STEEL

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STEEL
May 7, 1945

A Lesson for Us

Collapse of German resistance, coupled with the execution of Mussolini and the reported death of Hitler, marks the end of an experiment in government which should stand as a permanent lesson to all mankind.

It is a lesson to be heeded not only by political aspirants in every nation but also by every citizen. It is important that all of us in democratic countries learn as much as we can about the true facts attending the amazing rise to power of Mussolini and Hitler. We need a better explanation than has been provided thus far of how it was possible for these scoundrels to win the support of the men and women of Italy and Germany to the extent that they later gave up individual freedom and became slaves to all-powerful states.

Specific information along this line would help persons in all countries where individual freedom still exists to detect warning signs whenever their own governments veer toward the practices which led the Italian and German people to their doom. It would be enlightening to know in precise detail just how Italian and German industrialists reacted to every move of the dictators as they were building their super states. Were the leaders of industry too gullible, were they bribed with promises of profit or privilege or were they guilty of honestly believing that the principles advocated by their dictators were sound and just?

Light on these and similar questions will go a long way toward helping to guide us in building a better postwar United States. These are practical questions, because if we can get the correct answers—free of political distortion—we can determine how much authority we can entrust to our federal government without incurring the danger of a too-powerful state.

Many of us discount the idea that American citizens or American industrialists could repeat the mistakes of their contemporaries in Italy and Germany. Yet Hitler rose to power through democratic processes. At the start Mussolini and Hitler both advocated planned economies not unlike those entertained in the minds of earnest people in our own nation. We have been and even now are flirting with ideas and policies which, under certain circumstances, might lead us into danger.

The lesson of the fall of the Rome-Berlin axis should teach us to review again the strengths and weaknesses of our own house, to the end that we may make it a stronger citadel of freedom.

HOUSE CLEANING TIME: Almost every issue of this publication carries news items indicating the confusing effect of government regulations governing wages, working conditions and labor relations. Three items, picked at random from this issue, illustrate the point.

One has to do with the issuing of supplementary directives by William H. Davis, director of economic stabilization, to "further define fringe wage adjustment limits." Another deals with the apparent reluctance of WMC to grant permission to war contractors to shift from a 48-hour to a 40-hour week when cancellation of orders or cutbacks threaten to cause thousands of employes to be laid off. The third is the statement that in the first quarter of 1945, Bethlehem Steel Co. paid out $21,616,000 in overtime and $4,758,000 in retroactive wages.

These three illustrations are typical. "Supplementary directives" and other repeated attempts to clarify hopelessly confused orders are in themselves indictments of a too complicated system. The WMC incident is a typical case of bureaucratic inflexibility. The Bethlehem figures represent payments made more to conform to arbitrary government rulings

(OVER)

than to compensate fairly for services rendered.

These situations would not exist if the government's labor and wage agencies were properly organized. President Truman has a wonderful opportunity to merge these rambling bureaus into one responsible, efficient body. —pp. 83, 88, 92

• • •

ROAD WILL BE LONