use in the electric apparatus, metal-mining, smelting, chemical and glass fields where mercury-vapor concentrations must not rise above the toxic limit of 1.2 parts mercury-vapor to 100,000 parts air.

° ° °

Induction Heating for Steel Mill

A new, continuous small shape mill now is being designed for a Pittsburgh steel company which may use induction heating prior to rolling. A spokesman for the company said, "At present we have not selected induction heating for the furnace because the power required is about 4000 kilowatts and units of this power are not yet economically practical."

° ° °

Cast Cutting Tools

Considerable development work currently is being done with cast cutting tools. Their proponents envision a great future for them. One of the motor companies, using wax patterns, is casting these tools centrifugally to exact shape and closely to size. A tool steel producer is turning out tools of this type in a section of its laboratory, pouring the steel from small electric furnaces into graphite molds. It is reported that such cast tools, operated at red heat on heavy cuts, carry on through 8-hour shifts without regrinding.

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outbreak can the operation of these automatic units be safeguarded.

Engineers of Walter Kidde & Co. Inc., New York, builder of fire-fighting equipment, have devised built-in systems which form an integral part of various types of washing machines, with carbon dioxide as the lightning-quick extinguishing agent. Varying in design with the dimensions and type of washing machine, these high-pressure systems, specially engineered to fit particular needs, all operate on the same underlying principle, the rapid discharge of a large volume of carbon dioxide which surrounds the flame, immediately reduces the oxygen content of the air to a point at which fire cannot exist. Carbon dioxide is sure death to all fires resulting from the combustion of any cleaning solvent employed in the degreasing process.

The many types of automatic washing machines manufactured by Industrial Washing Machine Corp. and Detrex Corp.—conveyor, cabinet, rotary drum, monorail, vertical and teardown—all have Kidde built-in automatic fire-fighting systems. Whichever it adapts itself best to the requirements of the job—a fire protection system engineered to amply safeguard the special-hazard operations—is incorporated.

There are large tear-down washers now in operation in almost every large airplane engine plant in the country, at some of the air service command bases, as well as in many parts-manufacturing plants. This machine carries parts from the wire mesh conveyor at the load end of the machine through two washes and a rinse, a cold blowoff and a hot blowoff, discharging them cleaned and dried at the unload end of the machine. Three tanks supply the highly inflammable Varsol or kerosene for the degreasing process.

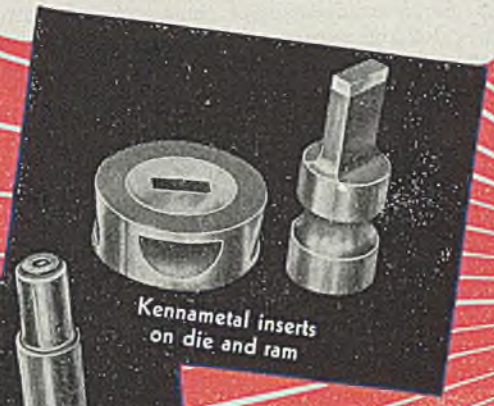
Actuators Operate System

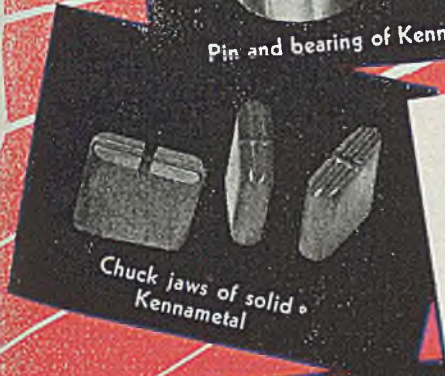
Mounted on one side of the machine are two 75-pound steel cylinders filled with carbon dioxide compressed to 850 pounds per square inch at 70 degrees Fahr. High in the hood of the machine are mounted heat actuators which, immediately at the outbreak of fire, relay an impulse which instantly sets the fire-fighting system in operation. Released from the steel cylinder, the carbon dioxide, under the tremendous power of its own expansion, gushes from the special built-in shielded nozzles installed above each cleaning chamber on the air washer and the spray eliminator. The gas quickly blankets the flame, driving out the oxygen necessary for its life. Simultaneously pressure-operated trips close all vent openings on the top of the machine and louvers in the exhaust duct. The motors on the fan and pumps likewise are immediately shut off by a pressure-operated switch. Closed within the machine, which is rapidly filled with carbon dioxide, the fire is extinguished in a matter of seconds. A control handle on the carbon dioxide cylinder makes possible the manual operation of the fire-fighting system in case of emergency.

Many advantages accrue from the installation of this comprehensive system.

The carbon dioxide has no deteriorating effect upon anything it touches, leaving no mess to be cleaned up, with the exception of the fire damage. The operator and the area surrounding the washing machine are protected by the automatic self-closing features which confine the fire within the cabinet.

Operating as it does on motive power supplied by the expansion of the liquefied gas, the system is not dependent upon any outside source of energy, mechanical or electrical. Unfailing and uniform performance is thus assured independent of power facilities supplying the factory. Since carbon dioxide is an inert gas, there is no danger of deterioration or corrosion in any part of the fire-fighting system. Inspection and maintenance requirements keep operating costs at a minimum. Periodic inspection and weighing of cylinders, with recharging only when weight indicates loss of 10 per cent of gas through discharge, constitute the only maintenance necessary to guarantee the efficient operation of this system which guards a process most vital in the production of war material.





Just to give you an idea . . .

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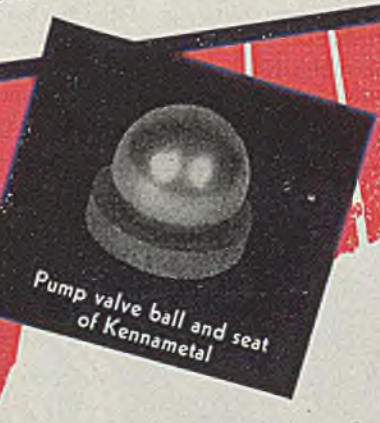


These typical applications are shown to suggest how *you* may employ Kennametal—the metal that masters wear—at critical points in *your* products and production machinery. Kennametal is available in a variety of standard shapes, and it can be accurately molded into many special forms. Particulars are yours for the asking.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL *Inc.*, LATROBE, PA.

Supercharger Buckets

(*Continued from Page 75*)

pattern removed from the lower mold by placing in a fixture as shown in Fig. 3. Here the mold is located over drive pins mounted flush with the table surface and actuated by the operator through the large lever shown. These pins in turn operate eight ejector pins in the mold which push the wax pattern free.

Molds are kept from becoming overheated with continued use by sliding them onto a portion of the work table top equipped with a 12-gage steel plate surface. A slab of solid carbon dioxide is held against the under side of this plate by a spring cover. Since the solid carbon dioxide has a temperature around 90 degrees Fahr. *below zero*, this arrangement provides an effective means of removing heat from the molds, which are thus easily kept at a temperature around 75 degrees Fahr.

In another setup not illustrated, the mold is held closed by a cam in turn operated by an air cylinder. This provides faster operation since closing the mold and applying the 10-ton holding pressure is done simply by flipping an air valve. In this setup, the girl operators fill the mold from an air operated "gun," a number of guns being kept in a warming chamber and used in succession as needed.

Inspection: First operation on the bucket groups is careful inspection of individual buckets for surface smoothness. No pits or fins are allowed. Any defective buckets are cut from the riser and replaced as shown in Fig. 4. This work is done on pattern plates which assure proper positioning of the buckets on the riser.

Assembly: Now six bucket groups are assembled with runners, risers and sprue to form a complete pattern for 24 buckets. Since arrangement of runners, risers, gates and sprue are extremely important in assuring the casting of good metal, the system used is detailed here in the simplified schematic, Fig. 9.

As can be seen from this diagram, the six groups of buckets are arranged in three pairs, the two groups in each pair facing each other. The sprue through which metal travels to the runners comes down the center of the assembly to the runners at the bottom. From here, the hot metal travels through the main runner to the three branch runners. Metal then feeds into the bottom of the buckets through individual gates.

In Fig. 5 the operator is holding the assembly by means of the crucible head on the sprue. Here the assembly is inverted so the bottom is revealed with the light striking in such a way as to clearly show the main runner and the three branch runners.

Note that metal must pass through a restricted passage from the branch runners in order to reach the base of the bucket. These restrictions or "gates" slow down the flow of metal into the bucket and thereby assure that runners are kept full. This, in turn, helps produce a smooth continuous flow into the bucket and thus aids in casting perfect metal.

As metal rises in the buckets, it reaches the short individual "risers" just above the buckets, that is, just beyond the blade tips as seen in Fig. 2. About this time hot metal has risen high enough in the sprue so that it begins to flow down the main riser and into the branch risers. This system of risers thus assures hot metal at top of the bucket, in turn aiding casting good metal throughout all portions of the bucket sections.

The groups of buckets are assembled to the runners and risers while using pattern plates to aid in precise positioning as shown in Fig. 2. In making these assemblies, a small steel double-ended instrument is used, one end being rather blunt and curved, the other sharper and smaller.

In working the wax, the end of the instrument is heated in a nearby gas flame so that it melts the wax it touches. Operators become quite skilled in use of these tools in making the joints in the runners, risers, and sprues. A sharp knife and an instrument with a fine pencil-like point are also employed in this work.

On each wax pattern assembly, two small wax wires are attached to cast two small test bars, each about 1/16-inch in diameter and an inch long. They provide a check upon the cast metal, for each of the two bars must bend 45 degrees before breaking. This test shows up quickly any departure from correct casting practice as it indicates density, fluidity at time of casting, and thus in turn the casting temperature.

Silica Dip Coat: Completed pattern assembly is now given a coating of refractory material by first dipping in a silica flour suspension which sets extremely fast. Only enough is made at a time to last about a half hour. One mix, about 3 quarts, is enough for some 155 assemblies.

Immediately after dipping in this solution, extremely fine sand is sprayed over all surfaces to back up the dip coat. Further backing is provided by the "investment" or silica mixture later poured in all around the pattern to make the mold for casting.

The dip coat stays in when the wax is later melted out so the hot metal goes directly against the dip coat surface when the castings are poured. . . .

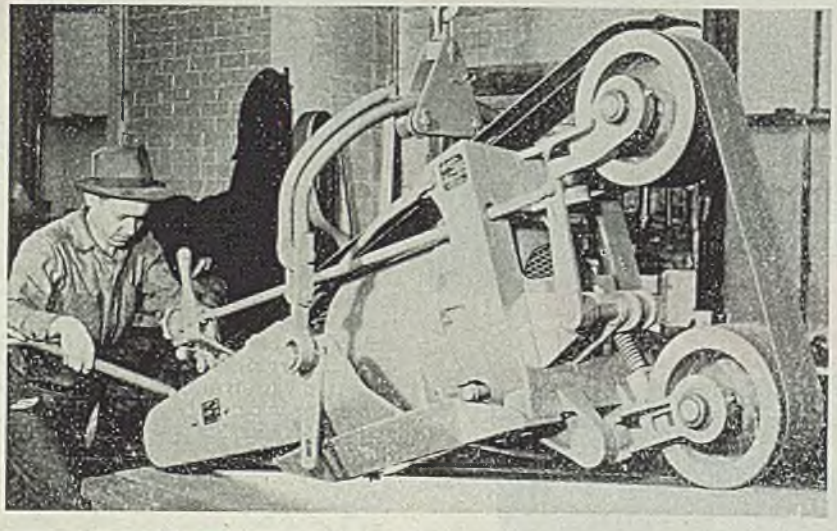
But we are getting ahead of the story.

Investing: After dipping and spraying with fine sand, Fig. 5, the pattern is allowed to stand for 48 hours while it dries thoroughly. Then it is ready for mounting in the cases or flasks. First step is to mount the assembly on a 6x6-inch by ⅛-inch thick steel plate by waxing it in place in an inverted position with the crucible pouring head of the sprue down against the bottom plate.

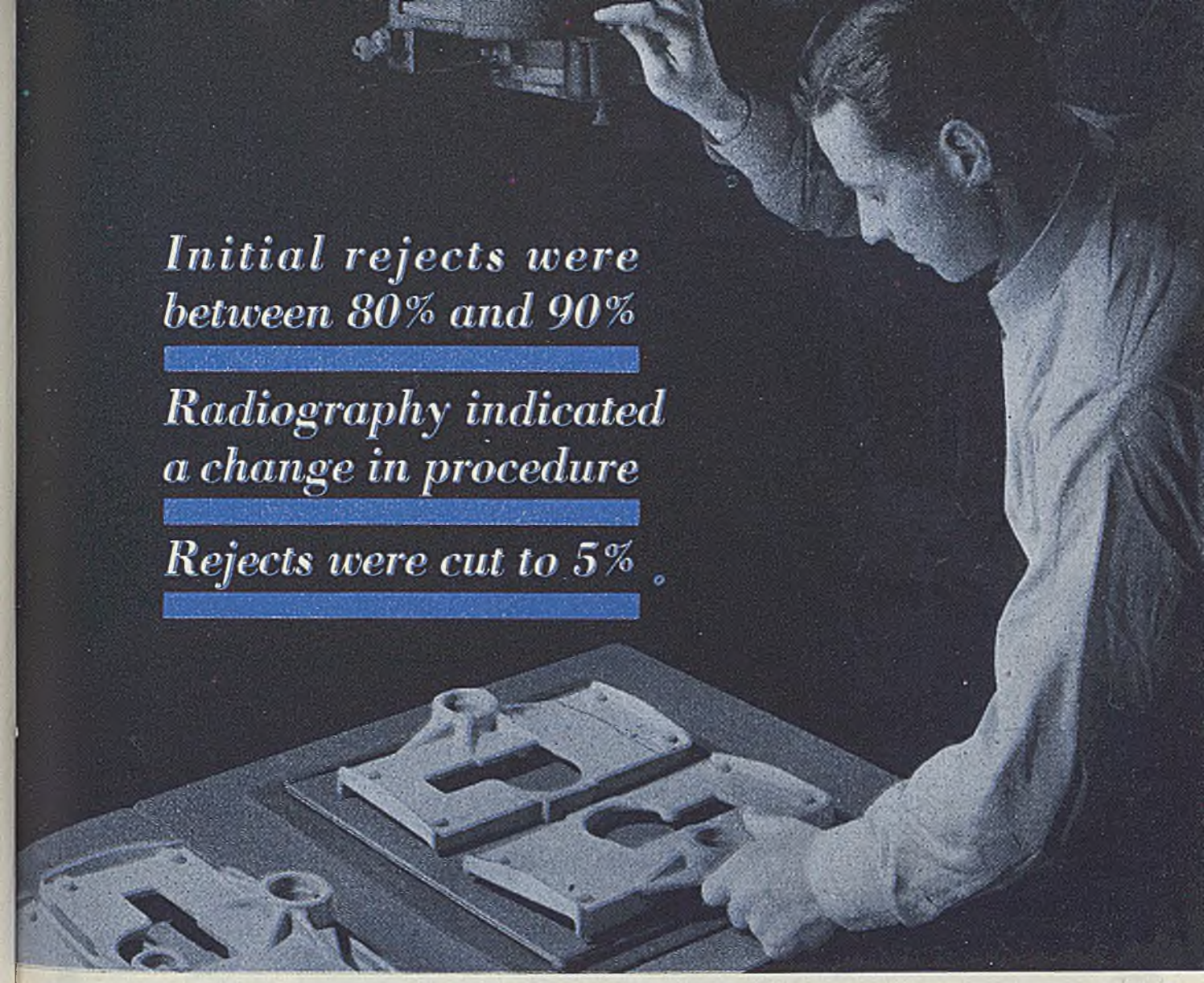
Next a chromium-nickel steel flask or case is attached. Made of Hastalloy "C," the flasks are good for about 80 heats before they burn through. An inner liner of waterproof paper is put in place and the entire assembly waxed together, forming a mount that holds the pattern securely in place during further handling.

Now a suitable liquid mold material called an "investment" is poured in around the pattern as shown in Fig. 6. This material is a combination of suitable finely ground refractories, mixed with a liquid binder. The flask is placed upon a "jogging" table where flasks are filled slowly with a small scoop. Investment material is mixed in small batches, a batch being enough for 8 to 10 molds.

After vibrating for about 40 minutes, the flasks are allowed to stand quietly for 10 minutes while the silicate jells. The vibrating period settles the fines in the mix and packs them closely



SWING BELT GRINDER: Powered by a special right-angle totally enclosed Westinghouse gearmotor and built to withstand shock, overload and rough service, this abrasive swing belt grinder is said to be capable of stepping up the finishing of stainless steel strip, tubing seams



Now only 1 casting out of 10 need be x-rayed

A FOUNDRY received an order for 200,000 aluminum alloy sand castings of various shapes, to be turned out at about the rate of 5,000 a week—and to receive 100% routine radiographic inspection.

Rejects the first week—for holes, cracks, and shrinks—were between 80% and 90%.

Functioning as an *inspector*, radiography separated the good castings from the bad—and so prevented considerable waste of man-hours and tool-time that might have been spent in needlessly machining defective parts.

But finding flaws through inspection, the foundry soon found out, was only one side of the story and the less important side at that.

What was more important was the way radiography showed how to *correct* faulty castings through improved foundry practice. Seeing what was wrong inside made correction easier.

And as a result, rejects dropped to 5% or less. In fact, it is now necessary to radiograph only 1 casting in 10.

To help radiography inspect and correct most efficiently, Kodak (1) supplies a line of films, solutions, and accessories and (2) invites you to share in the experience accumulated in 17 years of research in this field. Eastman Kodak Company, X-ray Division, Rochester 4, N. Y.

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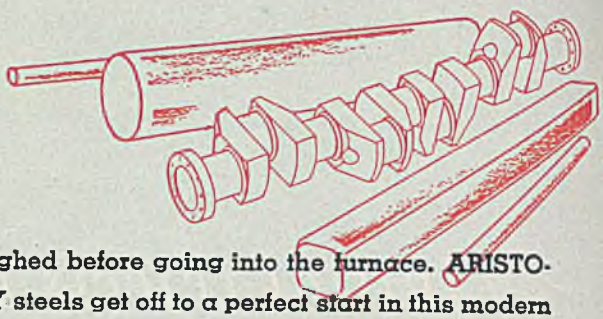

● It's always a thrill to see a heat of steel tapped. But especially so when its ARISTOLOY electric furnace alloy steel. Every tap means forty tons of steel from carefully prepared ingredients — scrap, lime, fluorspar, ferro-alloys and other materials — carefully inspected, analyzed and weighed before going into the furnace. ARISTOLOY steels get off to a perfect start in this modern melt shop. Every subsequent operation in the production of ARISTOLOY electric furnace steel is carefully guarded. That's why Aristoloy should be your preference in electric furnace steels.

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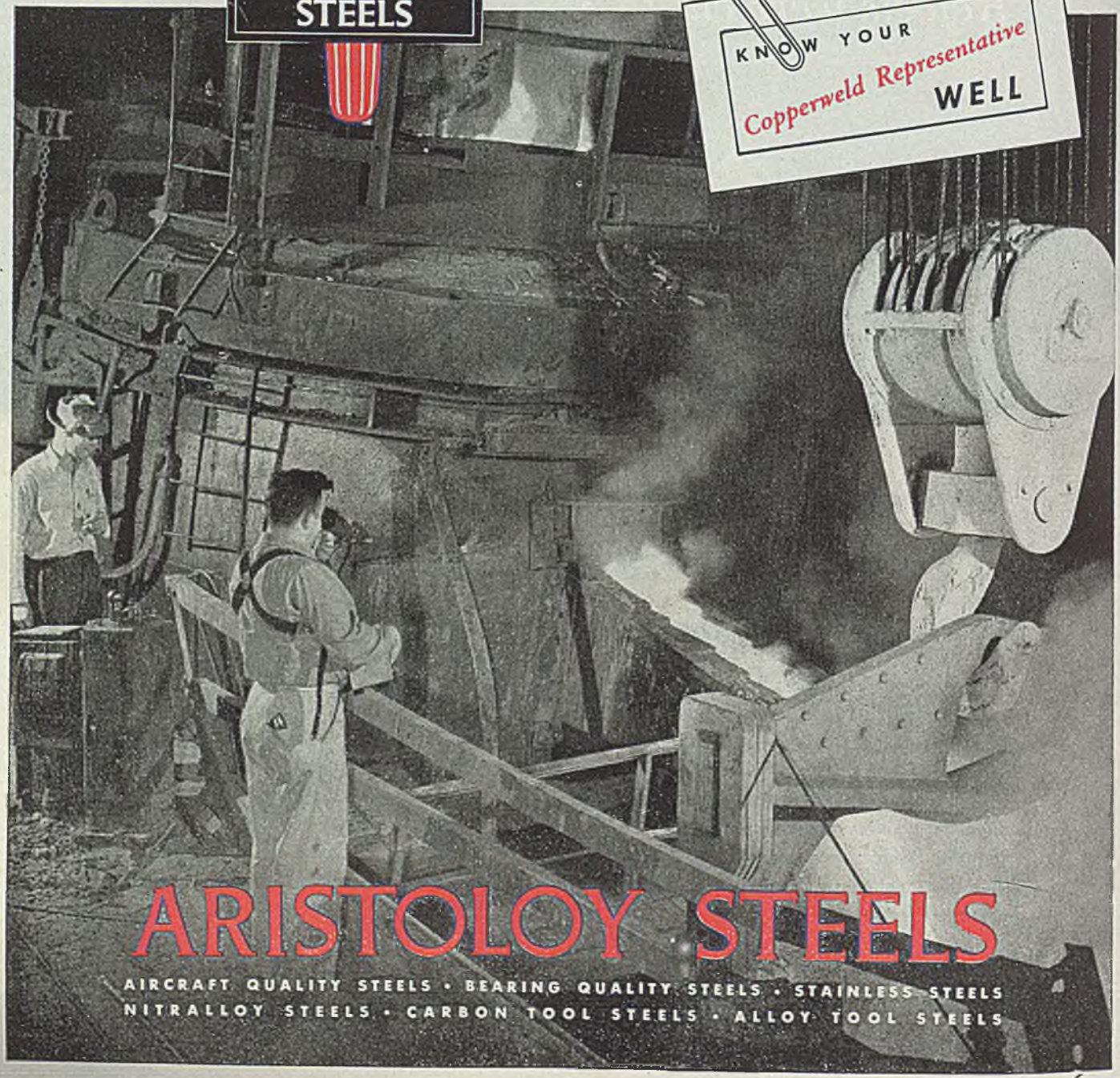


ARISTOLOY STEELS

AIRCRAFT QUALITY STEELS • BEARING QUALITY STEELS • STAINLESS STEELS
NITRALLOY STEELS • CARBON TOOL STEELS • ALLOY TOOL STEELS

around all portions of the pattern. Thus the bottom portion of the mold is extremely dense, and features exact reproduction of minute detail in the pattern.

The waterproof paper container into which the investment is poured is about 7½ inches deep. After vibrating and allowing to jell, the top 3 inches is cut off with a knife leaving the lower 4½ inches in the steel flask still intact. This is the portion in which the pattern is located and of course where most of the fines have been closely packed. The comparatively loose material consisting of the coarser particles is removed when the top 3 inches is cut away.

Conveyor Drying: Now the flasks are placed on an overhead chain conveyor of considerable length. Speed of conveyor is adjusted so flasks and molds remain on the conveyor for 8 hours before reaching the steam tables..

Melt Out Wax Pattern: Now the molds are placed on a steel grating and steam directed against them. See Fig. 7. The wax holding the base plate onto the flask melts, allowing the base plate to be removed. Further heating over the steam tables results in melting the wax pattern so most of the wax runs out. This reclaimed wax is used for runners, gates, risers and sprues in new patterns. New wax is always used for the buckets themselves.

Molds Preheated: Molds next are placed on alloy steel trays in an inverted position to prevent entrance of any foreign matter. Tray loads are then fed into a 2-zone gas-fired pusher type furnace shown in Fig. 7. First zone operates at 500-600 degrees Fahr., second zone at 1850 degrees. The purpose of this heating is twofold: First, any remaining wax in the molds is vaporized, clearing out the molds. Second, the mold is raised to a temperature high enough to assure fluidity of the Vitallium metal and to prevent excessive chilling as the metal flows through the mold.

A return conveyor is used to bring the trays back to the entrance end of the furnace. The furnace hearth is about 2 feet wide, 25 feet long.

Individual Melting Furnaces: Melting the stock for the castings is handled in small individual electric carbon-arc furnaces like that shown in Fig. 8. The electrodes enter the melting chamber at the furnace axis as these furnaces are the tilting type. The melt is discharged by hand as the operator tilts the unit, the operation being illustrated in Fig. 8. This casting machine was developed and patented by Austenal Laboratories Inc., U. S. Patent No. 2,125,080.

Furnaces are charged by feeding pure Vitallium metal slugs through the single pouring opening at top. Each slug is about ¾-inch in diameter, 2 inches long. Slugs first are weighed carefully to make up the charge. This is important for it assures having the right amount of metal to fill the mold. Each charge is weighed separately.

Melting time is 20 minutes.

Pouring: When a charge is ready to pour, a hot flask with its mold is taken from the discharge end of the preheating furnace and inverted on the melting furnace. A base plate is put on top and the whole securely clamped to the furnace as shown in Fig. 8.

Metal is at a slight super heat when it is poured into the mold by tilting both mold and furnace. Also air pressure is applied to assure proper filling of the mold and aid in production of sound castings. Note the shield in Fig. 8 so designed as to completely surround the mold when the furnace is inverted for pouring, thus protecting the operator.

Flasks go from the pouring furnace directly to an overhead monorail conveyor where they are allowed to cool for 4½ hours as they slowly move to the knockout station.

Stripping The Casting: Removing the casting from the mold is not easy for the investment is extremely hard, resembling concrete more than anything else. First step is to place the flask in a fixture in such a position that an air hammer can strike directly against the crucible head of the sprue. Controlled by a foot valve, this hammer breaks up the mold to such an extent that the casting can be removed from the flask. Most of the investment remaining on the casting comes off with additional strokes of the air hammer. Not all of it is removed until after tumbling and blasting.

None of the investment material is used over again, all of it being scrapped.

Shields surrounding the fixture lead to the air duct of an exhaust system so that dust and fines freed in knocking out the casting are drawn out of the immediate vicinity. There is no possibility of damaging the casting during knockout as the cast metal is extremely hard and abrasion resistant. Tensile strength is very high also.

Separating The Buckets: From this point, the castings go to an abrasive cut-off machine where a ⅛-inch thick Carborundum wheel with a rubber base is used to trim off the gates and risers from the buckets. Each bucket consists of the "streamlined" turbine blade itself with a rather substantial base at one end and a small rectangular tip at the other end. Shape of the bucket can be seen clearly in Fig. 3 where the operator is trimming off a defective bucket pattern just past the tip end.

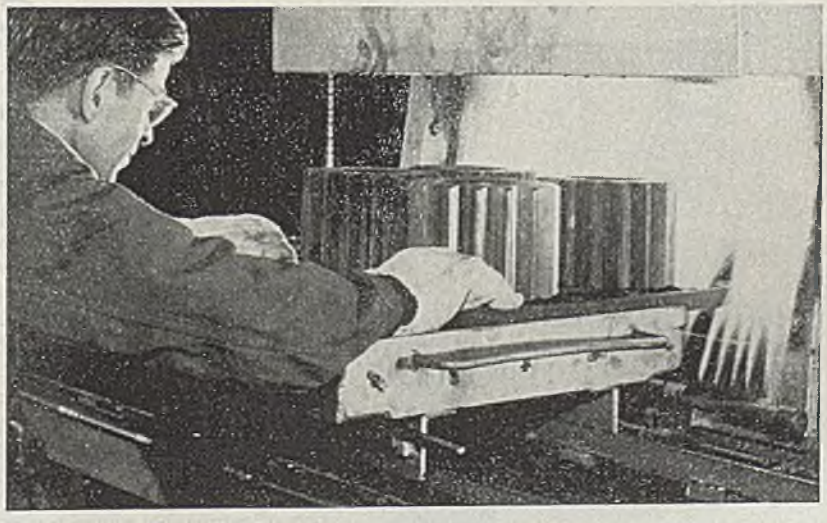
In cutting off the buckets, some of the investment still clinging to them is removed. Remainder is knocked off as the buckets are tumbled and shot blasted. The latter operation is done with 40-mesh shot.

Some idea of the tremendous volume of buckets cast here can be had when you are told that a single operator cuts off 10,000 buckets per day . . . and there are several operators so employed. All of the equipment described and shown here is found in multiple units. For example a large room is required to hold the battery of individual melting furnaces.

100 Per Cent X-Ray Check: Every bucket is X-rayed for defects and those found to be below requirements are again X-rayed as a further check before discarding. In order to provide positive identification of buckets before and after checking, those found okay are marked with a spot of red paint, those found defective being marked with yellow paint. Buckets with no paint have not yet been checked.

Individual buckets are loaded into pockets of a wooden tray which thus automatically positions them correctly. Tray is same size as 14 x 17-inch film used in the X-ray test. Twelve buckets are placed vertically in a row along the 14-inch side of the tray, there being nine such rows extending down the 17-inch dimensions to make a total of 108 buckets per tray.

New film is stored in lockers on edge to prevent pressure marks. It is loaded



HEAT TREATING "PUT AND TAKE": Steel retains carbon during heat treating in this furnace using Endogas, developed by Westinghouse Electric & Mfg. Co. Carbon in gas balances amount of carbon lost in heating steel, leaving analysis unchanged and doubling life expectancy of material

into an envelope and placed in a slot in the tray to come underneath the load of buckets.

Two trays at a time are slid from a roller top table into a high production X-ray machine and the control button pushed. Entrance and exit doors lower automatically and the correct X-ray exposure made by preset automatic controls. The doors open again automatically.

As the operators move in two new trays, they push out the two trays just X-rayed. Trays of parts checked are stacked on transfer tables and held until films have been processed and examined. Two trays of work, 216 buckets, are thus X-rayed simultaneously. Exposure is usually 1½ minutes. Loading and unloading time runs about ½ minute, so total cycle is about 2 minutes for the two trays, or a rate of a tray a minute. Actual output runs amazingly close to this extremely short cycle for more than 1100 trays have been exposed in 24 hours on this one X-ray machine, exposing more than 1100 full-size 14 x 17-inch films.

A penetrameter is mounted on each tray and shot with it to check on X-ray exposure and film processing.

Envelopes containing exposed film are passed into the processing room through a vestibule without interrupting processing operation. Similarly, processed films are loaded on drying racks in the processing room and moved into vestibule type dryers from which they are removed through another set of doors, again without disturbing operations in the processing room. Inner and outer vestibule doors are interlocked so both cannot be opened at the same time. This system greatly facilitates processing operations since the technicians can thus work continuously without interruptions formerly involved in receiving and dispatching film.

Also a telephone is provided in the processing room for communicating with other workers without the need for entering the room and disturbing operations. These provisions for continued work in the processing room are extremely important for they mean that the technicians there never have cause to lose their eye accommodation. Since most of the processing is done under conditions with very little light available, fully 20 minutes is required to obtain maximum eye accommodation. Retaining this accommodation is an important aid in turning out a full volume of work.

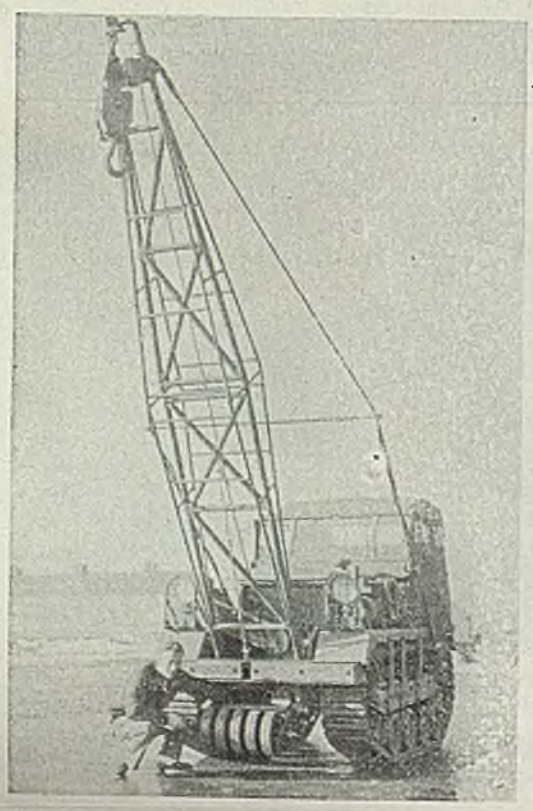
X-Ray Complete Wheels: In addition to the automatic 250,000-volt X-ray machine employed in checking the individual buckets, a million-volt X-ray setup is also used to check the completed turbine wheel after the buckets have been assembled on it. This is done at rate of about one wheel a minute by setting 36 wheels in a 20-foot diameter circle around the million-volt X-ray tube. Setup and shooting time totals 40 minutes for 36 wheels, an exposure of 3 minutes being sufficient to produce a negative with a density of 2.2—a rather dense negative but preferred because it shows up defects so well when viewed in a high intensity illuminator.

An ingenious device that saves 25 minutes on every setup is a serial numbering gadget with five wheels revolving between lead guard plates so shaped as to expose only one number at a time on each wheel. This speeds setting up the serial number of each turbine wheel so it records on the negative during the exposure. A serial numbering device is mounted on each film holder. Time consuming method formerly employed was to assemble individual lead numerals on a piece of tape that then was fastened to the negative holder.

Although each bucket is carefully X-rayed before being assembled on the turbine wheel, the final examination assures that no defective buckets may be in turbine wheels.

The million-volt X-ray tube is operated in a room shielded by thick lead plates. Even the door to the room carries a 1½-inch thick plate of lead. The steel bolts holding the door together are covered with lead caps to prevent radiation through the bolts. Door weighs 17,500 pounds and is interlocked with power circuits so the X-ray machine cannot be operated unless the door is closed. Emergency safety circuits with push-buttons are provided so anyone inadvertently caught in the room can prevent operation of the machine.

There are many other interesting operations involved in production of turbo-superchargers at Allis-Chalmers, including straddle milling the blades of the cast aluminum compressor impellers, bending the impeller blades to shape on a hydraulic press, stamping the housing in one operation instead of three, and the final hot gas test of the completed unit. Although rated speed is 24,000 r.p.m., each unit is tested at speeds up to 26,400 r.p.m. and at temperatures up to 1700 degrees Fahr.



Converts Tractor to Crawler Crane

AN arc-welded boom, constructed of 1 and 2-inch aircraft tubing with ¼-inch wall thickness, is used by the Army for lifting engines, propeller assemblies, tail ends of planes, and for other general hoisting operations. The base is slotted and reinforced with 1-inch bolts holding it to two uprights made of armor plating set behind the tractor bumper. The boom was designed for lifting 10 tons, but when attached to a 5-ton tractor for portability, it was necessary to design a retractable supporting wheel assembly to hold the tractor on an even keel when hauling heavy loads. Note position of retractable wheel under boom.

The boom hook is made of 6-sided bar stock tempered just enough to bend under severe strain, and channel iron and sheet steel are used for the sheave, reinforced with bosses in each section to prevent buckling. A ¾-inch flexible cable with a snapping point of 23.6 tons holds the boom, and is spliced and placed over the ears at its top which reinforce the sheave.

The supporting wheel has a ¾-inch clearance above the ground, very little tilt being necessary. It is raised when the boom is idle and is not in the way when the tractor travels at high speed over rough ground.

Description of the unit appeared in a recent letter to Hobart Brothers Co., Troy, O., from Stephen E. Stawiarski, Holyoke, Mass., former staff sergeant, Army Air Corps, who was its inventor.

The use of arc welding in constructing this boom is believed to have provided a strong and durable crane at low cost with a considerable saving in time and labor.

KNOW THE ARCH

The round arch is an easy means of identifying Cleveland Tramrail. Only Cleveland Tramrail makes ARCH BEAM with true round arches. No other section has the most important feature of ARCH BEAM — the raised wearing tread.

MILD STEEL BEAM

The beam is arched at regular intervals. It has same strength as similar solid beam.

COMPOUND SECTION

Made of two parts: wide flanged beam welded to standard Cleveland Tramrail rail.

HIGH CARBON RAIL

Especially rolled with flat raised treads of high carbon alloy steel. Minimum brinnel hardness of 260.

REDUCES WEIGHT

Arches reduce weight without sacrifice of strength. .

RAISED WEARING TREADS

Raised treads prevent rail peining and provide a wear factor not obtainable with any other single-piece rail. There are no separately mounted rails or wear treads to loosen and require maintenance.

SEVEN SIZES

ARCH BEAM is available in seven sizes (8" to 18" deep), all with same rail width, enabling carriers to travel between any pair of beams.

Arch Beam . . .

A SUPERIOR OVERHEAD TRACK

ARCH BEAM is recommended wherever loads to be handled are too heavy or spacing of supports too great for standard Cleveland Tramrail rail.

The development of ARCH BEAM track with regularly spaced openings in the beam was pioneered by Cleveland Tramrail. With millions of feet used for thousands of cranes, transfer bridges, runways and complete overhead track systems, both electrified and hand-propelled, ARCH BEAM has become a trade mark recognized everywhere by the true round arches, as a symbol of Cleveland Tramrail.

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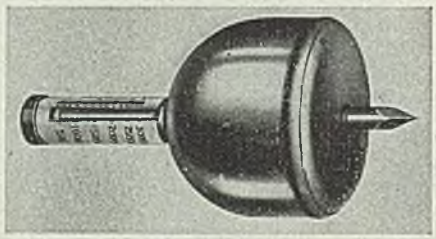
OVERHEAD MATERIALS HANDLING EQUIPMENT

INDUSTRIAL EQUIPMENT

Tachometer

Recordings in revolutions per minute are read without the use of any timing or counting device when using the new tachometer developed by Standard Machinery Co., Providence 7, R. I. The readings are constant and record fluctuations. The scale is made up of black figures against an orange background.

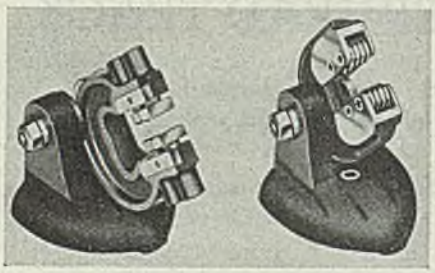
The instrument weighs 5½ ounces and is 2¼ inches in diameter which permits



one hand manipulation. The range runs from 500 to 3600 revolutions per minute. A pointed contact spindle is a part of the instrument for use with shafts that are centered and an elastic tip is provided that will slip over the pointed spindle for use on shaft ends that are not centered. The tachometer is dust and moisture proofed and has a baked enamel protective coating on all surfaces except the scale which is enclosed in a plastic tube.

Tool Holder

A new universal tool holder offered by Taft-Peirce Mfg. Co., Woonsocket, R. I., will accommodate any type or make of snap gage, including all AGD frames



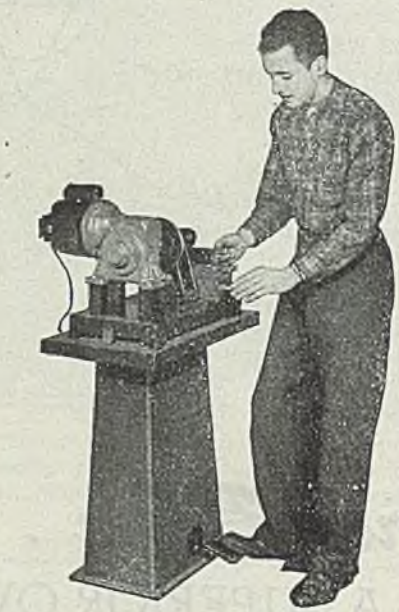
and standard adjustable thread snap styles. The holder may be clamped at any angle that is convenient for the inspector. It permits standardization on a single piece of equipment.

Regulating System

Cochrane Corp., Seventeenth and Allegheny avenue, Philadelphia 32, announces a new system to return condensate from process equipment operating at pressures up to 200 pounds directly back to the boiler without flash loss and with all the sensible heat contained in the original steam. All condensate, noncondensible gases and entrained air are easily handled by the jet at high temperature with a constant differential maintained across the equipment creating positive drainage — with entrained air automatically discharged from the closed circuit before return to the boiler. Because of the high back pressure maintained against the equipment, with constant flow of gases and liquids, there is no appreciable pressure drop in the steam chambers.

Indenting Machine

Designed to mark straight line impressions on metal parts, Adolph Gottscho Inc., 190 Duane street, New York 13, offers a new indenting machine. The moving parts consist mainly of a sector of a round steel die which makes one half turn and stamps an imprint into the metal part. The die returns to its



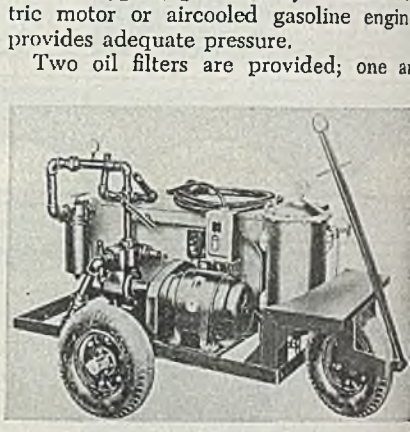
starting position, the marked part is removed and a new one put in its place. Actual marking occurs in a fraction of a second, so that production is dependent on handling.

Changes from one die reading to another may be made quickly. The adjustment for variation in thickness of diameter of the part being marked and for the depth of impression is made by a turn of a knurled wheel in the front of the machine. A bar locks this adjustment. The unit is equipped on its own stand with motor, gear reduction, friction and ratchet clutches, precision bearings on turning parts and roller bearings on all moving parts. It has a capacity for marking metal parts varying in diameter or thickness from ¼ to 2 inches. Size of character of the indented impression depends on the kind of part being marked.

Desludger Unit

For desludging and cleaning aircraft oil coolers and engines without the necessity of removal from airplane, Pacific Airmotive, Airplane Mfg. & Supply Corp., 409 North Brand boulevard, Glendale 3, Calif., offers a new aircraft desludge unit. It consists of a 25 gallon insulate tank with sight level gage. This tank i electrically preheated by two immersio type heaters with thermostat temperatur control. A rotary vane type pump wit built-in bypass, powered by either elec tric motor or aircooled gasoline engin provides adequate pressure.

Two oil filters are provided; one a



absorption type and the other a meta disc type with revolving cleaner handle. A four-way valve is used to frequently reverse the flow of the solvent. This operation causes a surging action which breaks down any built up sludge. The chassis is constructed of angle steel and is mounted on three pneumatic tires.

Air Chuck

Redmer Air Devices Corp., Chicago 6, announces a new development in connection with their No. 2 collet air chuck. By the use of an adapter, a master collet and pads can now be used giving a capacity up to 4 inches. This change-over from the standard chuck requires the re-

moval of the stop rod and the insertion of the adapter block. The master collet screws on to this base block holding the collet stationary.

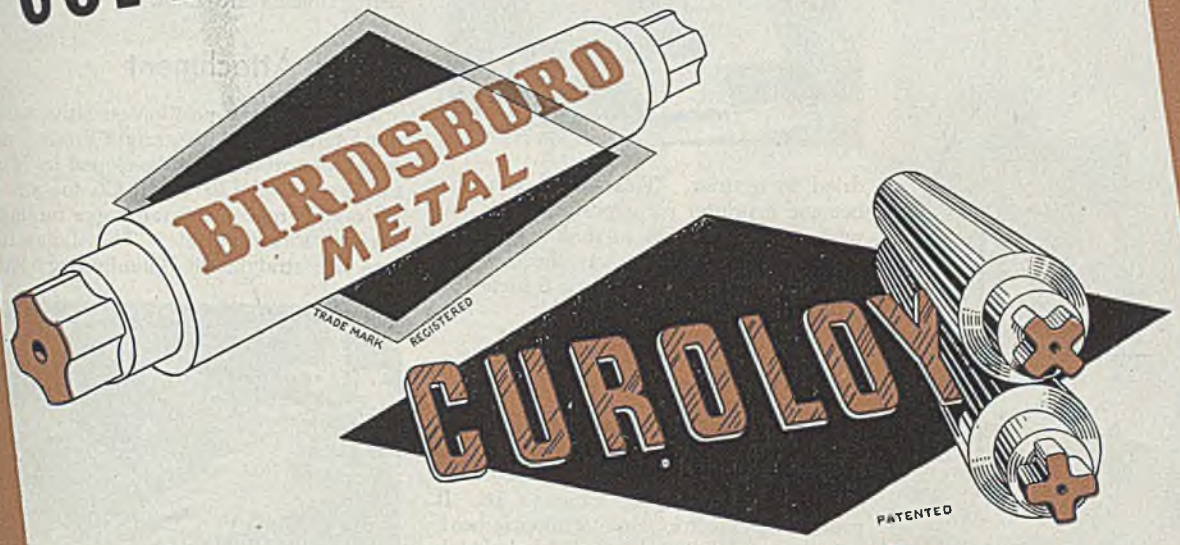
Height Indicator

Designed for use on a surface plate, a new type height indicator with Electrigage that gives a positive and accurate reading is announced by Sheffield Corp., Dayton, O. The instrument includes a surface plate block, a 26-inch column with rack and an Electrigage, 1000-1 amplification, smallest graduation 0.0001-inch, with electric pickup head mounted on an adjustable extension arm. A micrometer is provided for 8.32-inch vertical adjustment of pickup head.

The mounting bracket is adjustable

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

COPPER BEARING ROLLS



BIRDSBORO 30 ROLLS PATENTED

BIRDSBORO 40 ROLLS PATENTED

Type Rolls (Pat.)

Birdsboro "30"
Birdsboro "40"
Birdsboro Metal
Curoloy
Grainloy
Superloy
Bronze Wabbler

Are you sure you are using cast rolls that are least susceptible to "firecracking"?

Rolls with "firecracked" rolling surfaces do not increase the quality of the surface of rolled products.

Birdsboro Copper Bearing Rolls—because of their rapid heat-dissipation characteristics—reduce "firecracking" to a minimum.

Consult our roll engineers regarding our "individualized" roll service for answers to your roll problems.

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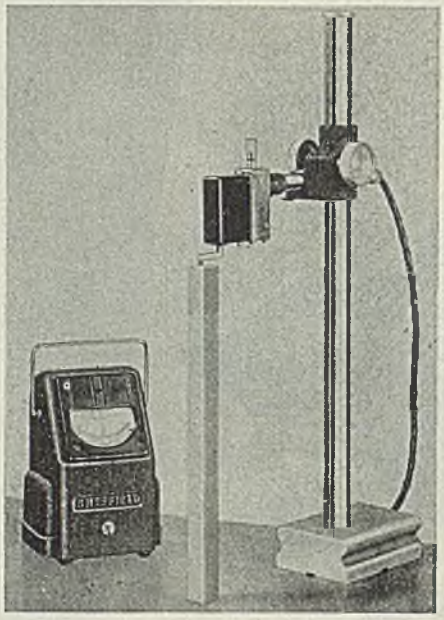
ROLLS

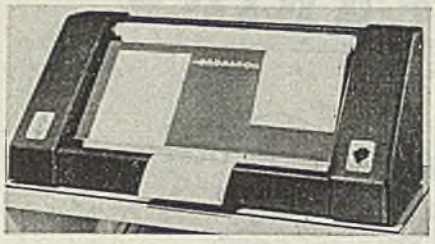
vertically with a capacity to 18 inches. The extension arm can be adjusted to bring the pickup head to any location, with a throat capacity, gaging point to edge of column, 4½ to 11 inches, and



gaging point to edge of base 3½ to 10 inches. The pickup head can be rotated and locked in position within a full range of 360 degrees, while a fine adjustment knob facilitates the coarse and fine setting-up.

Continuous Printer

Charles Bruning Co., Chicago, announces the BW-Copyflex model 2 continuous printer. With this unit anything drawn, typed, printed or illustrated may be duplicated. The printer exposes, with the use of special materials, tracings, line drawings, specifications, Van Dyke negatives, blue prints, etc. Original material with copy on both sides can be reproduced on either side or both sides. The prints are developed in trays and



dried in a drier. This model can also become a printer for exposing black and white prints. It fits in desk top space. It exposes roll stock or cut sheets up to 24 inches wide at a speed of 5 inches to 30 inches per minute.

Arc Torch

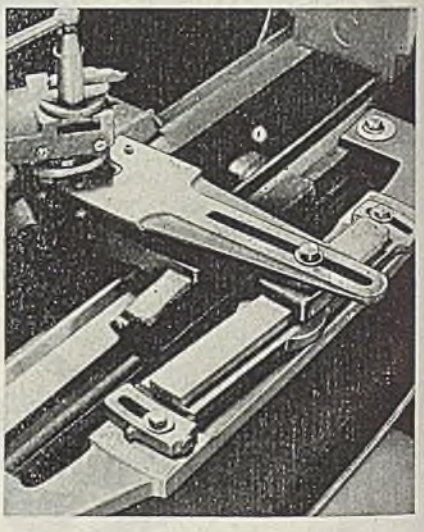
For use in conjunction with electric arc welders, the new 9000 arc torch is announced by Mid-States Equipment Co., 2429 South Michigan, Chicago 16. It provides an electric flame of intense heat, approximately 9000 degrees Fahr., which is pure heat without oxygen or other gas to contaminate the weld, and there

is no pressure to force molten metal away or to blow holes in light sections.

This torch can be used with any alternating or direct current electric welder for welding aluminum and its alloys, brass, bronze, red brass, phosphorus bronze, silicon bronze, nickel silver, cast iron and other copper and nonferrous metals and alloys. It can also be used for the following operations: Brazing steel, cast iron, malleable iron, copper, brass, bronze and other ferrous and nonferrous metals; preheating all metals prior to welding; soldering all ferrous and nonferrous metals; straightening and bending; hard surfacing where wear resisting metals are used.

Taper Attachment

For use in any position on lathe, without interference with straight turning, the new taper attachment developed by Master-Taper Co., 126 North Clinton street, Chicago 6, makes accurate taper turnings, borings, threading, etc. The sliding fixture has straight gibs eliminating vibra-



tion and tool play. Graduations are in inches at one end and in degrees at the other end of the swivel bar. It tapers up to 3½ inches per foot, 16½ degrees maximum in either direction, 7½ inches in length at one setting. The tool can be fitted to several popular models of lathes.

Heat Treating Fasteners

(*Continued from Page 77*)

conveyor furnaces, supply atmosphere gas which prevents oxidizing or decarburizing of material in the hardening furnaces. One of these prepared atmosphere machines is of sufficient capacity to supply two of the furnaces, thus permitting the overhaul of one generator without interrupting peak production of any one of the furnaces. Bright or dark finishes of various types of fasteners being treated are made possible by control of gas analysis.

The most important feature of the oil quenching system is the use of automatic temperature control, holding it very close to 100 degrees Fahr. at all times. A 3000-gallon storage tank, motor-driven pumps, a bank of cooling coils and automatic controls make up the oil quenching system. Cooling coils consist of two pipes, one within the other, with the oil passing between the two pipe surfaces. In most cases, sufficient cooling is provided by radiation from the outer pipe walls into the atmosphere. If this does not remove the heat fast enough, water is forced through the inner pipe, also cooling the oil. Oil and water may be shut off from any of the stands without stopping operation in any of the others by valves located between stands and manifolds.

Cooling Controlled Automatically

Cooling control is accomplished by regulating the amount of water pumped through the coils. At one time the cooling was controlled by hand with the result that the temperature of the quenching solution varied considerably. Now with the installation of automatic temperature equipment, the variation in temperature has been virtually eliminated. Not only did automatic control of water cooling pumps reduce the temperature variation to within 1 or 2 degrees, but consumption of water was reduced to such a great extent that more than $100 monthly has been saved on this item alone. Besides the saving in water consumption, the uniform quenching conditions allow for a significant saving in the amount of quenching oil consumed. If quench is too hot, oil is lost in vapor and if quench is too cold, more oil is dragged out with the work.

Another unusual feature of the oil quenching system is the arrangement for reclaiming oil picked up by the material and carried out of the quench bath. Water from the rinse, carrying this excess oil, is passed into a separate tank which has a selective overflow arranged to drain the oil which collects at the top. As the oil level in the tank rises, it overflows into a separate reservoir. This oil reclaiming system requires no attention and no maintenance but it saves the company hundreds of dollars every year in reclaimed oil.

At the bottom of the quenching tank, the fasteners are picked up by a second conveyor belt which carries them through an open mesh conveyor to drain off ex-

We're on the job...
DAY AND NIGHT!

Repairs speeded at vital iron mine

At 11:30 one Saturday night, our Twin City manager received an urgent call at his home. An alloy steel shaft was needed to repair a breakdown that was delaying operations at an important iron mine.

Our men got on the job and got the steel ready. The mine sent a truck to our warehouse at 4:30 A.M. to pick it up—getting back to the mine at 8:00 A.M. Another example of the teamwork that makes our service to customers so outstanding.

Rush job for the AAF

At noon, one Saturday in September, 1944, a call came to our St. Louis warehouse from an Army Air Field. Could we cut some 18,000 lbs. of steel angles into 20-foot lengths and load them onto an Army truck at 8:00 A.M. Sunday? We could and we did—meeting an important emergency.

NEED STEEL? *Call us...*

Stocks in our warehouses today are larger and there is a wide variety of steels available for quick shipment. If you need steel, steel products, tools, equipment or machinery, phone, write or wire our nearest warehouse. The chances are that we have what you want, so a call to us may solve your problem—avoid serious delays to vital war production. Our stocks include the National Emergency Alloy Steels which have proved so satisfactory for many applications. Your orders or inquiries will receive careful, courteous attention and immediate action.

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UNITED STATES STEEL

cess oil. Then the fasteners pass through a wash and spray of sodium sesquisilicate which is held at 180 degrees Fahr. They are then deposited in containers for transportation to the draw furnaces.

The National Screw & Mfg. Co. has six electric Homo drawing furnaces of the dense-load type. The four largest furnaces each have a capacity of 1000 pounds per hour, one has a capacity of 600 pounds per hour and the smallest a capacity of 200 pounds per hour. The second heating operation in the heat treating cycle is performed in these furnaces at some predetermined temperature, usually from 800 to 1000 degrees Fahr. This operation is performed in either one of two types of furnaces. One type is the electrically heated type known as the Homo drawing furnace, previously mentioned. The other type of drawing furnace is heated by means of recirculating gases which have been produced by burning natural gas in a combustion chamber.

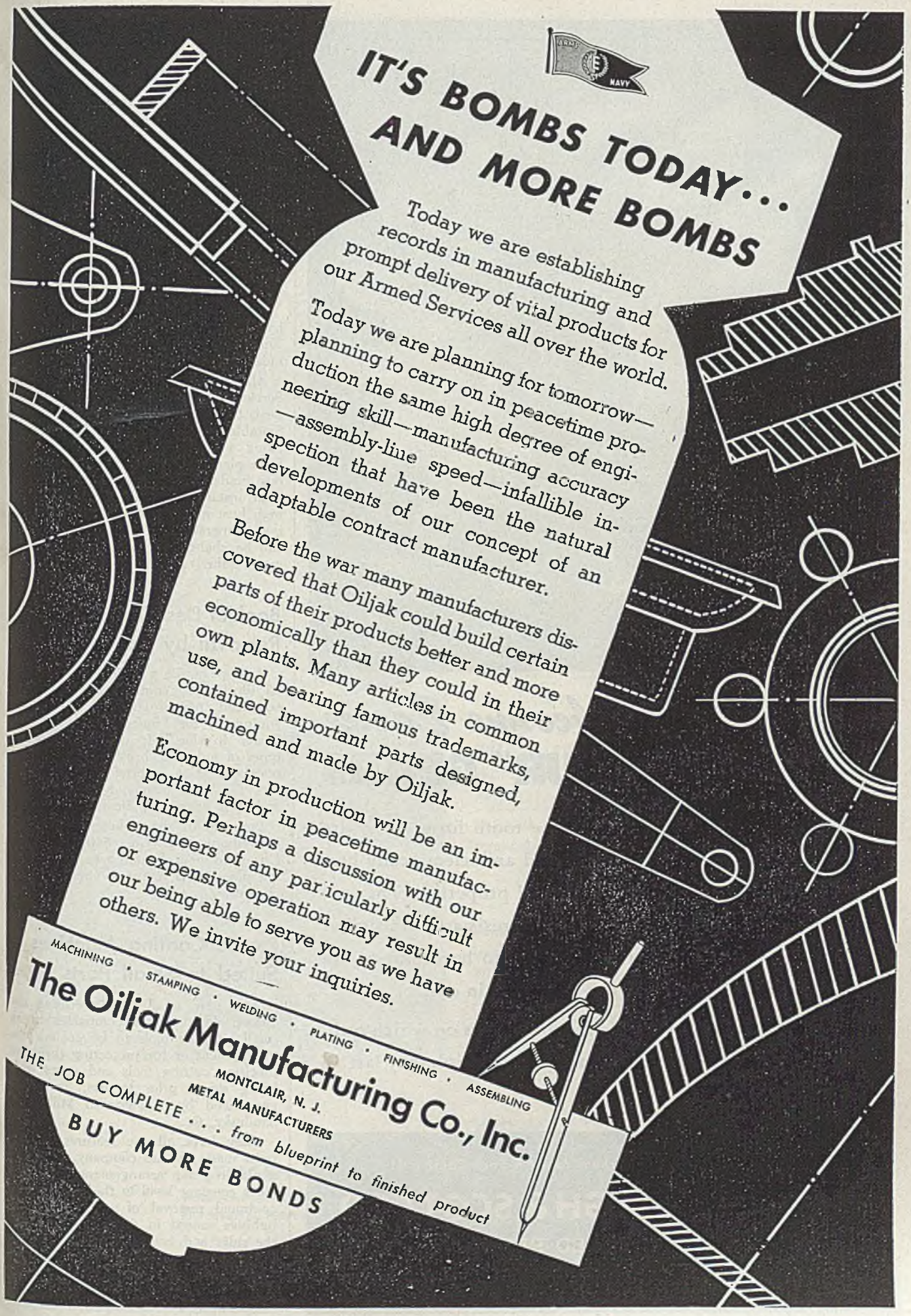
Forced Air Is Circulated

The power on the smallest of the electric Homo furnaces is 20 kilowatts and the power on the largest is 64 kilowatts. Forced air is circulated around the work in these electric air-draw furnaces. Effective operating temperature range of the furnace varies from 400 degrees to 1200 degrees Fahr. By recirculating air through the work, it is possible to bring the temperature up to point of operation in a very short time. Material generally is held in the furnace about 2 hours. About ½-hour is required to bring the work up to proper temperature. These furnaces have automatic temperature recording controllers and function to an accuracy of plus or minus 10 degrees Fahr.

Naturally, the heat treating time and methods for various types of fasteners differ. For example, the National Aircraft Standard close tolerance bolt is heat treated to a temperature of 1550 degrees Fahr. in the electric-belt-conveyor continuous furnace for 20 minutes after it has reached desired temperature. It is then oil quenched and placed in the air-draw furnace for 2 hours at a temperature of 850 degrees Fahr. Hardness is rockwell C 36-39. Tensile strength ranges from 160,000 to 180,000 pounds per square inch. Types of steel used are A-4037 (AN-S-9) and NE 8635 (AN-S-15) on small diameter bolts and NE 8740 (AN-S-16) on large diameter bolts.

The standard aircraft hex head cap screw, referred to as AN hex heads, are heated to a temperature of 1550 degrees Fahr. in the conveyor furnace for 20 minutes at temperature and then oil quenched. In the air-draw furnace, they are heated for 2 hours to a temperature of 1000 degrees Fahr., 150 degrees higher than the close tolerance aircraft bolt. Rockwell C hardness ranges from 26 to 32 and its tensile strength is 125,000 to 145,000 pounds per square inch. Type of steel used for this item is A-4037.

Temperature treatment for automo-


IT'S BOMBS TODAY...
AND MORE BOMBS
Today we are establishing records in manufacturing and prompt delivery of vital products for our Armed Services all over the world.
Today we are planning for tomorrow—planning to carry on in peacetime production the same high degree of engineering skill—manufacturing accuracy—assembly-line speed—infallible inspection that have been the natural developments of our concept of an adaptable contract manufacturer.
Before the war many manufacturers discovered that Oiljak could build certain parts of their products better and more economically than they could in their own plants. Many articles in common use, and bearing famous trademarks, contained important parts designed, machined and made by Oiljak.
Economy in production will be an important factor in peacetime manufacturing. Perhaps a discussion with our engineers of any particularly difficult or expensive operation may result in our being able to serve you as we have others. We invite your inquiries.
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tive cap screws in the continuous furnace is the same as the other two—1550 degrees Fahr. for 20 minutes. This work also is oil quenched and then placed in the air-draw furnace at 1000 degrees Fahr. for 2 hours. It is given the brinell test with a range from 207 to 263 and its tensile strength must be 105,000 pounds per square inch minimum. Type of steel used on this item is C-1038.

One very important product in which a carburized case is required are hub bolts for trucks and other automotive vehicles. This is accomplished in rotary retorts with natural gas containing approximately 80 per cent methane to provide the carburizing atmosphere.

Sheet metal screws require a very hard surface with a tough, ductile center. They are usually treated in a liquid cyanide bath.

All the tools and dies used by National Screw & Mfg. Co. are manufactured and heat treated to its own specifications. Suitable equipment is available for hardening a complete range of tool steels from plain carbon die steel to the various grades of high speed steel. Salt-bath installation consists of a preheat, high heat and quenching pots. Operating temperature of high heat operation can be changed from 2100 to 2350 degrees Fahr.

Booklet Describes Burr Removal by Power Brushing

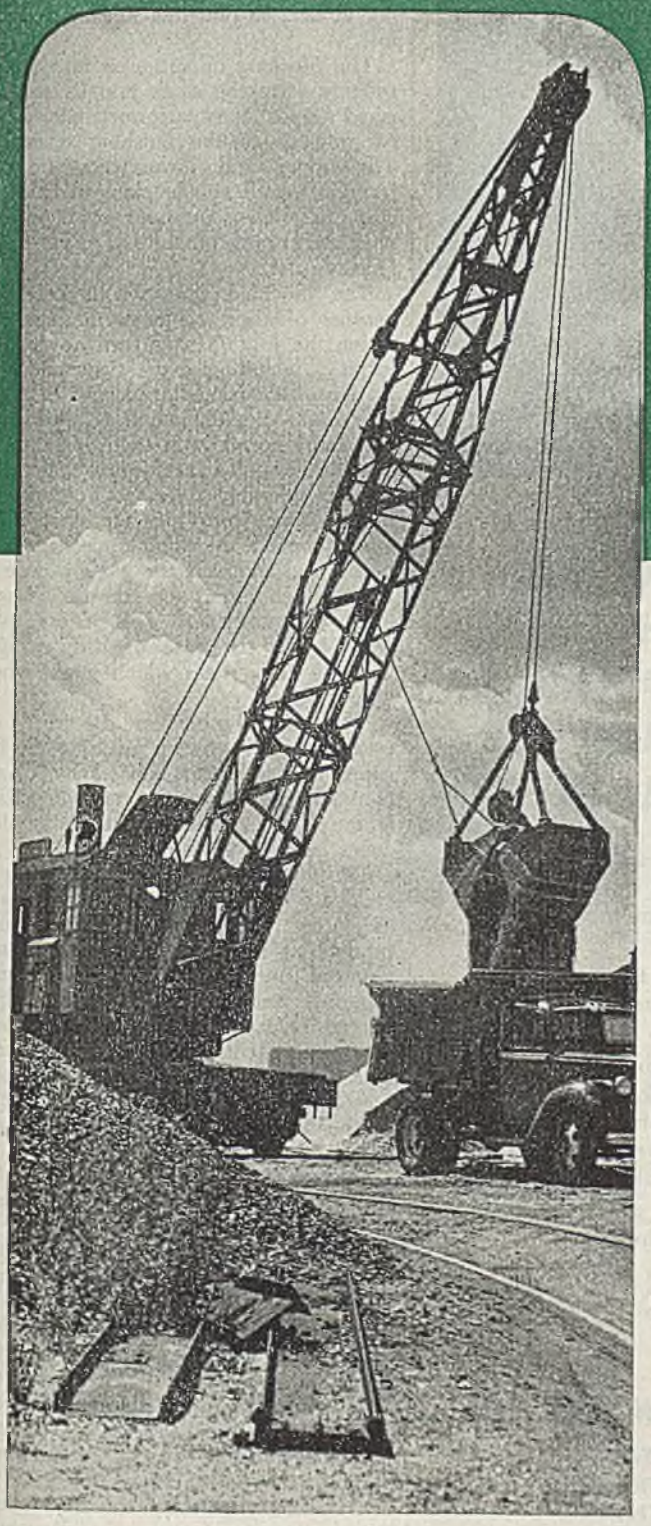
A 15-page, 8½ x 11 inch booklet with 23 illustrations contains information on advanced techniques, procedures and equipment for "Removing Burrs With Power Brushes." It describes different types of industrial brushes and their applications. Also, a brief summary chart lists the most commonly used brushes and their general applications.

Prepared by the technical department of Osborn Mfg. Co., 5401 Hamilton, Cleveland, and of interest to metal working plants, this report is offered free of charge.

Plastic Coating Machines Suited to Small Parts

Two new small plastic coating machines, designed for companies having small parts or tools to be coated prior to shipment or for protecting their own precision cutting tools and gages while being stored prior to use, have been announced by Youngstown Miller Co., Sandusky, O.

They have all the features of large units made by the company. Each has a plastic pump arrangement which provides constant level in the dip tank and continual removal of surface film and bubbles caused in dipping. Oil jackets the sides and bottom of each tank. Oil and plastic are thermostatically controlled so that the electric heaters are shut off when either reaches its ceiling temperature.



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Forging Practice

(*Continued from Page* 80)

ing in size, so that less stock is actually lost.

The *blocking* operation is intended to roughly form the stock into its semifinished shape. It is performed immediately previous to the finishing operation. The upper and lower dies are not brought together in blocking and the excess materials sometimes overflow and must be trimmed before it goes to the finishing die.

The blocking operation is necessary because of abrupt changes in shape between the forging slug and the finished forging, including depressions and protrusions. By using the blocker as an intermediate die, the metal is allowed to flow more normally in each operation.

If the shape of the forging is intricate and considerably different in cross-sectional shape from the bar stock used, more than one blocking impression may be utilized and thus the work is done in steps which entail less drastic changes in shape and size. This is especially valuable in the case of drop forging sensitive alloy steels which might otherwise crack.

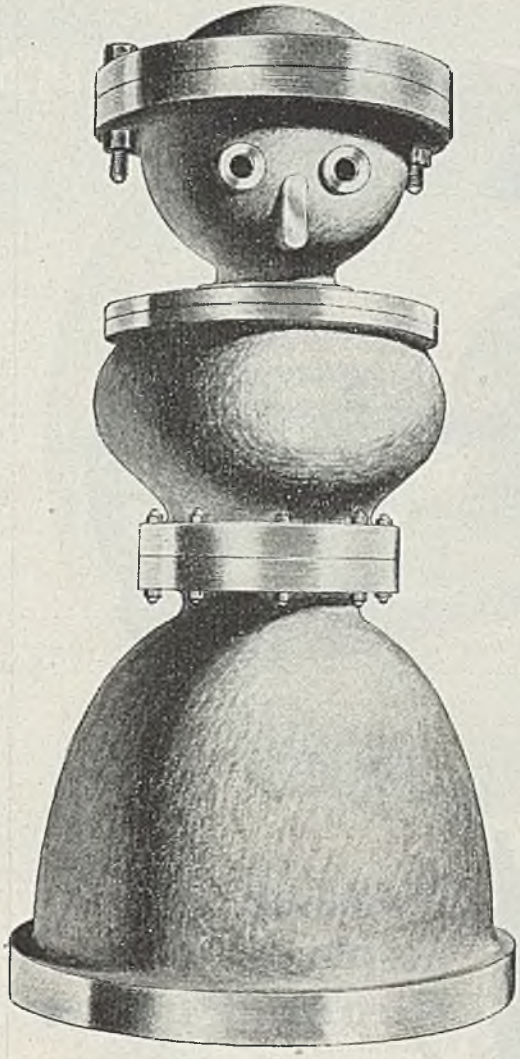
The use of the blocking die greatly increases the life of the finishing die because of less wear caused by drastic hammering. This is very important where it is necessary that close tolerances be held in the finishing die.

The *finishing* die is so designed as to yield a forging of dimensions and shape as closely similar to the finish machined product as is practical from the standpoint of future heat treatment and scale removal, and intermediate assembling operations, such as welding, etc. These dies are machined to close tolerances and it is very necessary that the hammer operator match them very exactly in the hammer to insure perfect alignment.

In operation, they are the only forging dies whose surfaces are brought into contact with each other. A gutter is machined into the die surrounding the forging to accommodate the thin flash or fin which is formed. This flash is necessary to accommodate the overflow and insure complete filling out of the die. In some cases, involving very simple forgings or small quantities, the raw material may be worked directly into the finishing die by gradual and carefully controlled blows.

Trimming is usually the final operation in the manufacture of a drop forging. The fin or flash which occurs in the finishing operation is removed usually in a trimming press equipped with a lower die design very much like a "cookie cutter." A punch the shape of the forging is forced through this concentric die pushing the forging through the opening and at the same time shearing off the flash and leaving it behind. The flash is also sometimes removed by grinding.

Certain other operations are sometimes used which aid in obtaining the desired shapes more easily. These in-



Going out with the Army . . . at her age?

IT used to be months before a casting outgrew its brittleness and was *mature* enough to go anywhere. Naturally, that was costly, keeping "green" castings around for necessary seasoning out-of-doors.

Now, castings are seasoned to meet even the unusual requirements of war production in a few hours' time—by *industrial refrigeration.*

This is just one of many interesting ways in which Refrigeration and Air Conditioning are serving American industry-at-war.

General Electric engineers, in order to meet war-time conditions, have vastly improved industrial refrigeration and air conditioning equipment. Today, it is more compact, more flexible, more efficient.

When the war is over, these improvements will be reflected in a host of better things for peacetime living . . . better, and costing less, thanks to General Electric.

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General Electric Co., Air Conditioning and Commercial Refrigeration Division, Section 451, Bloomfield, N. J.

Air Conditioning by

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clude punching out of webs and bosse twisting, reduction of draft, forming an close tolerance operations such as "coin ing," "sizing," and "planishing." Com bination dies are used where possible o small forgings. In this instance, one se of die blocks contains all the impres sions necessary to carry out the variou successive forging steps. This save much time otherwise consumed in chang ing dies, besides additional furnace heat ings.

The design of the forging has usuall included generous fillets and edge radi kept thin webs and tolerances as larg as practicable, and as previously men tioned, provided draft angles to facili tate the removal of the forging from th die. The parting line of the dies shoul be located in such a way as to take ad vantage of natural draft angles an thereby reduce excessive machining Fillet radii below ⅛-inch restrict th flow of metal into the deeper recesse of the die and cause "cold shuts" o folds. If the edge radii are too small excessive hammering is necessitated which causes rapid die wear and earl breakage. Thin webs cause difficul forging, because the heat is dissipate so rapidly through the relatively grea area of metal which is in contact wit the cold die, in comparison with the to tal volume of hot metal in the web.

Drastic Hammering Is Required

In order to move this cooled metal more drastic hammering is necessary an this is very apt to cause die breakage Sometimes depressions at the outside o the web fill with metal or offer stron resistance to filling before the web is re duced to the desired thickness. Fur ther flow of metal into the flash gutte then causes these newly formed protru sions or flanges on the forged part t shear away from the web, due to th extra strain exerted on the junction.

The principle of drop forging is th confined flow of the closed contour die The plastic metal is forced to fill ever portion of the cavity in the die. In cal culating the weight of the forging slug a slight amount of extra weight is adde as a safety factor in order to insure com plete filling of the die, the excess pro ducing a fin in the flash gutter of the die

When the plastic metal is upset s that it touches the outer confining wal of the die, a pressure is exerted and, du to this confinement, it is transmitte through the heated slug, causing it t flow into any cavities in the top of th dies. In order to accomplish this, th forging temperature must be kept high enough to insure plasticity and to over come the cooling effect of the dies. How ever, the temperature, and time at tem perature, must not be so great that burn ing or extreme grain growth takes place as both weaken the material.

If too drastic a deformation is at tempted, the plasticity will be counter acted by fractional and chilling effect o the die surfaces and metal flow will fol low the path of least resistance into th flash gutter of the dies. This produce an incomplete forging with heavy fins o

WHERE THERE'S DEPENDABLE PERFORMANCE YOU WILL FIN

THE STRENGTH AND TOUGHNESS OF FORGING

THE DEVELOPMENT of the full strength and toughness inherent in a specific grade of steel is continued throughout the forging process. Forging with closed impression dies concentrates grain flow and fiber structure at points of greatest shock and stress to obtain high tensile and impact strength, toughness and high fatigue resistance—*qualities which underlie dependable performance.*

Many manufacturers have found, by re-checking parts against the 7 advantages that forgings offer, opportunities to improve their product, to reduce weight, to reduce cost, to speed up assembly. A re-check of the parts you use may reveal unusual benefits which have been neglected or overlooked. Consult a forging engineer connected with your source of supply. His broad experience will be helpful to you in obtaining the advantages which forgings offer.

These Are Other Advantages

FORGINGS PERMIT THE USE OF A LOWER FACTOR OF SAFETY IN DESIGNING BECAUSE OF HIGH STRENGTH AND TOUGHNESS

FORGINGS LESSEN SCRAP; UNUSUALLY FREE OF CONCEALED DEFECTS; PRACTICALLY NO REJECTIONS

FORGINGS REDUCE ACCIDENTS TO MEN AND MACHINES THROUGH A GREATER MARGIN OF SAFETY

FORGINGS REDUCE DEAD WEIGHT THROUGH MAXIMUM STRENGTH IN LIGHTER SECTIONAL THICKNESSES

FORGINGS FACILITATE RAPID ASSEMBLY THROUGH WELDING ADAPTABILITY

FORGINGS REQUIRE LESS TIME TO MACHINE AND FINISH BECAUSE SHAPED IN CLOSED DIES

This new booklet will help you to avoid misestimating the qualities required to meet a specific service condition. Metal quality can be developed to the exact degree required by the forging process, and this booklet presents many examples that prove it. It contains 40 pages of factual information about the development of maximum strength and toughness in forgings. Over 200 illustrations are used, most of them for the purpose of showing directioned fibre structure, or grain flow as obtained by forging. This booklet has been prepared for the guidance of design engineers, metallurgists, and other technicians, production and management executives; whose task it is to determine the metal quality required for *safety and dependable performance.* Ask your source for forgings for a copy, or write direct.

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☐ Booklet on "Metal Quality – How Hot Workin Improves the Properties of Metal."
☐ "Drop Forging Topics," issued ten times a yea

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flash. In such cases, the drastic c formation should be avoided and seve successive steps used with blocking di gradually altering the shape.

Figs. 20, 21, and 22 illustrate succe sive steps in the manufacture of thr different types of drop forgings.

Effect of Composition on Forgeabilit

Among the metals which are comme cially forged are steel (including tho sands of different alloy modification aluminum and some of its alloys, ma nesium, copper, forging brass, son bronzes and monel metal. Steel is, course, by far the most important tonnage.

Low carbon steel is very easily forge and results in the least wear on dies an equipment. It is the material frequen ly handled by blacksmiths. Increas in carbon content cause an increase forging difficulty and more wear on th dies. Even high carbon steel, howeve is commercially forgeable.

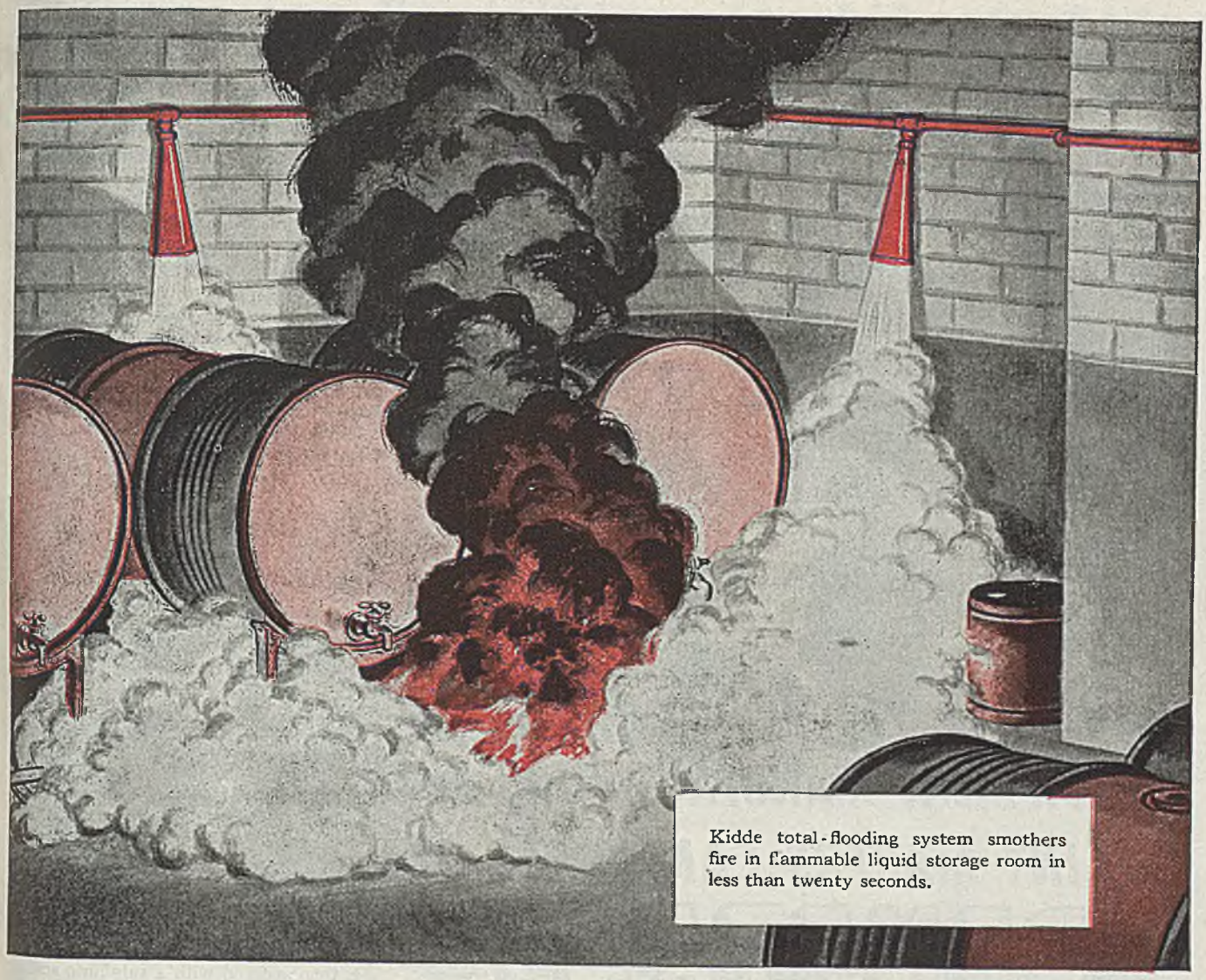
All of the low alloy steels (such as th SAE-3100, 3300, 4100, 4300, etc. serie are forgeable, although somewhat mo difficult to forge than carbon steels. I crease in alloy content shows a very d cided tendency toward more difficu forging. Certain highly alloyed stee are designed for use at high tempera tures and, therefore, exhibit grea strength at the forging temperatur This makes them extremely difficult t forge, as they offer strong resistance t deformation. Some of the highly a loyed steels are impossible to forge with out cracking.

The distinction between steels an nonferrous alloys is not clear when som of the complex modern alloys are con sidered. Some of these contain ten o more different alloying elements and consequently, the amount of iron in th alloy diminishes with the increase in al loy content. Molybdenum and tungste increase the strength and hardness a high temperatures and additions of thes elements increase the resistance of th metal to deformation by forging. Titan ium, beryllium and boron very greatl affect forgeability even in small amount

Manganese in moderately smal amounts is beneficial, because it coun teracts the detrimental effect of hig sulphur. Iron sulphide which is presen when the manganese content is too low forms in the grain boundaries and cause "hot shortness." The iron sulphide melt at a lower temperature than the steel At the forging temperature, it forms mushy phase in the grain boundarie and causes cracking and disintegratio under the impact of a heavy hamme blow.

When an excess of manganese is pres ent, it has a stronger affinity for th sulphur than the iron has, and there fore manganese sulphide is formed Manganese sulphide is not a low meltin constituent such as the iron sulphide i and, therefore, is not detrimental t forgeability.

Certain austenitic alloys with chro mium and nickel as the basic constit uents are nonheat-treatable. In order t raise the hardness and physical proper



Kidde total-flooding system smothers fire in flammable liquid storage room in less than twenty seconds.

BEFORE TOUGH FIRES GET TOO TOUGH

. . . *blast them out with Kidde!*

KIDDE KILLS TOUGH FIRES

In fighting the tough fires—the fast-moving ones that break out in flammable liquids (class B); and the hard-to-get-at types that start in electrical installations (class C)—you've got to smother them fast or they'll spread beyond control in a few minutes.

Ordinary water-type extinguishers can't control these tough fires. But built-in Kidde systems, employing carbon dioxide, will smother them in a matter of seconds. That is why Underwriters' and Factory Mutual Laboratories approve Kidde for fighting *both* these types of fire.

Some of the Kidde built-in systems are so designed that the fire can be automatically isolated, and the room quickly filled with flame-suffocating carbon dioxide. This gas—being dry, inert, odorless and non-toxic—leaves no after-fire mess to be cleaned up, cannot damage any materials; and does not contaminate or otherwise spoil costly processes. In brief, Kidde is one of the speediest, cleanest and most effective fire extinguishers in use today.

So, check this list (at right) now. Does even *one* of these hazards exist in your plant? If it does, write Kidde today. Ask to have a Kidde representative call upon you. He'll be glad to share his fire-prevention know-how with you.

K Kidde

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Ovens
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Motors
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Agitators
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ties in these alloys, it is necessary to co forge them. Cold forging takes pla at a temperature below which the met is not self-annealed during forging.

This temperature is called the r crystallization temperature becaus while the crystals are distorted duri hot forging, the residual heat in th metal is sufficient to relieve the strai and reform the crystals.

In cold working, the temperature not sufficient to affect the distort grains. Subsequent annealing at th cold-working temperature relieves th forging strains, but does not alter th distorted grains or crystals.

This distortion is the source of i creased hardness and strength, and some alloys, aging at this temperatu further increases the hardness by cau ing precipitation to take place.

Spot Test Speeds Sorting of Bronze

Speed in sorting aluminum bronz from manganese bronze among scrap ma chine parts intended for industry's calo rons has been made possible by a simpl but accurate acid "spot test" announce by the United States Bureau of Mines.

Developed at the Bureau's Central E periment Station at Pittsburgh, the "spo test" removes guesswork hitherto inescap able in distinguishing between thes bronzes because of their varied composi tion, according to a new Bureau repor prepared by L. B. Corbett, metallurgis

To make the test, a small area on th surface of the bronze part is cleaned b grinding. The freshly prepared surfac is then sprayed with a sulphuric acid so lution by means of an inexpensive spray ing device which utilizes the glass tip o a medicine dropper, a rubber pressur bulb, a rubber-stopped bottle containin the solution, and a small-bore glass tub which extends through the stopper to im part the spray.

After the acid has reacted with th metal for several seconds, a drop of indi cator solution, consisting of varied weight of ammonium-mercury thiocyanate, silve nitrate, and ammonium persulphate, i applied with a medicine dropper.

Almost instantaneous reactions tak place which produce a colored spot. I the part is made of manganese bronze, grayish-purple spot appears, but if it i of aluminum bronze, the resulting spo is greenish-yellow.

Flexible Tubing

Designed to meet many new require ments of industry and aviation, a 6 incl inside diameter size has been added to line of Rex-Flex stainless steel flexibl tubing manufactured by Chicago Meta Hose Co., Chicago. This increases th range of sizes from ⅛ inch to 6 inche inside diameter inclusive.

These units feature non-corrosive, dur able and pressure-tight characteristics and they are bendable in multiple plane for easy installation and long flexing life

Galvanizing Ventilators for Liberty Ships

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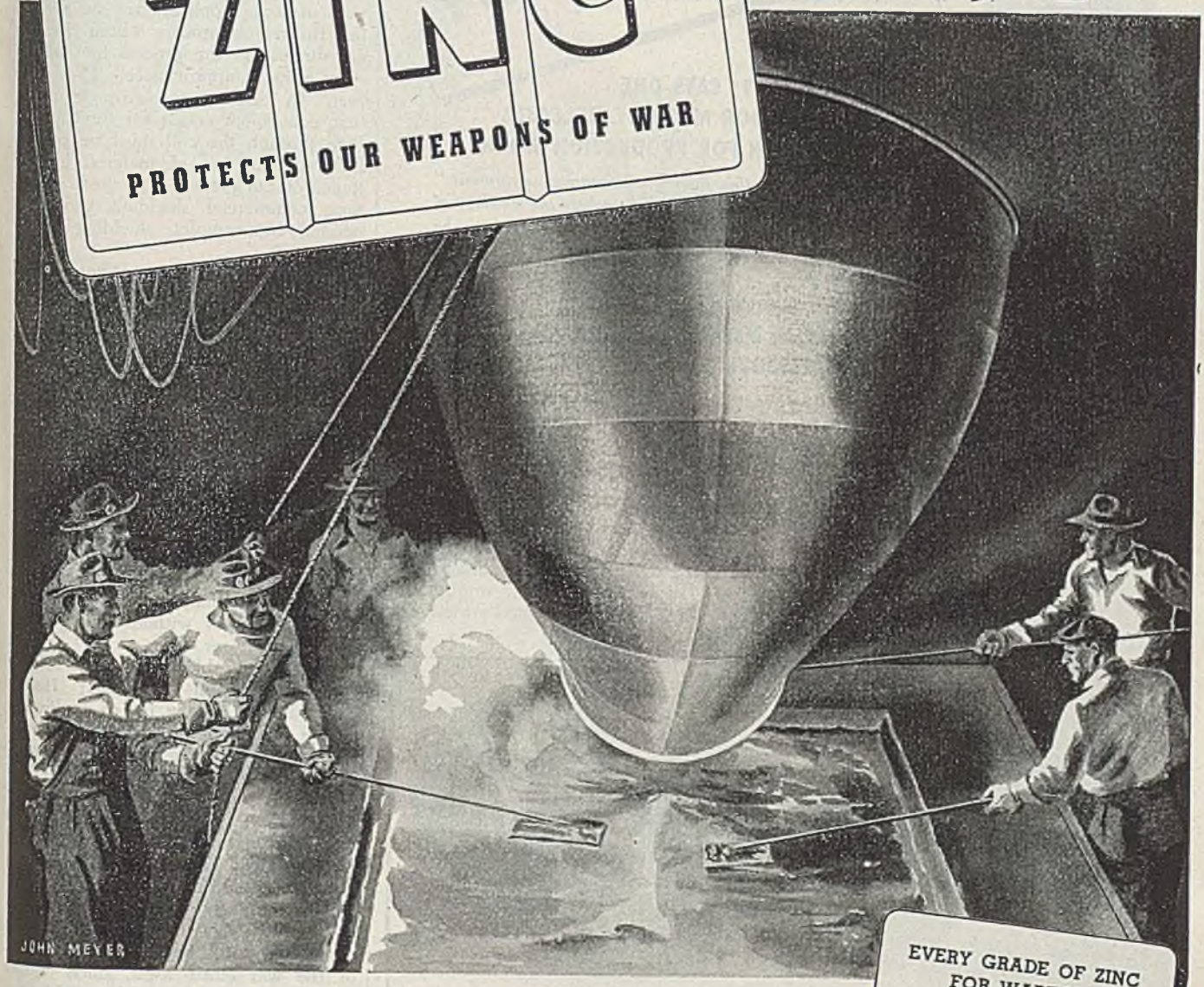

★ Wherever iron or steel is exposed to the attacks of rust and corrosion, galvanizing, or zinc coating, offers by far the best protection. Today zinc protects thousands of items of war equipment on land, sea and in the air . . . tomorrow zinc will serve equally well in the protection of thousands of peacetime products.

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COLUMBUS, OHIO CHICAGO ST. LOUIS NEW YORK

Induction Heating

(*Continued from Page 82*)

introducing the material to be heate into the electromagnetic field of the wor coil, he said, free and convenient acce to the work coil circuit always is nece sary if the production advantages c the induction heating process are to b realized.

"An example of the size and magn tude of some applications," he said, "i the tin reflow process where the coil are directly in the process line and oc cupy a space approximately 15 x 6 x feet. In case of the strip tearing i two, convenient access for threading th strip through the coil must be possible Delays mean loss of material in othe stages of the process. In these installa tions commercial shielding was incor porated, but complete shielding was im practical."

Shielding a Problem—Whereas smal equipments are portable and are move around a shop to the work to be done complete shielding could be accom plished only if the complete shop roon were shielded, said Mr. Madsen. "Th use of a complete shield around th work coils will often slow up the proces to the point where the production wil not justify the use of radio frequency generators." Satisfactory ground con nections to make set and process shield ing completely effective are not always possible, particularly with portable equip ment. Another situation which arises frequently is a major change in applica tion by the user without knowledge of the manufacturer.

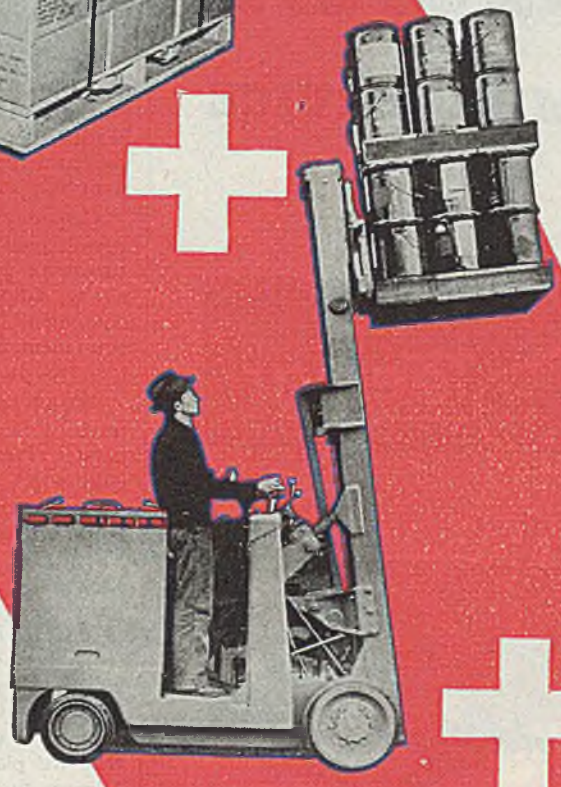
J. Wesley Cable, director of research and development, Industrial Heating Corp., recited a long list of applications of the induction heating process in the war production program. In particular, he described how millions of shells left over from the previous war were provided with new nose adaptors and made useful in this war, thus filling in the gap when war contractors were converting their plants to make shells. "High frequency induction heating is not simply a tool that is used in the war effort," he said, "but is definitely a part of the war effort itself, since changes in designs to utilize induction heating brought about weapons which were unequalled in performance and could not have been obtained by any other means."

Electrotinning "Here to Stay"—Wallace E. Powell, Jones & Laughlin Steel Corp., Pittsburgh, while expressing his company's interest in induction heating for use as a "machine tool" and in other ways for manufacturing purposes, was particularly interested in its use for the reflowing or "brightening" of electrotinned plate.

"Electrotinning, we believe, is here to stay," said Mr. Powell. "It is a new production method that enables us to give an improved type of product. Control of coating weight allows us to give to the canned milk producers, for example, tin plate at a cost in line with the price of their product. Low coating weights allow us to make a rust-resisting

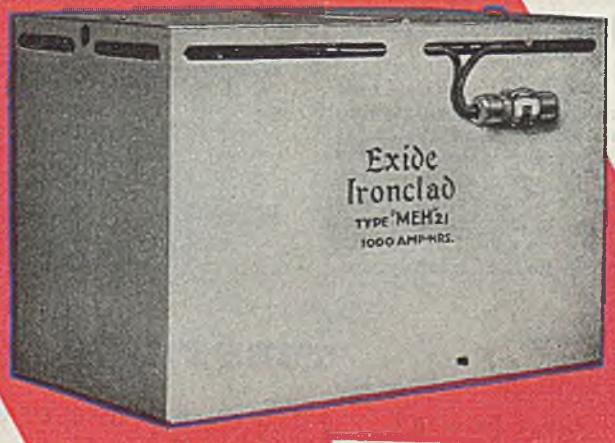
Palletized Unit Loads

. . . eliminate unprofitable handling
. . . cut handling time of operations
. . . increase warehouse capacity



Electric Industrial Trucks

. . . permit faster loading, unloading and load shifting



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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

product cheaper than bonderizing an equal in quality. Control of coatin weight, lower costs due to high-spee continuous production, high qualit make possible an entirely new line o tin plated products plus improvement o old products.

"Why do I mention all this? Becaus induction heating of the electroplate tin is an essential part of the entir process. Half of the electrotinning line today use induction heating to turn th white, easily-rubbed-off coat of ti leaving the plating bath into the shiny smooth, adherent coat that we see o the final product." This process bright ens tin plate without burning it, an without excessive unbrightened patches over a wide range of speeds, widths an thicknesses, said Mr. Powell. Inductio heating is particularly valuable in thi use also because it prevents damag from roll marks on the plate, he said

Simplicity for Steel Industry—Mr Powell pointed out that in selecting th circuit for generating the high-frequency power, simplicity has to characterize th equipment because the radio frequency equipment is a small part of a large in tegrated production unit.

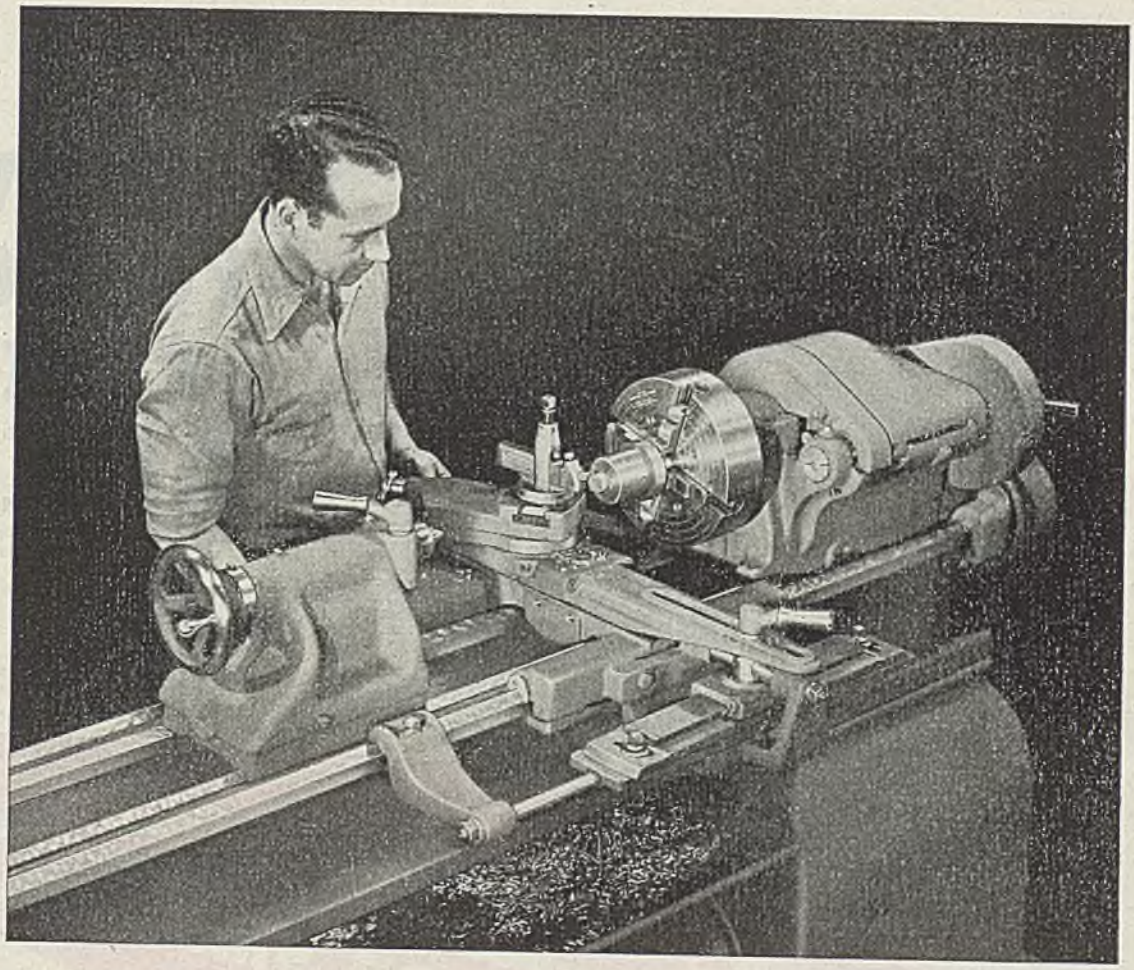
"Maintenance is done by part of a force of men already established in th plant. These men are not electronic engineers. They often started working when motor and motor control mainte-nance was all that was required of them These men have seniority rights strongly backed by a strong union. Equipment must be designed so that they can be trained to maintain that equipment. I worked in the field on the original in-stallation and operation of our two 600-kilowatt installations. I have been in-structor in the first of a series of courses that we plan to give these men. And I know, first hand, that you cannot train them overnight to maintain new types of equipment."

Another troublesome problem is shield-ing, said Mr. Powell. The two J & L units were designed to enclose the work coils in a copper-lined cabinet. One side of this cabinet has not been installed and never will be; problems that arise in operation make it essential that the work coils always are accessible.

In addition to the certainty that the electrotinning lines are here to stay, and that there will be more of them as time goes by, said Mr. Powell, further experience gives promise of another pos-sibility—continuous strip annealing.

200 KW Tubes Available—"Here in-duction heating may be combined with both furnace and conduction heating to make an improved product," he said. "Capacities up to 6000 kilowatts per unit may be used. Too many variables make prediction of unit size almost im-possible. However, sufficient power for such units is now a possibility. Already one manufacturer of power tubes has announced one of 200 kilowatts. That means we can make 400 to 800-kilo-watt single oscillators.

"Other possibilities are being consid-ered—annealing of wire, for example.



Precision —

THE DISTINGUISHING QUALITY OF SOUTH BEND LATHES

It is for their high precision that South Bend Lathes are best known. Their dependable accuracy has made them first choice for the most exacting work in hundreds of essential war production plants. Finish turning and boring operations are often performed with such exactness that subsequent grinding, honing, or lapping is unnecessary.

In war production, there is no place for equipment that can not hold required tolerances or deliver maximum output. Investigate the possibilities of South Bend Lathes for handling your exacting jobs with greater efficiency. With them, you will find it easier to maintain precision tolerances on toolroom and production operations.

South Bend Engine Lathes and Toolroom Lathes are made in 5 sizes: 9″, 10″, 13″, 14½″, and 16″ swing. Precision Turret Lathes made in 2 sizes: Series 900 having 9″ swing with ½″ collet capacity, and Series 1000 having 10″ swing with 1″ collet capacity.

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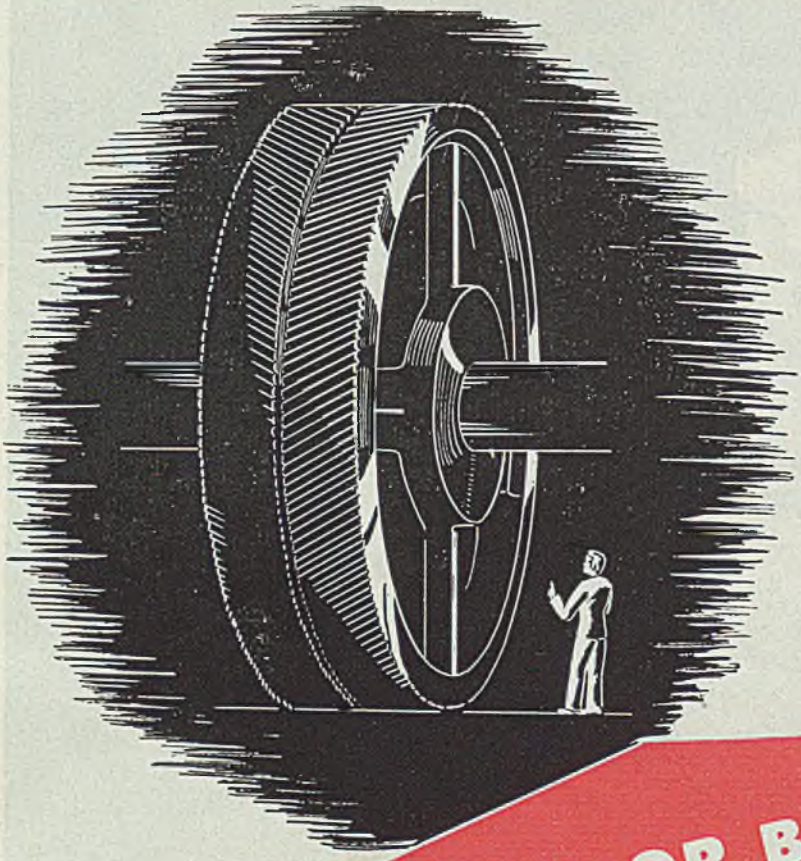
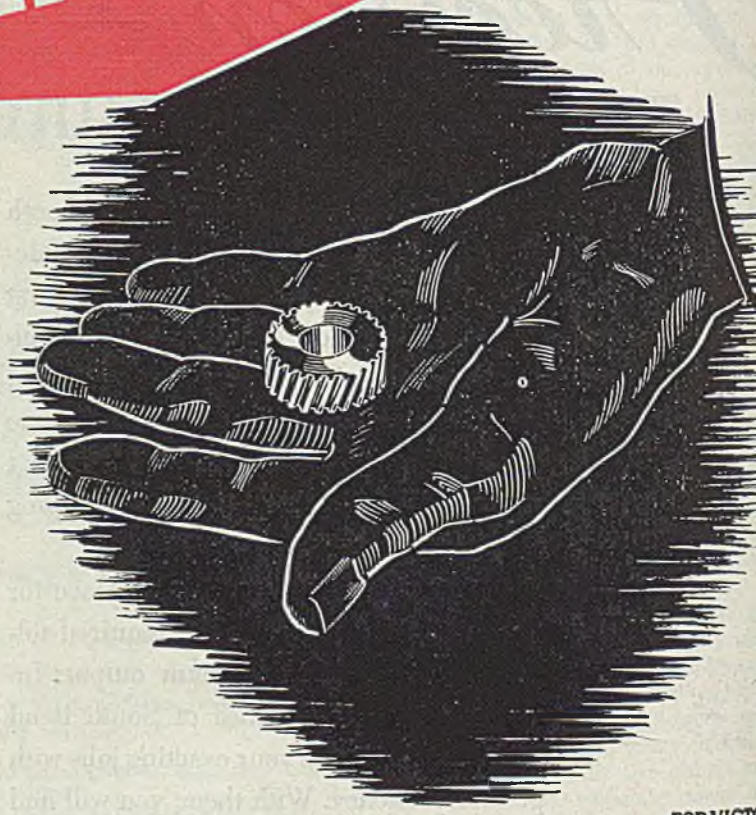


NOW YOU CAN FINISH GEARS

AS BIG OR BIGGER
AS SMALL OR SMALLER



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Helpful Literature

1. Gearing

Fairfield Mfg. Co.—16-page illustrated bulletin entitled "Fairfield For Fine Gears" shows and briefly describes 27 different gears and gear sets produced by company, including spiral bevel gears and pinions, worms and worm wheels, Zerold gears and pinions, spur gears, helical gears, splined shafts and complete differentials.

2. Lubrication Devices

Gits Bros. Mfg. Co.—172-page illustrated catalog No. 60 contains descriptions, application data and list prices of line of oil hole covers, oil cups, wick feed oilers, oil gages and sights, constant level oilers, sight gravity feed oilers, multiple oilers and oil and grease seals.

3. Heat Treating Baths

A. F. Holden Co.—32-page illustrated bulletin No. 120 contains technical information and application data on neutral baths for hardening and tempering. Various types of baths, their use and production results are listed.

4. Aluminum Alloy

Oscar W. Hedstrom Corp.—4-page illustrated bulletin on "OH38 Aluminum Alloy" lists characteristics, physical properties, typical tests and applications of this light weight alloy which is particularly adaptable for sand casting.

5. Muffle Furnaces

Claud S. Gordon Co.—4-page illustrated bulletin on "Muffle Furnaces" describes uses, temperature range, control, operation and gives specifications of multiple replaceable unit type muffle furnaces.

6. Manufacturing Facilities

Harnischfeger Corp.—32-page illustrated bulletin entitled "Three Score Years of Free Enterprise" relates story of this industry which produces overhead cranes, electric hoists, power shovels, electric shovels, arc welders, welding electrodes and welding positioners. Contributions of company to modern manufacturing technique are explained.

7. Metal Saw

Motch & Merryweather Machine Co.—58-page illustrated bulletin "The Cold Sawing of Metals" describes features of Triple-Chip method featured by company's cold sawing machines. Details are given on saw blades, blade sharpeners and engineering information relating to cutting of various metals.

8. Die Casting Machine

H. L. Harvill Mfg. Co.—20-page illustrated bulletin "Die Cast Your Product" explains potentials of die casting and outlines features of standard and special production die casting machines and accessories. Physical properties and compositions of aluminum, magnesium, zinc and copper base die casting alloys are tabulated. Typical products which may be purchased are shown.

9. Blind Rivets

B. F. Goodrich Co.—4-page illustrated catalog section No. 12050 explains design and application of Rivnuts, blind fasteners which serve as nut plate or rivet or both. Step-by-step installation procedure is shown and application data are included.

10. Exhausters

General Blower Co.—8-page illustrated bulletin No. SC-101 shows construction and lists selection features of complete line of multiblade exhausters which are available in sizes and styles to meet practically any requirement. Optional drive arrangements as well as typical installations are covered.

11. Spectrograph

Gaertner Scientific Corp.—12-page illustrated bulletin No. 151-14 gives features and describes applications of Model L-254 two-lens quartz spectrograph which is recommended for applications requiring high quality spectra, quantitative precision and flexibility.

12. Potentiometers

Foxboro Co.—24-page illustrated bulletin No. 202-5 describes line of potentiometer controls for industrial processes involved in making iron and steel, glass, ceramics, chemicals and other such materials which require accurately controlled temperatures ranging from —300 to 2800 degrees Fahr.

13. Oil Hardening Steel

Firth-Sterling Steel Co.—4-page illustrated bulletin No. SL-2003 discusses characteristics, applications, typical analysis, heat treating, forging, annealing, preheating, quenching, hardening practice and drawing data on Invaro oil-hardening steel.

14. Lubrication System

Farval Corp.—4-page illustrated bulletin No. 207 discusses applications of Dualine system of centralized lubrication which eliminates hazards caused by manual lubrication of high up or difficult of access bearings on presses, cranes and other types of equipment.

15. Scales

Detecto Scales, Inc.—36-page illustrated catalog No. 643 lists standard scales and scales converted to meet war time requirements. All types of scales for home, institutional and industrial use are described. Included are postage scales, laboratory balances, small platform scales and recording units.

16. Adjustable Cutters

Robert H. Clark Co.—12-page illustrated catalog No. 44 gives complete details of line of adjustable cutting tools. These include lathe tool holder, hole cutter, counterbore, boring bars, face milling cutters and fly cutter. Also described are grinding fixtures for sharpening bits used in tools.

17. Cylinders

Hanna Engineering Works—28-page illustrated catalog No. 230 gives dimensions and specifications of complete line of cylinders which are adaptable to pushing, pulling or lifting movement. Also described are valves and other accessories for use with these cylinders.

18. Low Temperature Brazing

Handy & Harman—4-page illustrated regular publication "Low Temperature Brazing News" No. 29 discusses applications of Sil-Fos and Easy-Flo low temperature brazing alloys in preplace uses. This publication will be sent regularly to users of silver alloy brazing materials.

19. Industrial Locomotives

General Electric Co.—16-page illustrated bulletin No. GEA-4133 contains complete details on 50-ton, two-axle, 300-horsepower diesel-electric locomotive which is designed specifically for use in industrial plants where loads are heavy, high speeds are unnecessary and clearances are close.

20. Parts Cleaning

Gray-Mills Co.—5-page illustrated bulletin No. N-5157 covers design features and operation of self-contained, portable parts cleaning system which has swisher platform. Advantages of Flo-Bac parts cleaning materials are listed.

21. Leather Belting

Graton & Knight Co.—56-page illustrated "Leather Belting Selection and Application Manual" contains technical data to aid in proper use of leather flat, link, round and V-belting. Also covered are lace leather, fasteners, cements, group drive arrangements and other related power transmission information.

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22. Production Facilities

Lyon Metal Products, Inc.—20-page illustrated bulletin No. 645-B is entitled "Craftsmen in War Production." Details are given regarding manpower, facilities, finances and management of this concern which are available for contract and sub-contract work in metal working field.

23. Corrosion

International Nickel Co.—52-page illustrated data book entitled "Corrosion — Processes —Factors — Testing" also includes information on characteristics of monel, nickel and inconel. It contains comprehensive analysis of corrosion processes with particular application to alloys. Data are given on various corrosive media and results of 120 tests under varied conditions in 44 common corrosive agents are listed.

24. Hydraulic Pumps

Lyon-Raymond Corp. — 4-page illustrated bulletin No. 138 on foot- and hand-operated hydraulic pumps gives specifications and describes various types of units which are used for supplying hydraulic fluid under pressures of up to 10,000 pounds per square inch to hydraulic operated equipment such as lift trucks, elevating platforms and other units.

25. Gearing

Illinois Gear & Machine Co.—64-page illustrated catalog No. 39 describes wide range of gears produced and includes technical data for ordering gears, symbols used in designating gear parts, formulas for computing horsepower of gears and factors for determining strength of gear teeth.

26. Electric Welding

Lincoln Electric Co.—56-page illustrated bulletin No. 402 entitled "The Lincoln Weldirectory" describes development of company. Data are given to aid in selection of welding electrodes and specification of properties of various electrodes. Also covered are weld fluxes, electrode holders, shields, protective clothing, welding textbooks and electric arc welding machines.

27. Industrial Greases

E. F. Houghton & Co.—16-page bulletin on "Houghton's Industrial Greases" defines and outlines purpose of grease. Factors to guide selection of lubricant and recommended lubricants for various types of bearings are given. Specifications and application data are included on lime, soda, mixed, oxidation inhibited, aluminum, brick, textile, paper, milling, mining and other greases.

28. Hose Couplings

Kelly Machinery Co.—4-page illustrated bulletin on Trojan and Duro universal quick-acting hose couplings also describes double-bolt malleable iron clamps, malleable iron air hose mandrels, coupling systems for pavement breakers, Hy-Way malleable iron hose couplers and other units made by this company.

29. Cast Tool Steels

Jessop Steel Co.—12-page illustrated bulletin on "Cast-To-Shape" tool steels covers applications, patterns required, available compositions, heat treating instructions and typical parts produced from tool steel, stainless and heat resisting steels. Parts produced for glass industry are also described.

30. Alloy Steel Castings

Lebanon Steel Foundry—Two illustrated 4-page reference charts are revised editions and they give comparable designations of A.C.I., A.I.S.I., A.S.T.M., Hydraulic Institute, S.A.E. and U. S. Navy carbon and low alloy structural steels, and corrosion and heat resistant alloy steels. Principal alloying elements and typical physical properties are listed.

31. Collapsible Taps

Landis Machine Co.—8-page illustrated bulletin No. G-94 explains design features of Style ALT collapsible taps which are available for sizes ranging from 1 to 12-inch pipe size and various thread sizes. Specifications and clearances of all units are tabulated.

32. Materials Handling

Lamson Corp.—24-page illustrated bulletin No. 144 is entitled "Case Histories to Aid You in Blueprinting Conversion to Peace." Studies are made of individual materials handling problems which were solved through use of conveyors, pneumatic tubes and chutes.

33. Powder Metal Presses

Kux Machine Co.—4-page illustrated bulletin entitled "Triplets" gives specifications and briefly describes three standard automatic presses which are designed for production of powdered metal and ceramic parts. Capacities of these machines range up to 30 tablets per minute with maximum diameters of 5 inches and maximum depth of fill of 5½ inches.

34. Sub-Zero Machines

Kold-Hold Mfg. Co.—4-page illustrated bulletin "150° Below Zero" gives specifications of 5 and 11 cubic foot capacity industrial subzero machines for metallurgical work. Controlled temperatures as low as —150 degrees Fahr. are obtainable. Equipment is designed for hardening steel tools, making expansion fits and for research.

35. Electrical Generators

Kato Engineering Co.—4-page illustrated bulletin on "Katolight" revolving field generators describes design and operating features of these units which are available in sizes from 5 to 25 kilowatts in either 1800 or 1200 revolutions per minute designs.

36. Gas Furnaces

Johnson Gas Appliance Co.—20-page illustrated catalog No. 43 gives specifications and briefly describes furnaces, burners, blowers, torches, mixers and valves for all types of industrial purposes. Details are given on bench soldering, melting, pot hardening, heat treating and other industrial furnace units.

37. Power Lift Trucks

Hyster Co.—4-page illustrated bulletin No. 672B describes Model 75 Hyster lift truck which has capacity of 7500 pounds. This pneumatically operated, gasoline engine driven power truck has telescoping hydraulic lift and is adaptable particularly for heavy duty outdoor work.

38. Hydraulic Presses

Hydraulic Press Mfg. Co.—4-page illustrated bulletin entitled "Faster Speeds for 194X Metal Working Production" briefly describes H-P-M Fastraverse presses which provide automatic hydraulic speed production for reducing metal working costs.

39. Die Casting Machines

Lester-Phoenix, Inc. — 4-page illustrated bulletin is descriptive of Model HHP-1 fast cycle, high pressure, die casting machine for zinc, tin and lead. Modification of this unit is available for producing aluminum, brass and manganese die castings. Machine is available in wide range of sizes and capacities.

40. Combustion Control

Leeds & Northrup Co.—16-page illustrated catalog No. N-01P-163 contains descriptive and application data on type P combustion control unit for boiler furnaces. This equipment is adaptable for stoker fired, pulverized coal, gas or oil fired equipment. It regulates fuel feed and draft by simple electrical balance.

41. Machine Accessories

K. O. Lee Co.—Four illustrated 2-page data sheets contain specifications and descriptions of K-O expanding mandrels, keyless drill chucks, Knock-Out reamer drive and wheel dresser.

42. Deaerating Feed Tanks

Elliott Co.—30-page illustrated instruction manual No. NH-500 has been written especially for operators of marine equipment and deals with purpose of deaerating feed water heaters. It includes complete description of their construction and operation. General maintenance suggestions are given and many charts and tables amplify text.

43. V-Belt Drives

B. F. Goodrich Co.—44-page illustrated handbook of "Industrial Fractional Horsepower V-Belt Drives" contains technical data to aid in selection of proper drives. Formulas, horsepower ratings and general engineering data are given, together with selection tables of stock drives.

44. Solders and Fluxes

Lloyd S. Johnson Co.—Six illustrated bulletins cover metal coating compound for replacing surfaces damaged by welding; metal solders for aluminum, bronze and other alloys; soldering fluxes; soldering kits; soldering fluids and other such materials to aid in application of all types of solders to practically any metal.

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Another is the heating of rounds and flats for a continuous small shape hot mill. This mill is now being designed. At present we have not selected induction heating for the furnace because the power required is about 4000 kilowatts and units of this power are not yet economically practical. As such large units are made possible by electronic developments, other uses for induction heating are sure to develop."

Whereas the amount of shielding required should be set by some standard of maximum radiation, cautioned Mr. Powell, the standard should be as high as possible without interfering with communication circuits.

Method for Welding Tubing Is Covered by Patent

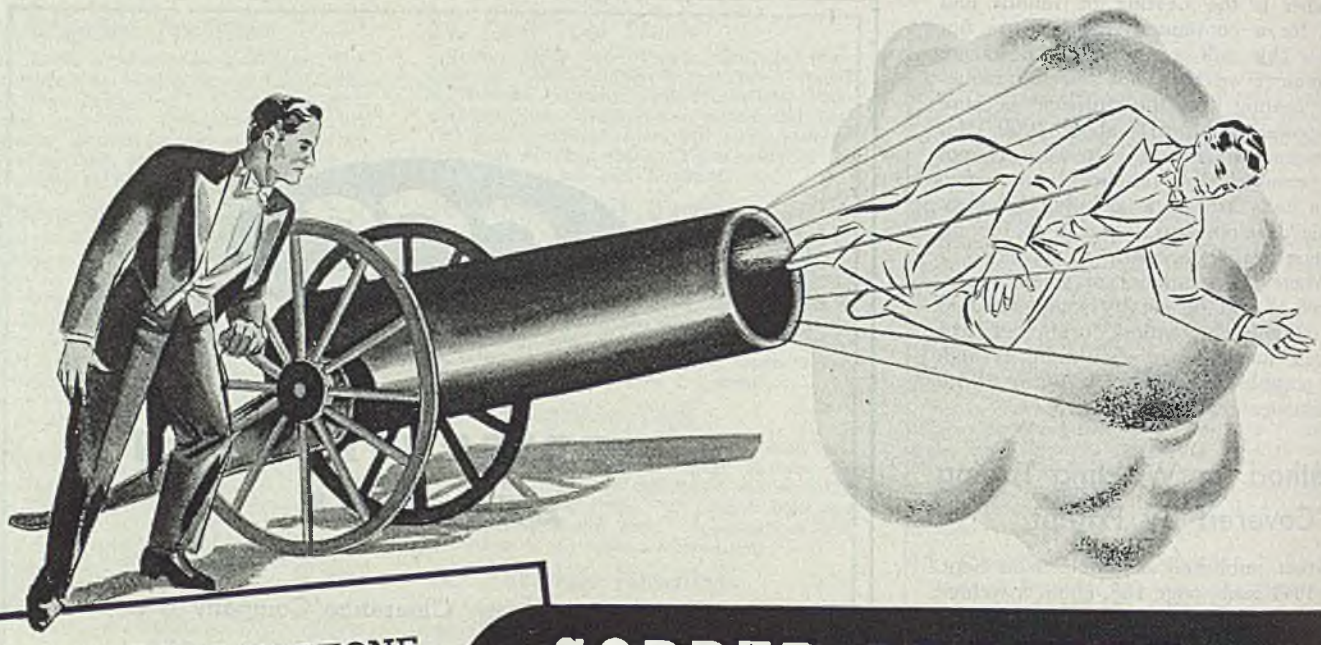
STEEL published an article in its Sept. 11, 1944 issue, page 138, about a welded joint for tubing so designed that 100 per cent penetration on the first pass is permitted. This was reported to have been developed by Russell Meredith, Meredith Welding Co., Los Angeles.

STEEL is informed by Frank R. Seaver, president, Hydril Co., Los Angeles, that the method is covered by Patent No. 2,258,913, held by Albert L. Stone, assignor to the Hydril Co. Mr. Stone is vice president of this company.

Electromagnetic Brake Stops Motor Quickly

A direct current motor turning at 16,000 revolutions per minute may be brought to a standstill in 1/15-second by a new brake, the armature turning only 11 revolutions after brake is applied. This is done by an electromagnetically controlled friction brake which operates without disengaging the motor rotor from the load. A disk of special friction material, splined to the shaft, turns between two stationary brake shoes that try to close under spring pressure but are held away by electromagnetic coils as long as power is applied to the motor. Opening the line switch permits springs to force the shoes against the spinning brake disk and is said to afford instantaneous stopping. This system is simpler mechanically than one in which the rotor is first disconnected by a clutch. By applying pressure equally to both sides of the shoe, end-thrust effect on the motor bearing caused by braking may be reduced to a low figure. The brake was still operable after a test run of 10,000 operations, according to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

For use on a special propeller-feathering motor, one of these brakes is said to have withstood an ambient temperature of 200 degrees Fahr. and a vibration of 30 times gravity imposed 240 times per second for 50 hours. The company states that brakes of this sort are needed on many motor-driven devices aboard airplanes to permit more exact remote control operation or to prevent injury to the motor or the device.



HARRY BLACKSTONE

. . . Master Magician of his Day

Born in Chicago in 1885, the "King of sleight-of-hand artists" is also famous for his "Cannon Illusion." Catapulted into space from a huge cannon, he reappears almost instantly in faultless evening dress. One of the most popular of the magical fraternity, to date he has played to more than 30,000,000 people.

COPPER BRAZING...

Production Magician of our day

Today many leading metal product manufacturers in varied fields, know, through actual experience, the practical efficacy and economy of Copper Brazing. Some call it Electric Furnace Brazing, others Hydrogen Brazing. *All* recognize it as the *ultra-modern method of joining together metal component parts to produce assemblies with extraordinary properties.*

Yes, it's simple: assemble components* in fixed relationship to one another. Place commercial copper—or lower melting point materials if non-ferrous assemblies are processed—in or near joints. Pass the assembly through brazing furnace,

where the brazing metal melts and is drawn into the joints by capillary attraction.

The results:—magic! No longer an assembly but *one piece of chemically clean, practically homogeneous metal.* If components have been fitted together smoothly and tightly, *strength equals or even surpasses actual one-piece construction.*

Let us help *you* develop higher-quality, lower-cost metal products through the magic of copper brazing, which is doing a BIG war job and is destined to do a STILL BIGGER job when peace comes. Our two modern plants do Copper Brazing and Bright Annealing *exclusively* . . . please contact the nearer one.

**predominantly steel to steel, but also many non-ferrous alloys.*

SALKOVER METAL PROCESSING

COMMERCIAL ELECTRIC FURNACE BRAZING

4209 W. LAKE ST., CHICAGO 24, ILL. **34-16 BORDEN AVE., LONG ISLAND CITY 1, N. Y.**

War Steel Needs Maintain Demand Far Into Future

Government continues to enlarge munitions programs. . . Mills sold to midyear on major products. . . Raw material scarcity grows

RENEWED success of Allied arms on all fronts and possibility of an early victory in Europe have not caused relaxation in demand for munitions and other war supplies.

In contrast to the similar situation last summer government procurement agencies are moving as vigorously as ever to build up stocks of guns, ammunition, military vehicles, communications equipment, aircraft, ships and other critical items. This is reflected in bars and sheets most importantly among major tonnage products and in hot narrow strip and some types of wire and cable among others, with producers sold virtually through the year on certain specifications of the latter products.

In practically all finished steel products little capacity remains open before midyear and in some cases nothing can be promised before third quarter. In hot-rolled sheets many producers are scheduled to August and later and in cold-rolled and galvanized only occasional openings can be found earlier. Some makers of galvanized are filled practically to the end of the year. Much the same condition prevails in hot-rolled carbon bars, especially in medium and large rounds, with some tonnage of smaller diameters available in May and June. In plates the situation is not so tight, though demand is increasing and is much heavier than had been expected earlier.

Steelworks operations last week are estimated at 93½ per cent of capacity, unchanged from the prior week. Buffalo regained 4½ points to 81½ per cent, Youngstown rose 7 points to 85, Cleveland ½-point to 86½ and Detroit 7 points to 90. Pittsburgh declined 2½ points to 86 per cent, Chicago ½-point to 97½ and Wheeling 1 point to 92½. Rates were unchanged as follows: Eastern Pennsylvania, 94; Birmingham, 90; St. Louis, 75; Cincinnati, 92; New England, 92.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Jan. 27	Change	Same Week 1944	Same Week 1943
Pittsburgh	86	—2.5	97	97
Chicago	97.5	—0.5	102.5	100.5
Eastern Pa.	94	None	96	94
Youngstown	85	+7	94	97
Wheeling	92.5	—1	94	82.5
Cleveland	86.5	+0.5	96	92
Buffalo	81.5	+4.5	83.5	93
Birmingham	90	None	95	100
New England	92	None	95	95
Cincinnati	92	None	89	95
St. Louis	75	None	83	92
Detroit	90	+7	88	93
Estimated national rate	93.5	None	*99	*98.5

*Based on steelmaking capacities as of these dates.

Steel production is being maintained in the face of many difficulties, lack of workers, developing shortages of pig iron, scrap and coke, and bad weather in some sections. Curtailed pig iron supplies are growing to the point some observers expect formal allocations to be resumed after being absent for a year. Lighting of some idle high-cost furnaces may be forced. Consumer inventories are limited to 30 days instead of the former 60 days.

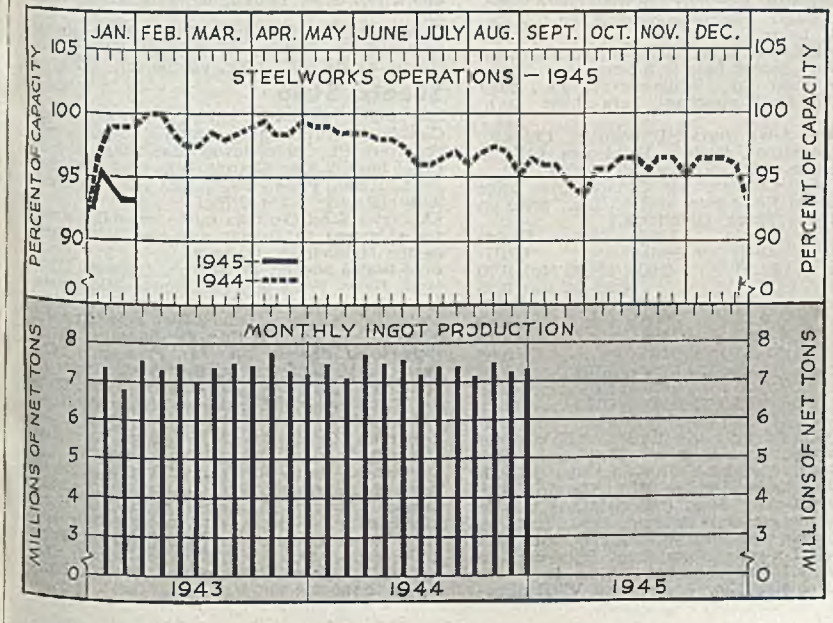
Scrap suffers from lack of workers, who are deserting to employment listed as essential, limiting collection and preparation and at the same time delivery is slowed by snow over a large part of the northeastern industrial area. Some allocations have been necessary to relieve distress. Shortage of coal and coke also have made themselves felt and supplies are perilously low in most cases.

Warehouses continue their effort to obtain OPA permission to apply the recent interim price increases to their base prices instead of absorbing the increase by following the former base, though paying the increase to mills in delivered prices.

Pig iron output in 1944 set a new record with 61,939,474 net tons, compared with 61,777,296 tons in 1943, in spite of the lowered output during the last few months. Through August more than 5 million tons were smelted monthly, the alltime high being reached in March with 5,434,240 tons. After August only one month reached 5 million tons. December production was 4,998,757 tons, compared with 4,904,011 tons in November and 5,213,146 tons in December, 1943.

Nonferrous metals feel effect of the war program and conditions are tightening, with revised regulations directing all available tonnage into such use. Reserves will be called on to meet peak demands in several instances. Tightness is expected to continue through first half.

Average composite prices of steel and iron products remain at the same level as in recent weeks, ceiling prices governing in all cases. Finished steel composite is $57.55, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.



COMPOSITE MARKET AVERAGES

	Jan. 27	Jan. 20	Jan. 13	One Month Ago Dec., 1944	Three Months Ago Oct., 1944	One Year Ago Jan., 1944	Five Years A Jan., 19
Finished Steel	$57.55	$57.55	$57.55	$56.73	$56.73	$56.73	$56.
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.
Steelmaking Scrap	19.17	19.17	19.17	16.40	19.17	19.17	17.

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard a line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Ir Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youn town. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finish steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Jan. 27, 1945	Dec., 1944	Oct., 1944	Jan., 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.20	2.10	2.10	2.10
Plates, Philadelphia	2.25	2.15	2.15	2.15
Plates, Chicago	2.20	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.20	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to 9/64-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Jan. 27, 1945	Dec., 1944	Oct., 1944	Ja 19
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.
Basic, Valley	23.50	23.50	23.50	23.
Basic, eastern del. Philadelphia	25.34	25.34	25.34	25.
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.
No. 2 foundry, Chicago	24.00	24.00	24.00	24.
Southern No. 2, Birmingham	20.38	20.38	20.38	20.
Southern No. 2 del. Cincinnati	24.30	24.30	24.30	24.
No. 2 fdry., del. Phila.	25.84	25.84	25.84	25.
Malleable, Valley	24.00	24.00	24.00	24.
Malleable, Chicago	24.00	24.00	24.00	24.
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$19.75	$16.95	$20.
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	14.50	18.
Heavy melting steel, Chicago	18.75	18.75	17.55	18.
Rails for rolling, Chicago	22.25	22.25	22.25	22.
No. 1 cast, Chicago	20.00	20.00	20.00	20.

Coke

Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$6.
Connellsville, foundry ovens	7.75	7.75	7.75	7.
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. T schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products a any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal establish basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individu companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill. Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. Ports).

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. Ports, $52.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—5/16 in. inclusive, per 100 lbs., $2. Do., over 5/16—47/64-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific Ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freig on hot-rolled bars from Buffalo to Mansfield

Cold-Finished Alloy Bars: Pittsburgh, Chicag Gary, Cleveland, Buffalo, base 3.35c; Detroi del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburg Chicago, Gary, Cleveland, Birmingham, Spa rows Point, Buffalo, Youngstown, base 2.15 Detroit del. 2.25c; Eastern Mich. and Tole 2.30c; Gulf ports, dock 2.50c; Pacific port dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Ch cago, Gary, Cleveland, Birmingham, Young town, Buffalo base 2.15c; Detroit, del. 2.25 Eastern Mich. and Toledo 2.30c; Gulf port dock 2.50c.

(Sweet's Steel Co., Williamsport, Pa., ma quote rail steel reinforcing bars 2.33c, f.o. mill.)

Iron Bars: Single refined, Pitts. 4.40c; doub refined 5.40c; Pittsburgh, staybolt, 5.75c; Ter Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gar Cleveland, Birmingham, Buffalo, Youngstow Sparrows Pt., Middletown, base 2.20c; Granit City, base 2.30c; Detroit del. 2.30c; Easte Mich. 2.35c; Phila. del. 2.37c; New York de 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled shee for shipment to Detroit and the Detroit are on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Clev land, Gary, Buffalo, Youngstown, Middletow base, 3.05c; Granite City, base 3.15c; Detro del. 3.15c; Eastern Mich. 3.20c; New York de 3.39c; Phila. del. 3.37c; Pacific ports 3.70

Galvanized Sheets, No. 24: Pittsburgh, Ch cago, Gary, Birmingham, Buffalo, Youngstow Sparrows Point, Middletown, base 3.65c; Gra ite City, base 3.75c; New York del. 3.89 Phila. del. 3.82c; Pacific ports 4.20c.

(Andrews Steel Co. may quote galvanize sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicag Gary, Birmingham, 29 gage, per square 3.31

Culvert Sheets: Pittsburgh, Chicago, Gar Birmingham, 16 gage, not corrugated, copp alloy 3.60c; Granite City 3.70c; Pacific Port 4.25c; copper iron 3.90c, pure iron 3.95c; zinc coated, hot-dipped, heat-treated, No. 24, Pitts burgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis, Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c
Woven fence, 15½ gage and heavier, per base column ..... .67c
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	...
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2¾"	12	17.54	20.21	16.58	26.57
3"	12	18.59	21.42	17.54	29.00
3½"	12	19.50	22.48	18.35	31.38
4"	11	24.63	28.37	23.15	39.81
4½"	10	30.54	35.20	28.66	49.90
5"	10	37.35	43.04	35.22	.....
6"	9	46.87	54.01	44.25	73.93
	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

°Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base. Standard spikes, 3.00c.

°Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	...	...
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
†347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅞ and ⅝ x 6-in. and shorter... 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
1⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
⅞-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.... $2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.00
Connellsville, foundry	7.50- 8.00
Connellsville, prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75

By-Product Foundry

Wise county, furnace	6.75- 7.25
Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.35
Philadelphia, delivered	12.88

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[21]	4.715	6.012[25]	6.0
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.103[21]	4.774	.....	...
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.103[21]	4.774	.....	...
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[16]	4.872[26]	4.072[21]	4.772	5.816[25]	5.8
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[26]	4.052[21]	.....	.....	...
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1a]	5.196[17]	4.841[20]	4.041[21]	.....	.....	...
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	...
Bethlehem, Pa.[a]	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...
Claymont, Del.[a]	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	...
Coatesville, Pa.[a]	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	...
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[16]	4.40[10]	3.75[21]	4.669	5.60[25]	5.7
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[16]	4.30[10]	3.65[21]	4.35	5.60[25]	5.7
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[21]	.....	.....	...
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[12]	4.30[24]	3.65[21]	.....	.....	...
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[21]	4.45[21]	5.60[25]	5.6
Cleveland (country)	3.25[1]	..	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	...
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.800[21]	4.659	5.93[25]	5.9
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[10]	5.443[24]	4.443[12]	.....	.....	...
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[10]	.....	.....	.....	.....	...
Cincinnati	3.611[1]	6.391[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[19]	4.475[24]	4.011[21]	4.711	6.10	6.2
Youngstown, O.[a]	.....	.....	.....	.....	.....	.....	.....	4.40[12]	.....	.....	.....	.....	...
Middletown, O.[a]	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	...
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.75[21]	4.65	5.75[25]	5.8
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.887[21]	4.787	5.987[25]	6.0
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	3.98[21]	4.78	6.08[25]	6.1
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.361[21]	5.102	6.09[25]	6.1
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.031[21]	4.931	6.131[25]	6.2
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[18]	4.78[24]	4.33[21]	.....	.....	...
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[18]	4.852[24]	4.54	5.215	.....	...
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.60[21]	5.429	.....	...
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[9]	3.768[3]	4.318[3]	4.313[3]	5.313[26]	4.10[10]	3.65[22]	.....	.....	...
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[6]	6.75[6]	6.00[12]	7.20[6]	5.583[22]	5.613	5.85[25]	5.9
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[18]	7.30[15]	5.333[21]	7.333	8.304[25]	8.4
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[16]	6.60[15]	5.533[15]	.....	.....	...
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.783[21]	.....	.....	8.0
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.05[15]	5.783[21]	.....	.....	8.0

[a]Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside al cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bund [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pou [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pou [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, b [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-68% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, C 91.0c; prices include duty on ported ore and are subject to miums, penalties and other p sions of amended M.P.R. No. effective as of May 15. Price basing points which are also p of discharge of imported ma nese ore is f.o.b. cars, shipside dock most favorable to the b

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric fur Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Bi pe
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$ 2.00	....	
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.65	13.00	1.15	2
NE 8720	.18-.23	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	2
NE 9255	.50-.60	.70- .95	1.80-2.20	.....	.....	.....	.40	8.00	....	
NE 9261	.55-.65	.70-1.00	1.80-2.20	.10-.25	.....	.....	.65	13.00	....	
NE 9262	.55-.65	.70-1.00	1.80-2.20	.25-.40	.....	.....	.65	13.00	....	
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	2
NE 9425	.23-.28	.90-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	2
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	2

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices qu on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 16, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	25.00	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.68	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del.	25.46	24.96	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del.				
Baltimore, del.	25.99	.....	.....	.....
No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, base	25.00	24.50	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Youngstown, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

5.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley base 23.50

Low Phosphorus

Basing points: Birdsboro, Pa., $29.50; Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $26.50.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co., (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $2 per ton, effective May 20, 1943. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942. E. & G. Brooke Co., Birdsboro, Pa., allowed $1 above basing point.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $64.00

First Quality

Pa., Ill., Md., Mo., Ky. 51.30
Alabama, Georgia 51.30
New Jersey 56.00
Ohio 43.00

Second Quality

Pa., Ill., Md., Mo., Ky. 46.50
Alabama, Georgia 38.00
New Jersey 49.00
Ohio 36.00

Malleable Bung Brick

All bases $59.80

Silica Brick

Pennsylvania $51.30
Joliet, E. Chicago 58.90
Birmingham, Ala. 51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press $31.00
Wire cut 29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick $54.00
Chem. bonded chrome 54.00
Magnesite brick 76.00
Chem. bonded magnesite 65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .45c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk, 13.50c packed 13.35c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed, 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 7%) Contract, carload, bulk, 13.50c, 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11% alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% Max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max., sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate, to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide, approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract, carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309, Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal, 16-20%, mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed: 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.), per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unit age of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bul c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western, 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central, 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99% per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40; eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. F.O.B. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferro titanium.

Bortam: Boron 1.5-1.9%, ton lo 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contra basis, per lb. contained vanadium f.o.b. producers plant with usu freight allowances; open-hearth grade $2.70; special grade $2.8 highly-special grade $2.90.

Zirconium Alloys: 12-15%, per l of alloy, eastern, contract, carlot bulk, 4.60c, packed 4.80c, ton lo 4.80c, less tons 5c, carloads bul per gross ton $102.50; packe $107.50; ton lots $108; less-ton lo $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Easter contract basis, carloads in bulk package, per lb. of alloy 14.00 gross ton lots 15.00c; less-ton lo 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum 40% silicon, 40% iron) contract ba sis f.o.b. Niagara Falls, N. Y., p lb. 5.75; ton lots 6.50c. Spot cent higher.

Simanal: (Approx. 20% each Si Mn., Al.) Contract, frt, all. not ov St. Louis rate, per lb. alloy; ca lots 8c; ton lots 8.75c; less ton lo 9.25c.

Borosil: 3 to 4% boron, 40 to 45 Si., $6.25 lb. cont. Bo., f.o.b. Philo O., freight not exceeding St. Lou rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 15 of Sept. 4, 1944, issue of STEEL.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Machine Shop Turnings	13.75
Mixed Borings, Turnings	13.75
Shoveling Turnings	15.75
No. 2 Busheling	15.50
Billet, Forge Crops	21.25
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turning	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	13.50-14.00
Mach. Shop Turnings	13.50-14.00
Short Shovel Turnings	15.50-16.00
Mixed Borings, Turnings	13.50-14.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	15.50
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06*
No. 2 Heavy Melt. Steel	14.06*
No. 1 Bundles	14.06*
No. 2 Bundles	14.06*
No. 1 Busheling	14.06*
Machine Shop Turnings	9.06*
Mixed Borings, Turnings	9.06*
Short Shovel, Turnings	11.06*
Chemical Borings	13.06*
Low Phos. Clippings	16.56*
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

*Inland base ceiling; Boston switching district price 99 cents higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Mach. Shop Turnings	15.00
Short Shovel, Turnings	17.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle, Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	12.50-13.00
Mix. Borings, Sht. Turn.	13.25-13.75
Short Shovel Turnings	15.25-15.75
Cast Iron Borings	14.25-14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	13.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	10.50-11.00
Short Turnings	13.00-13.50
Cast Iron Borings	12.00-12.50
Low Phos Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.00-10.5
Rerolling Rails	21.0
Steel Car Axles	21.50-22.0
Steel Rails, 3 ft.	21.5
Steel Angle Bars	21.0
Cast Iron Wheels	20.0
No. 1 Machinery Cast	20.0
Railroad Malleable	21.00-21.5
Breakable Cast	16.5
Stove Plate	18.0
Grate Bars	15.2
Brake Shoes	15.2
(Cast grades f.o.b. shipping point	
Stove Plate	18.0

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.5
No. 2 Heavy Melt. Steel	18.5
No. 1 Comp. Bundles	18.5
No. 2 Comp. Bundles	18.5
Machine Turnings	8.50- 9.0
Shoveling Turnings	10.50-11.0
Cast Iron Borings	10.50-11.0
Mixed Borings, Turnings	9.50-10.0
No. 1 Cupola Cast	20.0
Breakable Cast	16.5
Low Phosphorus	21.00-21.5
Scrap Rails	20.50-21.0
Stove Plate	16.00-16.5

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.0
No. 2 Heavy Melt. Steel	13.0
No. 1, 2 Deal. Bundles	12.0
Machine Turnings	4.5
Mixed Borings, Turnings	4.0
No. 1 Cast	20.0

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.5
No. 2 Heavy Melt. Steel	14.5
No. 1 Busheling	15.5
No. 1, No. 2 Bundles	13.5
No. 3 Bundles	9.0
Machine Turnings	6.9
Billet, Forge Crops	15.5
Bar Crops, Plate	15.5
Cast Steel	15.5
Cut Structural, Plate, 1", under	18.0
Alloy-free Turnings	7.5
Tin Can Bundles	14.5
No. 2 Steel Wheels	16.0
Iron, Steel Axles	23.0
No. 2 Cast Steel	15.0
Uncut Frogs, Switches	16.0
Scrap Rails	16.0
Locomotive Tires	16.0

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.52½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $118 to $120 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more; New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ' copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 128

Sheet demand continues strong and deliveries are being deferred further. Hot-rolled material promises range from June to September, most extended on heavier gages. Cold-rolled sheets are offered for third quarter, mainly in August and September. Stainless and silicon sheets can be obtained for April to June. Galvanized deliveries spread from July through the year.

Philadelphia—Contributing to increasing need for sheets is a substantial light landing craft program requiring in particular 10-gage material. Some orders have just been placed for second quarter, although directives will be necessary if much is to be had in that period. Most producers are scheduled well into third quarter, into August and beyond in various important instances. This is also true of cold-rolled and galvanized sheets, although in both some tonnage can be had in late June and July. Specifications for hot and cold-rolled sheets for trucks have increased sharply.

With resquaring charge based on a percentage of the base price plus all other extras, that is, a percentage of the total cost of the sheet at the time of resquaring, some producers who had taken the OPA interim increase as an increase in the base have had to make slight readjustments as cost to consumers ran higher than allowed by OPA.

New York—Sheet inquiry is diversified, with district sellers reporting business as brisk as at any time in recent weeks. Delivery promises cover a wide range on all the major products. Hot-rolled offerings range from June to September, with deliveries most extended in the heavier gages. Cold-rolled sheets fall almost entirely in third quarter, mainly in August and September. Galvanized sheets are being quoted from July through the remainder of the year.

Spurt in ammunition box requirements has placed long terne shipments in May, some producers report. Stainless steel sheets are available in April and May, and silicon sheets in April, May and June, depending principally upon grade, and with most promises falling in the latter two months.

Cincinnati — Orders for galvanized sheets have committed district mill capacity into third quarter. Not all tonnage offered was accepted because facilities were not adequate. Backlogs of other sheets now run into third quarter. Shipping troubles, mainly due to weather conditions, continue and aggravate pressure for deliveries.

Pittsburgh—Estimates of Army sheet requirements released by the chief of ordnance last week indicated that approximately 600,000 tons per quarter would be needed to meet the Army's need. This is a substantial increase in overall sheet demands and with increasing demands from the Navy and other programs indicates a continued tight situation in sheet mills for the rest of this year unless there is cancellation on some programs now contemplated. At present books are full for first half and with substantial tonnage already placed for third and fourth quarters, galvanized sheets cannot be obtained before fourth quarter. Price confusion continues, with the latest development indicating that the $2 increase on hot-rolled sheets will be extended to cover over-runs, seconds

and excess material, in addition to the mill run primes covered in the first price notice.

Cleveland — Directive tonnage has subsided somewhat. Overall sheet and strip bookings this month are expected to be about equal to the December total, which was about 20 per cent above November. Most sheet demand has originated from truck body manufacturers, the tank, shell container, and landing mat programs. Pickled hot-rolled sheet deliveries are now extended into August, and galvanized into November as result of extensive buying recently for Army barracks. Narrow strip deliveries, up to 4 inches are extended into May, on wider sizes through the remainder of this year for at least one producer. Straight hot and cold-rolled sheets are promised for June on an average.

Steel Bars . . .

Bar Prices, Page 128

Cleveland — Substantial increase in bar directive tonnage earlier this month forced much revision of schedules. Alloy steel bar backlogs have been further extended in recent weeks, not so much due to the increased demand as that the heavy ammunition program has cut into the available supply of steel for alloy production. Cold-drawers are more active, reflecting increased war requirements. Small and medium rounds are available for June delivery, with larger sizes extended into September. Alloy bars are being promised for August while flats are extended into July and shipments on narrow sizes are available in June.

Philadelphia—Most carbon bar producers are booked solidly into third quarter on medium and large rounds, with smaller sizes generally available in May and June. Hot alloy bar schedules are advancing steadily, with certain producers now having little to offer before May. Orders are being increased as a result of a new shell fuze contract recently placed with Edward G. Budd Co., Philadelphia.

Buffalo—Mills have been forced to curtail bar schedules sharply as large quantities of finished material is clogging finishing departments, awaiting freight cars. Bethlehem Steel Co. reports its 10-inch mill, which has been rolling shell steel, has been idle nearly three weeks and its 12-inch mill is also down.

Steel Plates . . .

Plate Prices, Page 129

Plate demand is increasing and is much heavier than had been expected at this period. Shipbuilding and repair, freight car building and miscellaneous needs contribute a heavy total. Some plate mills are filled through first half but others are able to offer delivery in May.

New York—Plate orders here show further gains, with some directive tonnage being placed for ship repairs. Sellers declare that there has been considerable increase in ship repair work recently, due not in particular to any recent damage, but rather to the fact that time is being provided for repair of ships which have been in need for some time. For quite a period last year pressure for ships was so great that only those in need of urgent repair were laid

up. The pressure is still heavy, but somewhat less and more attention is being devoted to this work.

Jobbers likewise are pressing hard for tonnage, and railroad equipment builders are placing orders as promptly as possible, with some concern expressed over possibility that there may be deferments in domestic cars and locomotives. So far, however, no cutbacks in this work have been reported. Some railroads are placing maintenance requirements for as far ahead as fourth quarter. Most plate producers are now quoting May delivery.

Pittsburgh—New plate commitments are heavier and backlogs are beginning to increase again. New ship commitments and a heavier volume of armor plate than had been anticipated, with general overall increases in miscellaneous buying has filled schedules on most mills through first half, with some gaps late in second quarter. This situation is not as tight as might be expected, considering the fact that less time on stripsheet mills is being included in mill facilities at the moment. More sheet buying and more urgency on sheets has recaptured a substantial volume of mill time which a year ago would have been devoted to plate rolling.

Philadelphia—Plate orders are becoming increasingly diversified, although some producers declare that at the moment actual specifications do not equal capacity. At the same time, reservations, such as in the case of maritime work principally, are sufficient to force a further slight extension in delivery promises, most producers quoting May.

Birmingham — Considerable pressu for plates has been removed in this a as War Production Board seeks grea output of shell forgings. Plates co tinue the major product but considera ingot tonnage formerly available to pl mills now is diverted to shell prod tion, especially as the Tennessee Co Iron & Railroad Co. has completed large addition to its 155-mm plant he

Cleveland — Operations at local pl mill and converted strip mill are not pected to be materially altered throu February as the result of the revis Maritime Commission plate requi ments estimated to have been increas about one million tons for the first sev months this year over the earlier p jected schedules for 1945. Plate outp at both mills were reduced late in D cember. Deliveries on Maritime pl tonnage on mills in other districts, ho ever, are now being promised for Ap in contrast with late February earl this month. May delivery is genera promised for both sheared and univer plates.

Tubular Goods . . .

Tubular Goods Prices, Page 129

New York—Merchant pipe deliveri are becoming more extended, with o leading producer now quoting June butt-weld and on the larger sizes lap-weld. This interest still has son lap-weld up to five inches available May. Certain other producers who r cently could offer April delivery on bu weld now have nothing before May, the very earliest. Some lap-weld is ava able in April.

New building construction is ligh but so far as this district is concern considerable maintenance work still going on and shipyards are said to taking substantial quantities. Division steel and seamless capacity to shell wo also is having a tightening influence a around.

Tubing schedules, as indicated recen ly, are being advanced even more ra idly, with reservations being made f boiler requirements for the new me chant marine program and aircra manufacturers are stepping up the needs. Hot-finished boiler tubing now being offered generally for Jun although some May tonnage can still h had, and cold-drawn tubing for Augu and September, in some cases.

Cleveland—Larger military requir ments have not yet cut into shipme of pipe to jobbers and dealers to an marked extent, as was expected a fe weeks back. Jobbers' stocks of pipe a in good balance, although the overall i ventory is off somewhat from a fe months ago. Miscellaneous industri plant maintenance and repair work co tinue to absorb the largest pipe tonnag in this district.

Wire . . .

Wire Prices, Page 129

Chicago—Wiremakers report that th Army quartermaster corps is preparin to double its requirements for can-ope ing keys. The boost is said to be fro two million a day to four million. Shor age of these keys, which are forme from carbon wire, has become seriou with packers of food and rations opera ing with less than a week's supply. Jo

bers and dealers are willing to accept any merchant products which mill can supply to have them available to move later. Fencing is moving freely to farmers. Nail shortage is acute, with inventories light.

Tin Plate . . .

Tin Plate Prices, Page 129

Chicago—Demand for tin plate continues strong and steady. One producer reports its first openings in March, unless cancellations are received and at the moment the latter appears unlikely. Inquiries for plate are increasing, the result of the recent revision of M-81 permitting use of this material for certain types of containers previously under restriction.

Pittsburgh—Although tin plate buying for domestic users has been heavy, export business has been lighter than anticipated. In all probability the tight overall steel situation is the primary cause of lower exports in tin plate as well as in other products. Inquiry has been active for 0.25 coated plate on a wide variety of miscellaneous applications. As anticipated, labor difficulties have prevented full utilization of provision of the new revisions in limitation order M-81.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 129

Pittsburgh—Heavier buying has resulted in an upward surge of bolt and nut backlogs here. Shortage of semi-finished steel has caused reductions in wire rod deliveries and cuts in inventories at some points. The bar situation has become more difficult, due to extreme pressure from the shell program, and bolt plants have found it increasingly difficult to obtain satisfactory delivery on bar stock. New demands for structural bolts and rivets for Army and Navy construction programs both here and abroad have built up demand in some instances.

Rails, Cars . . .

Track Material Prices, Page 129

Pittsburgh—After a slow start, freight car programs have been outlined and more cars are on order than a year ago, despite the fact that car shops anticipate smaller production in 1945 than in 1944. Current AAR figures show 36,597 cars on order Jan. 1, compared with 35.737 a year earlier. Total production in 1944 for domestic roads, 40,392 units, was slightly better than 1943 but still far below the 1942 peak. Manpower difficulties, plus the fact that several of the major car shops are devoted to shell and rocket production, will cause difficulties, but the real key lies in the volume of cars required for military and foreign programs. In 1944 this was a very substantial amount (not included in the above totals) and unless there is a cut in present programs, which seems unlikely, there will not be enough available shop capacity to produce all the cars wanted by domestic roads.

Structural Shapes . . .

Structural Shape Prices, Page 129

Philadelphia — Shape deliveries fall principally in May, due to the recent increase in ship work and growing re-

quirements of the shell program. Building construction continues a limited factor, with orders light and little in prospect.

Cleveland — Inquiries are expected out shortly for two Firestone Tire & Rubber Co. projects, one at New Castle, Pa., and the other at Pottstown, Pa., involving $16 million for equipment and remodeling of plant. Goodyear Tire & Rubber Co. is expected to have bids out soon for Akron, O., plant addition and Goodrich Tire & Rubber Co. is planning a laboratory at Brecksville, O., and a plant in Cleveland. Nickel Plate railroad announced plans for a $1,600,000 plant improvement at Bellevue, O. Mill deliveries on shapes have been pushed back into May.

Pittsburgh—Substantial new tonnage, mostly in light shapes, has been booked in recent weeks, and in addition available billets for structural rolling have been reduced, so that although current structural demand is not unusually heavy, backlogs are beginning to build up and little tonnage is available before the middle of second quarter, and in some cases, third quarter. Military building programs, including engineer task force huts, barracks, and storage buildings, account for most of the new tonnage booked.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 129

Pittsburgh — Increasingly tight steel situation has resulted in a shift in r forcing steel from new billet to rail l Effective immediately and contin through first quarter, there is a subs tial monthly reduction in steel direct for new billet bars. In effect, this bring the available tonnage at the o ing of second quarter to approxima 20 per cent of that available at pres This poses some difficult problems i much as a considerable part of the semer billets currently being produ have been going to reinforcing bars it will now be necessary for WPB to locate bessemer billets to other purp or reduce steel production by an eq alent amount. Indicative of cur thinking in Washington is the fact a substantial Lend-Lease tonnage tined for rehabilitation work in Eur has been placed with rail mills, with exception of a few hundred tons in l sizes, which were taken by new b mills.

Pig Iron . . .

Pig Iron Prices, Page 131

Tightness in pig iron continues to crease and resumption of allocation expected by many observers. An al native is relighting of some high- furnaces now idle. Part of the sit tion is due to snow and cold inter ing with transportation. Consumer ventories are being restricted to 30 d instead of 60 in an effort to spread supply more evenly. Shortage of fo dry grades of scrap is another fac causing larger proportion of pig iron foundry mixtures.

Philadelphia—In an effort to reli the shortage of pig iron Washingto restricting consumer inventories to days instead of 60 and there are i cations that resumption of formal a cations is still possible. Tightness in i is ascribed not only to difficulty transportation, due to severe weat but suspension of production at s inland furnaces supplying the seabo also due indirectly to the weather.

Pittsburgh — Tightness in pig i noticed in this immediate district some time has spread to other ar and it is the opinion here that s action will be taken soon, either on a cations or on relighting of additio stacks on a premium price basis, to sure a steady flow of foundry as well basic. Demand is increasing, and i anticipated that current governm pressure on the castings program result in further stimulation of foun output. Shipping difficulties, both iron and on raw material, particul coke, have made the problem m pressing.

Boston—Tightening in pig iron is e phasized by heavier charges in m due to shortage of foundry grades scrap. Furnace stocks are low; the trict unit is down, and with more t nage than normally coming from c side, shipments are scheduled hea from current production.—In peace ye consumers generally built up reser against winter transportation delays, buying policies, still influenced by e lier allocations and inventory cont have made this impossible. Delays car shortages have developed, cont uting to a tighter situation. The w of new war contracts is affecting fo dries less than other metalwork shops, but most have all the orders t

can handle. Subcontracting continues on a broad scale.

January deliveries are behind schedule and to fill emergency needs some additional tonnage has been shipped from reserves at the Everett, Mass., furnace.

Birmingham—No. 5 blast furnace at Ensley works of the Tennessee Coal, Iron & Railroad Co. has been blown out for relining and will be idle until about March 1. Its removal does not affect steelmaking as it has been devoted mainly to ferromanganese.

Buffalo—Delays and confusion in pig iron shipments because of weather conditions are considered about the worst on record. Merchant iron producers report shipments in all directions are as much as four weeks behind schedule. Deliveries in the immediate area are a week or more in arrears. Consumers pressing for material claim operations have been curtailed or are about to be. Some outside malleable users depending on local producers for supply have been especially hard hit.

Cleveland—Pig iron production and consumption remains in close balance, with producers' stocks off moderately from a month ago. Renewed emphasis aimed at increasing output in foundries serving the heavy truck, farm implement and machine tool programs has stimulated pig iron consumption. Thirteen out of 14 blast furnaces in this district are now active.

Cincinnati — Shipments of northern foundry iron continue laggard, although transport of southern iron is near normal. So far, melters have not been forced to curtail for lack of pig iron. One interest, however, resorted to borrowing to avoid shutdown. Specifications tend upward but this may reflect a smaller proportion of scrap, hope to build up better reserves, or hedge against further transportation difficulties.

Scrap . . .

Scrap Prices, Page 132

Scrap supply to consumers continues to shrink, mainly because of smaller labor forces to collect and prepare material and also in some areas because of transportation difficulties from snow. Steelmakers have dipped deeply into reserves in recent weeks. All offerings of good material are being bought readily. Prices are at ceiling with few exceptions.

Cleveland — Movement of scrap through dealers' yards continues to be handicapped by adverse weather. Production scrap is holding up well, but this material is mostly light turnings and railroad freight congestion has held up delivery to consuming points. Railroad scrap offerings this month were off somewhat from December and little change in volume of these offerings is indicated for February. Steel mills have been forced to be largely dependent on home scrap and stocks to sustain operations. Steel interests are buying up all available good open-hearth grades. Demand for turnings has improved recently, with some mills forced to use a greater proportion of this material.

Buffalo — Scrap is definitely tighter here and delays in shipment because of weather have caused mills to dip heavily into reserves. Dealers have been able to move more material to mills but find receipts low and yard stocks shrinking. Cars are reported to have been on the way for as much as a month. Local consumers have suffered a cut in expected supplies by diversion of some midstate shipments to Sparrows Point, Md., to relieve shortage there. Local mills are using a larger proportion of pig iron in open hearths.

Pittsburgh—Snow and cold weather again have cut down yard activity after some interests had been able to resume activity after several weeks of idleness. Miscellaneous material coming out of scrap yards in this area is virtually nothing at the moment and this complicates the situation, which is probably as tight a market as has existed for over a year. All mills are in the market and full ceiling is being paid, with springboards in a number of instances. The most critical material at the moment is cast scrap, although no material is being turned down and there is good demand for all grades.

New York—Cold weather and increasing shortage of manpower retard movement of scrap and many consumers report inventories low. Difficulties are further accentuated by trouble in getting pig iron. Except for billet and forge crops all grades are at ceilings.

Philadelphia — While adequate scrap is available, shortage of manpower and adverse weather conditions, combined with abnormally low stocks at consumers' plants and increasing shortage of pig iron have made for one of the most critical situations in scrap since the war began, some trade leaders declare. Some eastern mills have less than ten days supply. So far seaboard mills have been able to hold ingot production at a

fairly sustained rate but the outlook is not encouraging. Consumer stocks continue to dwindle in spite of frequent emergency allocations and increasing springboard prices. Cast scrap is in particularly acute situation, although the trade admits there is relatively little material to be collected.

All scrap grades are at ceilings except billet and forge crops. Manpower in Philadelphia yards is down 50 per cent from early summer. Omission of the scrap industry from the list of critical manpower industries has hastened the movement to other employment.

Boston—Only alloy scrap is below ceiling and that is generally firmer. Shortage of cast with some foundries remains acute; steelworks material offerings are light with some tonnage allocated. While short shoveling turnings are being moved at ceiling, some Pennsylvania consumers are still reluctant to pay top price while others hold strictly to specifications as to alloys, including the Worcester melter. Foundries are more interested in short steel scrap. Production of light industrial scrap tends upward, including the ratio of alloys, a condition reflected in the first weakness in prices from which alloys never fully recovered, although other grades have made up lost ground.

Two companies of demolition troops from Fort Devens, Mass., have been detailed to New England scrap yards, operating last week at David Feinberg's yard at Medford, Mass., on presses, cutters, and sorting and loading, to expedite movement of material to steelworks and foundries.

Cincinnati — Melters of iron and steel scrap are in the market for tonnage, and supplies are tighter. Some district mills have not bought recently but filling of old contracts plus new demands are creating an active market, with most grades at ceiling. Foundries are eager for cast scrap, the supply again falling below demand.

Los Angeles—Scrap is becoming tighter as war production accelerates, with prices at or close to ceilings. Shipyard scrap is in good supply and provides high-grade material. Shipments to the midwest continue. It is rumored that WMP may place scrap yards on the labor critical list, which would tend to aid in collection and preparation.

St. Louis—Scrap continues to tighten as receipts decrease and mill demand grows. Bad weather and labor shortage limit shipments and steelmakers are drawing on reserves, which average about 30 days supply. Little improvement is expected over the next 60 days. Railroad scrap is being allocated. Heavy axle turnings have risen to ceiling.

Warehouse . . .

Warehouse Prices, Page 130

Philadelphia — Warehouses are still appealing to OPA for permission to advance asking prices for sheets and plates in accordance with the interim increases recently granted mills on their delivered prices. With many, it is understood, it is not only the matter of having to absorb the advances now made in these products but the possibility of having to absorb other similar increases later on other major products.

Cleveland — Steel distributors expect OPA to soon permit passing on the recent steel mill price increases to ware-

house customers. It is thought the adjustment in warehouse steel prices on the items increased at the mill delivered price level will be brought about through amendment 12 to PR-6, or through revision to warehouse order PR-49.

Recent sharp upward revision in the heavy ammunition and other key war programs may force WPB to temporarily reduce the mill warehouse load directive. WPB has already sharply reduced the tonnage of steel available under the spot authorization plan, and this agency probably will revoke the order granting steel distributors permission to purchase from the mill up to 25 per cent in excess of shipment from stock.

Pittsburgh—Warehouse situation here is still upset by lack of a definite price policy. Current reports in the industry foreshadow an extension of recent price increases through secondary markets and an expansion to include not only prime material but also seconds and rejects as well. However, there has been no official announcement as yet from OPA covering such price increases. It is further reported that other products will be increased in the near future and warehouses expect the same problem will hold on new increases as has been the case with the ones already announced unless there is some definite change in the policy of OPA toward the warehouse industry before new price changes are announced.

Cincinnati — Demand for warehouse steel is strong, with the result that shipments of wanted items are absorbed quickly, unbalancing stocks of jobbers. Plates are tighter than heretofore, as the pinch in sheets and structurals continues.

Metallurgical Coke . . .

Coke Prices, Page 129

Pittsburgh — The most difficult problem at the moment in a whole welter of difficult problems besetting the coal industry is that of obtaining cars. Shortage of cars is beginning to affect operations at some points and both coal and coke are being shipped in any available rolling stock, from flat cars to box cars. Gondola supply is the worst at the moment, followed by hoppers. Demand for coke is extremely heavy, with all beehive and byproduct plants now filled up with orders. This has been caused partially by a lower operating rate in the beehive districts, which in turn goes back to the manpower shortage, both at the ovens and mines.

Seattle — Wilkeson Products Co., Tacoma, Wash., announces closing of its coke plant for the duration because of impossibility, due to labor shortage, of obtaining steady coal supply from the Wilkeson mines. It is found impracticable to ship coal from other areas.

Nonferrous Metals . . .

Nonferrous Prices, Page 133

New York — All nonferrous metals have tightened under pressure of war demand. Revised regulations controlling uses are directed toward channeling all available tonnage to war requirements and reserves of several metals will be called on to meet another peak demand expected to carry through the first half at least, including copper and zinc. Conservative policy maintained, sometimes under pressure for relaxation of restric-

tions, by the various divisions of WPB is paying dividends, for which stockpiles will permit no waste of metal, most appear sufficient to meet heavy consumption now well under way.

Pressure for copper is heavy and demand developed for increased programs earlier than expected indicated by delivery of 156,800 tons of refined last month. Manpower is the most serious factor in production of refined copper as with brass mills and fabricators. For February delivery, demand is heavy with customers frequently asking for early delivery. Ingot makers are also asking for more copper because of the tighter scrap supply. Stockpiles will supply more tonnage next month and a further decline in stocks is likely. However, all arrivals next month will be channeled into production first to avoid drawing on warehouses where possible.

Calls for zinc are mounting, but rather unevenly distributed, centered in prime western and special high grade. Both are tight. Ordinary high grade supplies are ample and some effort to switch users from special high grade is considered. Some consumers have placed orders for March delivery on special high grade. Heavier use of zinc in brass, galvanizing and die castings is developing. Meanwhile additional restrictions have been placed on lead for numerous uses.

Simanal Price Reduced

Ohio Ferroalloys Corp., Canton, O., announces reduced prices on its ferroalloy Simanal, containing approximately 20 per cent each of silicon, manganese and aluminum. The new prices are 8c per pound in carloads, 8.75c in ton lots and 9.25c in less than ton lots. These prices are f.o.b. works, with freight allowed up to the equivalent of the St. Louis rate.

Iron Ore . . .

Iron Ore Prices, Page 130

Consumption of Lake Superior iron ore in December totaled 7,090,174 tons, compared with 6,882,696 tons in November and 7,509,096 in December, 1943, according to figures of the Lake Superior Iron Ore Association, Cleveland. For the full year consumption was 87,246,990 tons in 1944 and 89,027,689 tons in 1943.

The Association reports the breakdown of 1944 ore shipments included 60,111,928 gross tons of nonbessemer, 16,864,758 tons bessemer, 2,318,820 tons manganiferous, 54,740 siliceous and 31,991 tons aluminiferous.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4000 tons, process carbon black plant, Guyman, Okla., for Cabot Carbon Co., to Robberson Steel Co., Oklahoma City, Okla.

250 tons, plant for E. I. du Pont de Nemours & Co., at Dresden, N. Y., to Leach Structural Steel Corp., Rochester, N. Y.

STRUCTURAL STEEL PENDING

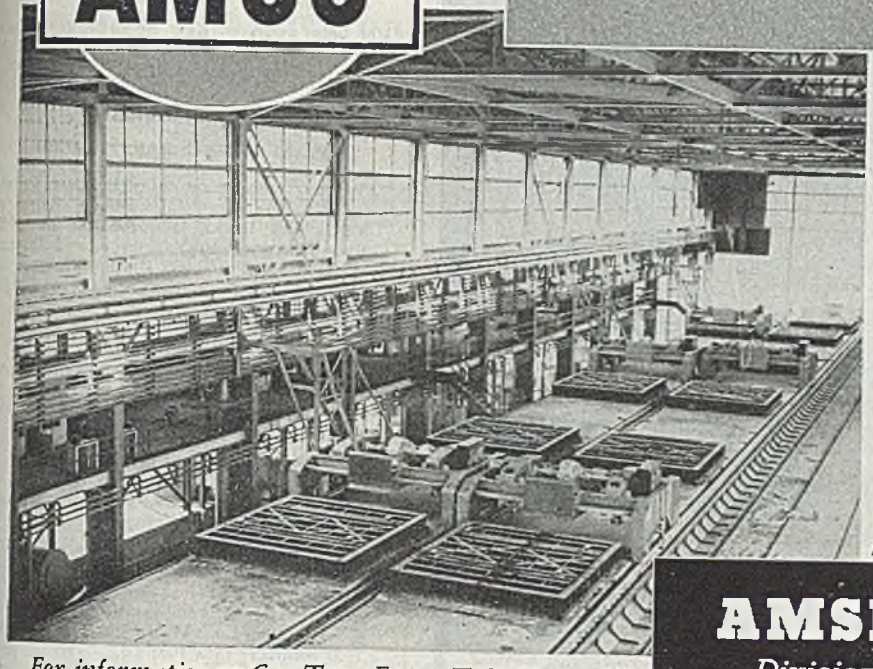
2700 tons, trestle caps and stringers, for Texas, for Atchison, Topeka & Santa Fe railroad; bids Jan. 23.

581 tons, Elk river bridge, Grove, Okla., for state highway commission.

290 tons, four highway bridges, Costa Rica.

238 tons, eighteen 32-foot beam spans, bridge 126-A, Chillicothe, Ill., for Atchison, Topeka

AMCO PIT FURNACES



Since their introduction in 1936 AMCO Recuperative Soaking Pit Furnaces have outsold all competitive designs. The reason . . . more and better heating with higher yields for less dollars, due in large part to the AMCO RECUPERATOR.

The Amco Recuperator will also accomplish similar results when applied to *large Amco Recuperative Rotating Hearth Furnaces.*

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A-1

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For information on Car-Type, Forge, Tube Normalizing, Heat-Treating, Continuous Conveyor, Galvanizing or Pit Annealing Furnaces . . . write to PENNSYLVANIA INDUSTRIAL ENGINEERS Division of Union Mining Co., Fulton Bldg., Pittsburgh 22, Pa.

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SHOT • GRIT

ALLOY METAL ABRASIVE COMPANY

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WAR • PRODUCTION • MUST • NOT • LAG

& Santa Fe railroad; bids Jan. 23.

100 tons, evaporating plant for P. H. Glatfel Spring Grove, Pa.; bids opened by H. Wilson & Co., engineers, Philadelphia.

100 tons, municipal light and power pl Ephrata, Pa.; Louis T. Klauder, Philadelp engineer.

100 tons, addition, New Rochelle, N. Y., h pital, Turner Construction Co., New Y City, asking bids.

REINFORCING BARS . . .

REINFORCING BARS PLACED

725 tons, radio transmitter building for vanced base, for U. S. Navy, Bureau Yards and Docks, 500 tons to Joseph Ryerson & Son Inc., Chicago, and 225 t to Ceco Steel Products Corp., Chicago.

265 tons, Bureau of Yards and Docks, N Department, Davisville, R. I., to Bethleh Steel Co., Bethlehem, Pa.

REINFORCING BARS PENDING

400 tons, U. S. Veterans Administration h pital, Lexington, Ky.

200 tons, high school, Dundalk, Md.

150 tons, Gopher Ordnance works, E. I. Pont de Nemours & Co., Rosemont, Minn.

130 tons, nurses' home, Billings, Mont.; J. Boespflug, Miles Center, Mont., low on g eral contract; bids Jan. 15.

118 tons, veterans hospital, Dwight, Ill., U. S. Veterans Administration; J. D. He Construction Co., Washington, low on g eral contract; bids Jan. 16.

PLATES . . .

PLATES PENDING

Unstated tonnage, two asphalt tanks at Nicholas, Pa., one water tank and two asph tanks at Locust Summit, Pa., for Read Briquet Co., Philadelphia; Day & Zimmerm Philadelphia, engineers, opened bids Jan.

Guaranteed Annual Wage Discussed at Forum

(*Continued from Page 47*)

hard work and ability and a willingn to take a chance.

Mr. Randall discussed the financ aspect of the guaranteed annual wag "Like every other enterprise under t American system, a steel company r plenishes its working capital from sales of its products. Cut off that sour of funds and the company is doome Take the example of having my co pany produce steel at 100 per cent c pacity and then ship only one-half f immediate sale. The full payroll wou be going ahead but the replenishme of the working capital would be cut by half. In that situation the amou of cash which my company norma had on hand before the war would ca it just exactly three months."

The problem of storing unshipp steel is a staggering one, he continue To continue the intake of raw mater into a steel mill and cut off 50 per ce of the outlet creates vast physical pro lems also.

He pointed out that a fleet of 14 la steamers serve Inland with raw mater and that every 48 hours during the se son of navigation three ships arrive loa ed with iron ore. Half of each car represents metal that later must be d posed of as finished steel. Each day top production two trainloads of ste

leave Inland, each containing 75 cars. With 50 per cent of sales cut off, that would mean that each day 75 cars of steel would have to go into warehouses.

The largest steel warehouse organization in the world is Joseph T. Ryerson & Son Inc., an affiliate of Inland. "If all of its warehouses in 11 cities were empty and ready to receive this excess product of ours, its buildings would be full in just five weeks. In the course of a single year, if we kept on producing at capacity we would need warehouse space 10 times as great as that owned by the Ryerson company. For the industry as a whole, it would require buildings costing between two and three billions to warehouse half of our annual production.

"In addition to the storage problem," he continued, "there is that of physical deterioration. Some types of steel become unsuited to their end purpose unless promptly used. For example, cold-rolled steel sheets that are to be subjected to severe forming action have internal strains set up by aging. And sheets that require a mirror-like finish must receive their protective paint or lacquer immediately. And for all steels special precaution must be taken in warehouses, if there is danger of unusual humidity."

But the most fundamental problem of all, he pointed out, is the essential fact that steel is rolled to order. Not until the customer is ready to manufacture his product does the steel producer know the size or shape or quality of the metal that he will use. Each piece, he asserted, has individuality, has a special length, special breadth, special thickness and special chemistry. "A steel rail has nothing in common with a garbage pail except its common ancestry up in the Lake Superior region," he added.

Discussing consumer buying habits and requirements, he cited the case of agricultural implements. The farmer, he said, is wholly unpredictable in his buying habits. A reduction of as much as 80 per cent has occurred in his buying volume between years, and 30 or 40 per cent is common, Mr. Randall said.

"In reality, however, the farmer is no more unpredictable than the weather upon which he depends. If corn weather had been good and there is a bumper crop, he buys corn pickers. But if the season has been poor and his corn is not mature when the first frost comes, he buys corn binders. If the spring is wet and the hay crop heavy he buys mowers and rakes and balers. In a dry year, he buys none of these things."

With respect to tin plate, can manufacturers anticipate needs as far as possible. But one large can company in the course of a year, he pointed out, has 2000 different types of metal which it requires—2000 variables in length, width, thickness and chemistry. The weather decides which crops will be abundant and each crop takes a different can. In the case of automobiles, who, he asked, is to say whether the public in a given year will buy coupes or station wagons. And so it goes.

CONSTRUCTION AND ENTERPRISE

MICHIGAN

CADILLAC, MICH.—Standard Foundry Inc., Fifth street and Third avenue, has been incorporated with $50,000 capital to operate a general foundry, by B. J. Teeter, 415 East Chapin street, Cadillac.

DEARBORN, MICH.—Petrak Mfg. Co., 25131 West Warren avenue, has been incorporated with $10.000 capital to operate a general machine shop and manufacturing business, by Emil F. Petrak, 22538 Beech street, Detroit.

DETROIT—Detroit Brass & Malleable Works, 100 South Campbell street, has let contract to Austin Co., 429 Curtis building, for a plant building to cost about $40,000.

DETROIT—Continental Motors Corp., 12801 East Jefferson avenue, has let contract to F. H. Martin, 955 East Jefferson avenue, for a test house for its engine plant, to cost about $75,000.

DETROIT—Johnson Piston Ring Co., 6010 Woodward avenue, has let contract to Clausen Co., 14429 Woodrow Wilson avenue, for a manufacturing building, and office, estimated to cost $50,000.

DETROIT—Clinton Mfg. Corp., 706 Griswold building, has been incorporated with $10,000 capital to manufacture mechanical tools, devices and equipment, by Oswald McGross, 1945 Vinewood street.

DETROIT—Grico Two Axle Drive Co., 19840 West Eight-mile road, Redford station, Detroit, has been incorporated with $100,000 capital to manufacture automobiles, parts and accessories, by Leo F. Stone, 19015 Woodring avenue, Farmington, Mich.

DETROIT — Formetal Co., 2746 Penobscot building, has been incorporated with $30,000 capital to manufacture metal parts, by Renville Wheat, 72 Touraine street, Grosse Pointe, Mich.

DETROIT—Howard H. Heinz Inc., 19326 Woodward avenue, has been incorporated with $50.000 capital to manufacture tools and metal parts, by Howard H. Heinz, 275 Hamilton road, Bloomfield Village, Birmingham, Mich.

DETROIT—Industrial Conveyor Corp., 678 Henry street, has been incorporated with $50,000 capital to manufacture industrial conveyors, by Robert W. Wood, 10494 Bryden street.

DETROIT—Butt Welding & Mfg. Co., 4847 Bellevue avenue, has been incorporated with $50,000 capital to conduct a manufacturing business, by Eben L. Dunn, 821 Trombley road, Grosse Pointe Park, Mich.

DETROIT—Contour Grinding Co., 9460 Connor street, has been incorporated with $150,000 capital to manufacture mechanical appliances and instruments, by William J. Pallister, 23420 Young avenue, Detroit.

DETROIT—Douglas Machine Co., 2040 West Jefferson avenue, has been incorporated with $10,000 capital to do general machining and manufacturing, by Douglas Trebilcock, 12815 Mercier street, Wyandotte, Mich.

FRANKLIN, MICH.—Franklin Products Co. has been incorporated with $25,000 capital to manufacture fabrications of metals and nonmetallic materials, by Franklyn S. Collins, Route 1, Birmingham, Mich.

GROSSE POINTE, MICH.—Pressure Cast Products Corp., 15127 Charlevoix avenue, has been incorporated with $12,550 capital to manufacture machinery and engines, by Russell G. Simpson, 18516 Stoepel street, Detroit.

MANISTIQUE, MICH.—Hiawatha Metal Products Inc., River street, has been incorporated with $25,000 capital to conduct a general manufacturing business, by Stephen R. Elko, 13123 Hamilton avenue, Detroit.

WYANDOTTE, MICH.—Pressure Vessel Service Inc., 13210 Mercier avenue, has been incorporated with $2500 capital to manufact power and heating boilers and pressure vess by Floyd A. Nicholson, 3929 Guilford str Detroit.

MASSACHUSETTS

SPRINGFIELD, MASS.—Smith & Wesson, Stockbridge street, has let contract to Ern F. Carlson Inc., 1694 Main street, for electric power and heating plant estimated cost over $50,000.

PENNSYLVANIA

JOHNSTOWN, PA.—Air Reduction Sales C 60 East Forty-second street, New York, pl a reinforced concrete and steel plant bui ing costing about $287,000.

PITTSBURGH—F. J. Kress Box Co., Twen eighth street, plans new boilerhouse with c unloading hopper, coal-handling equipme track hopper and conveyor, to cost abo $50,000.

OHIO

ASHTABULA, O. — General Electric C Schenectady, N. Y., will erect plant here 100-acre site for manufacture of home fre ers, costing between $3 and $4 million.

COLUMBUS, O.—Minneapolis-Moline Pow Equipment Co., 4444 North Front stre plans brick and steel warehouse building the Grandview section, costing abo $175,000.

GENEVA, O.—Geneva Metal Wheel Co., Fa tory Row, H. A. Carter, president, will bui a one-story 25 x 200-foot addition, plans mature in spring.

ILLINOIS

CHICAGO—Radio Steel & Mfg. Co., 65 West Grand avenue, has let contract to Abe Howe Co., 53 West Jackson boulevard, a 97 x 155-foot plant addition estimated cost $60,000. C. A. Metz, 224 South Mich gan avenue, is engineer.

MARYLAND

BALTIMORE—Utility Welding Service, 8 West street, newly formed, has begun o erations in a new plant.

BALTIMORE—Union Sheet Metal Co. has e tablished a plant at 1004 Hillen street f welding, fabricating, punching, shearing, et

BALTIMORE—Tomke Aluminum Co. expec to start production of aluminum ingots February in an 80 x 280-foot plant at 42 East Monument street.

BALTIMORE—William S. Clark, 3009 Mont cello Terrace, welder, has completed pla for a shop at New Philadelphia road a Schaefers lane, Baltimore county.

BALTIMORE—Milcor Steel Co., Fayette a Oldham streets, subsidiary of Inland Ste Co., plans erection of a two-story warehou 160 x 240 feet on Philadelphia road.

BALTIMORE—Tool & Die Co. of Baltimo has removed from 2510 Harford road into two-story building at 814 East Lombard.

NORTH CAROLINA

CHARLOTTE, N. C.—Trailmobile Co., Cinci nati, has acquired manufacturing faciliti of Caroline Truck & Trailer Co., 2019 Nor Tryon street.

FLORIDA

MIAMI, FLA.—Pan-American Metal Produc Co., 252 N. W. Twenty-eighth street, w build one-story 50 x 130-foot manufacturi building costing about $18,000. Harv Baxter, 407 Alhambra circle, Coral Gable Fla., is engineer.

MISSOURI

POTOSI, MO.—C. F. Cresswell, mayor, a

nounces that city will soon build a municipal light and power system, for which a bond issue of $60,000 has been voted.

ST. LOUIS—National Foundry & Machine Co., 8025 South Broadway, is building a one-story 104 x 124-foot and 34 x 75-foot nonferrous foundry at 7815 Alabama avenue.

ST. LOUIS—National Lead Co., International building, Eighth and Chestnut streets, St. Louis 1, plans erection of a new plant in this vicinity costing more than $200,000. with equipment.

ST. LOUIS—Apex Metal Products Co., recently incorporated, has acquired a one-story 80 x 120-foot building and adjoining vacant lot 40 x 120 feet at Ninth and Victory streets, to be used as a machine shop and factory. Plant formerly was used by the Wackman Welded Ware Co.

ST. LOUIS—United States Steel Supply Co. has bought site at Sarah and Duncan street for postwar construction of warehouse and distribution plant.

ST. LOUIS—Century Electric Co., 1806 Pine street, is adding a floor to its six-story plant at 1812 Pine street from plans by William B. Ittner Inc., 408 Board of Education building, 911 Locust street, at cost of about $40,000, with equipment.

ST. LOUIS—Hussman-Ligonier Co., 2401 North Leffingwell avenue, has let contract to W. H. & Nelson Cunliffe Co., 3320 Lindell boulevard for a one-story 40 x 169-foot plant at 2832 Benton street, to cost about $40,000 with equipment.

WISCONSIN

WEST ALLIS, WIS.—Allis-Chalmers Mfg. Co., 1126 South Seventieth street, is having plans made by C. E. Meyer, care owner, for a one-story 60 x 500-foot metal pattern storage building to cost about $80,000.

MINNESOTA

LUVERNE, MINN.—Village, E. Thron, superintendent of utilities, has let contract to Pittsburgh-Des Moines Steel Co., 915 Tuttle street, Des Moines, Iowa, for steel water tower and 300,000-gallon steel tank, costing about $29,600.

MINNEAPOLIS—Lewis Bolt & Nut Co., 506 Malcolm avenue SE, has let contract to Victor Carlson & Sons, 2853 Park avenue, for rebuilding its forge shop, to cost about $50,000. Toltz, King & Day, 1509 Pioneer building, St. Paul, are engineers.

CALIFORNIA

LOS ANGELES—U. S. Aluminum & Mfg. Co., formed by H. F. Long, has started operations at 5200 Telegraph road.

LOS ANGELES—Brachman Ignition Works, 1450 Long Beach avenue, will build machine shop addition 22 x 35 feet, costing $1800.

LOS ANGELES — Airplane Equipment Co., 2822 Benedict street, is building a plant addition 20 x 80 feet, costing about $3840.

LOS ANGELES—M. & M. Metal Processing Co., formed by A. C. Moulton and J. S. McCurdy, is conducting its business at 219 Wilcox building.

LOS ANGELES—Heller Pipe & Machinery Co., 5707 South Alameda street, is building a crane runway costing about $2500 and a plant addition costing $6000.

LOS ANGELES—General Cable Corp., 3600 East Olympic boulevard, has permit for addition to storage building 50 x 130 feet, costing about $50,000.

SANTA MONICA, CALIF.—GMC Tool & Die Co. has been formed by Ralph S. Mercill, Fred Carlson and Roy Gregson and has started operations at 2731 Lincoln boulevard.

SAN PEDRO, CALIF.—California Shipbuilding Corp., Terminal Island, has been awarded a contract for 16 Victory ships.

SAN PEDRO, CALIF.—C. W. Driver Inc., 11 West Seventh street, Los Angeles, has general contract for addition to plate shop build No. 128, at U. S. Naval dry docks, T Island, San Pedro, for Bureau of Yar Docks, to cost about $213,663. St been awarded to Consolidated Steel 5700 South Eastern avenue, Los Ange

VENICE, CALIF.—North American A Inc., 5701 Imperial, has building per new altitude chamber, 18 x 70 feet, about $25,000.

WASHINGTON

LONGVIEW, WASH.—Longview Found plans expansion of its plant to hand orders. A recent order was a subcontr 500,000 grenade castings.

TACOMA, WASH.—American Smelting fining Co., Ruston, Tacoma, has been WPB priorities for installation of two hp boilers, screw conveyors, water- system and other equipment, to cost $297,697.

CANADA

BRANTFORD, ONT.—W. T. Snowdon Marlboro street, plans to start work s foundry addition to cost about $15,0

ETOBICOKE TOWNSHIP, ONT.—Ing Canadian Clock Co. Ltd., Grand avenue plant addition estimated to cost with ment about $35,000. John B. Park Bloor street West, Toronto, is architect.

HAMILTON, ONT.—Frost Steel & Wi Ltd., 250 Lottridge street, plans plant tion to cost about $10,000.

LEASIDE, ONT.—Sheridan Equipmen Ltd., 7 Industrial street, has given g contract to Dickie Construction Co. Lt Yorkville avenue, Toronto, and work started immediately on a plant on Laird to cost about $45,000.

LONG BRANCH, ONT.—Sully Brass Fo Ltd., 7 Wabash avenue, Toronto, has tenders through E. I. Davidson, archite Toronto street, Toronto, for foundry estimated to cost about $50,000 with ment.

TORONTO, ONT. — Davenport Tool & Works, 2720 Dundas street West, is plans prepared by C. W. Smith, architec Jane street, for plant addition to cost $25,000.

TORONTO, ONT.—Canadian Steel Str Co. Ltd., 103 Bathhurst street, is consi the erection of a plant estimated to cost $50,000, with equipment.

WINDSOR, ONT.—Chrysler Corp. of C Ltd., has given general contract to Din McIntire Ltd., Security building, for addition to cost about $350,000.

LACHINE, QUE.—Steel Co. of Canada 525 Dominion street, Montreal, plans ad to plant here and installation of equi estimated to cost about $100,000.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has autho the following expansions and equip purchases (figures are approximate

Berger Bros. Co. Inc., New Haven, $75,000 to provide equipment at a pl New Canaan, Conn.

Brewer Mfg. Co., Muncy, Pa., $200,0 provide equipment at a plant in Willia Pa.

Brown & Root Inc., Houston, Tex., $92 to provide plant facilities at Houston.

Lehigh Foundries Inc., Lehigh, Pa., $1 000 to provide plant facilities at Easton

Scripto Mfg. Co., Atlanta, Ga., $260,0 provide equipment at a plant in Atlanta.

United States Hoffman Machinery Corp. York, $3,500,000 to provide equipment plant at Poughkeepsie, N. Y.

Advertisement FEBRUARY, 1945

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Brass and Copper for Deep Drawing, Spinning and Stamping

Wide Range of Physical Properties

Space does not permit a complete discussion of the many advantages of brass for drawing, spinning and stamping. Through long usage its fine appearance, wearability, non-rusting properties and lasting satisfaction are taken for granted by users of brass products. Only when it is necessary to use substitute materials are the fine characteristics of brass most fully appreciated. The manufacturer, on the other hand, thinks of brass in terms of easy workability, less wear on tools, economy when a number of fabrication operations are involved, and ease of attractive, durable plating and finishing.

Manufacturers striving for lower costs through greater efficiency seek materials which are of correct composition, gauge, temper, surface, coil length, etc. Laboratory skill, modern manufacturing methods and close cooperation can work wonders by increasing quality and cutting waste, labor and materials through reduction of unnecessary scrap.

The physical and mechanical properties of six alloys, ranging from high brass to gilding metal, together with standard grades of copper, are listed herewith. Included are recent specifications and brief descriptions of their most popular uses. Keep this bulletin for future reference. We shall be glad to supply extra copies as long as they are available.

High Brass (approximately 66% copper, balance zinc) color, bright yellow. Most widely used alloy of the brasses. Suitable for a great variety of drawing, forming, spinning, stamping and etching operations. Has many applications in the manufacture of building hardware, electrical sockets and other parts, auto lamp reflectors and accessories, novelties, gift items, etc.

70-30 Brass (approximately 70% copper, balance zinc) color, bright yellow. Known as cartridge brass. Because of greater strength and higher ductility than high brass it is universally used for the manufacture of artillery cartridge cases and small arms ammunition; for deep drawn and spun parts such as musical instruments; for the manufacture of eyelet machine items, and products made by progressive machine operations. 70-30 brass is also used for making parts requiring extra deep draws with fewer intermediate anneals than high brass.

Low Brass (approximately 77% to 82% copper, balance zinc) color, light golden. Very ductile. For making flexible metallic hose, metal bellows, clock dials, medallions, etc.

Red Brass sometimes known as "rich low" (approximately 82% to 87% copper, balance zinc) color, deep golden. Very ductile. Widely used for water pipe and auto radiator cores, because of its corrosion resistance; vanity cases and inexpensive jewelry because its color resembles 14K gold. Also used for weather strip, fire extinguishers, because of its resistance to weathering and season cracking.

Commercial Bronze (approximately 87% to 94% copper, balance zinc), rich, warm bronze color. Has great ductility. Resists weathering, corrosion and season cracking. For outdoor electric light fixtures, hardware, costume jewelry, grilles, screen cloth, primer caps, screw shells.

Gilding Metal (approximately 94% copper and over, balance zinc) color, light copper. Great ductility and resistance to season cracking and corrosion. Used for enamelled jewelry, escutcheons, nameplates, bullet jackets.

Copper for Fabrication

Can be worked either hot or cold. When cold worked does not harden as rapidly

(*Continued on page 2, column 2*)

BRASS AND COPPER STRIP—*For Drawing, Spinning and Stamping*

		High Brass	70-30 Brass	Low Brass	Red Brass	Com. Bronze	Gilding Metal	Copper Elec. Tough Pitch
ANALYSIS								
Copper %		66.0	70.0	80.0	85.0	90.0	95.0	99.92
Lead %								
Tin %								
Zinc %		34.0	30.0	20.0	15.0	10.0	5.0	
Oxygen								0.04
MECHANICAL PROPERTIES								
Ten. Strength psi	Hard*	74,000	76,000	74,000	70,000	61,000	56,000	50,000
	Soft	47,000	47,000	44,000	40,000	38,000	35,000	34,000
Yld. Strength psi (@½ % extens. under load)	Hard*	60,000	63,000	59,000	57,000	54,000	50,000	45,000
	Soft	15,000	15,000	14,000	12,000	12,000	11,000	11,000
Elongation % in 2"	Hard*	8	8	7	5	5	5	6
	Soft	62	62	50	47	45	45	45
Rockwell Hardness	Hard*	B80	B82	B82	B77	B70	B64	B50
	Soft	F64	F64	F61	F60	F57	F52	F45
PHYSICAL CONSTANTS								
Melting Pt. (Liq)°F		1710	1750	1830	1880	1910	1950	1981
Density. lbs./cu. in.		0.306	0.308	0.313	0.316	.318	.320	.321-.323
Coeff. Therm. Exp. per °F from 77°F to 572°F x10-6		11.3	11.1	10.6	10.4	10.2	10.0	9.8
Thermal Conduct. Btu/sq ft/ft/hr/°F @ 68°F		67	70	81	92	109	135	226 192 (a) 228 (b)
Elec. Cond. % IACS @ 68°F Soft		27	28	32	37	44	56	101 85 (a) 102 (b)
Mod. of Elas. (Tension) psi.		15,000,000	16,000,000	16,000,000	17,000,000	17,000,000	17,000,000	17,000,000
FABRICATION PROPERTIES								
Machinability Rating**		30	30	30	30	20	20	20
Cold Working		E	E	E	E	E	E	E
Hot Working		P	F	F	G	G	G	E
Hot Working Range °F			1350-1550	1500-1650	1450-1650	1400-1600	1400-1600	1400-1600
SPECIFICATIONS								
A.S.T.M.		B36-43T Alloy #8	B36-43T Alloy #6	B36-43T Alloy #4	B36-43T Alloy #3	B36-43T Alloy #2	B36-43T Alloy #1	B152-42T
Federal		QQB611A Comp C	QQB611A Comp E					QQC501A
Navy		47B2INT Aug. 15, 1944	OS1331 47B2INT Aug. 15, 1944				OS819	47-C-2f
Army			(57-172-10) (57-173B)	57-160	57-160	57-171-1B	57-171-2	57-226A
AMS			4505A					4500

(a) Phosphorized Copper (b) Oxygen Free Copper E—Excellent G—Good F—Fair P—Poor
*Hard temper values are for strip reduced 4 B & S gage numbers in thickness by cold rolling.
All figures are nominal values and should not be used as specifications. **Machinability rating.

CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

ACCELERATED CORROSION — Cold Wall Effect (Cont.)

We shall now consider the "cold wall effect" in relation to stress corrosion cracking. The contamination of a condensate by ammonia or ammonium compounds from steam or the products of combustion (from coal or gas fired furnaces and water heaters) may lead to stress corrosion cracking of stressed brass condenser tubes or basement cold water pipes. This type of corrosion is found in plants such as oil refineries where ammonia gas is used for neutralizing acid vapors. Stress corrosion is much more localized than the corrosion grooves described in our previous discussion, and is characterized by very narrow cracks which penetrate the metal from the surface facing the corrosive atmosphere or solution. See microstructure illustration in figure 1. There may be a single crack, which eventually opens up as shown in figure 2, or a network of many cracks.

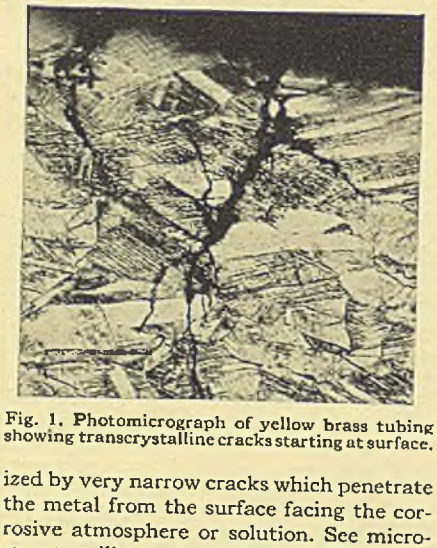

Fig. 1. Photomicrograph of yellow brass tubing showing transcrystalline cracks starting at surface.

The time required to penetrate a yellow brass rod, sheet or tube varies considerably depending primarily upon the combined action of:

1. Amount of ammonia or similar nitrogen compounds.
2. Magnitude of the stresses.
3. Inherent susceptibility of the alloy to this specific type of attack.
4. Amount of water vapor.
5. Amount of air.

If conditions are severe enough, stress corrosion on the outside of a cold tube or pipe may proceed much more rapidly than the type of corrosion occurring on the inside.

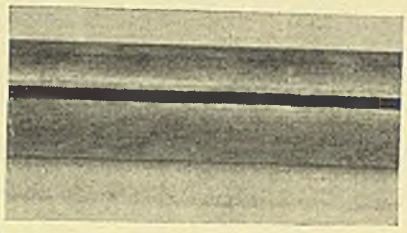

Fig. 2. Yellow brass tube with fully developed crack.

Brass and Copper

(*Continued from page 1*)

as other materials, and consequently, will stand severe cold working with fewer intermediate annealing operations. It will soften above 450°F. Since it oxidizes readily at elevated temperatures, its surface should be protected by a reducing or neutral atmosphere during annealing. Copper can be readily polished and plated, and will take on beautiful finishes. Copper is used in the manufacture of electrical equipment such as electric switches, terminals, lighting fixtures, serving trays, percolators, creamers and sugar bowls, electrical appliances, radios, automobile radiators, gift items, clock cases, enamelled goods, cooking utensils, garden sprayers, concrete road expansion joints.

Electrolytic Tough Pitch Copper (contains small quantity of copper oxide). Used in far greater quantities than other grades. Has high electrical conductivity and can be stamped, formed, spun, brazed or soldered. Not suitable for oxyacetylene welding because it tends to become brittle at some distance from the weld.

Phosphorized Copper (deoxidized with phosphorous). Has lower electrical conductivity than tough pitch copper. Used for operations involving extra deep drawing or flanging. Can be welded by the oxyacetylene method without becoming brittle.

Oxygen Free Copper. Has high electrical conductivity and is free from both phosphorous and cuprous oxide. Suitable for extra deep draws. Used where pure copper is required, i.e. radar, electronics and other exacting electrical requirements.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

A Saw Blade for the rapid cutting of ferrous and non-ferrous alloys has an innovation in the design of teeth to permit rapid production, parallelism and close tolerance over the entire finished cut, according to recent announcement. **No. 59**

Plexiglas Masking Jigs are available for copper plating. Machinability, dimensional stability, and light weight are said to make this material valuable in reducing reject and in stepping up production rates. Carbon rings to be plated are inserted in groove 1/64 in. wide on either side of the Plexiglas jig rings. **No. 59**

A New All-Purpose Disc Grinder, said to be suitable for use with any type of metal, wood or plastic material, is available in 3- and 5-h.p. models. Principal features claimed are (1) a 30-in. disc with 26-in. high grinding area (2) hydraulic controls that eliminate all gears, worms and jack screws ordinarily employed for raising, lowering and tilting the table (3) an accurate position stop provided on protractor for stopping table in any position from 45° down to 15° up; (4) ventilated table with properly placed perforations to channel dust into highly efficient dust guards; and (5) paper or cloth abrasive discs may be removed and replaced without removing the steel disc. **No. 59**

Dependable Temperature Regulation is reported with a new control for electrically heated furnaces, ovens, and similar units. An on-off contacting system feeds to the heating unit the current needed to hold temperature to the required control point or program. Input is either full-on or full-off. Regulation is obtained by controlling automatically the time during which current is on and off. Other features reported are full proportional time action, automatic drop-correction, and optional "overshoot control" for use in bringing temperature up to desired heat. **No. 59**

Revised Duronze Manual

Revised Manual with new tables, curves and other physical data now off the press. If interested in improving existing products or making new ones, be sure to write for a free copy of this 80-page technical booklet.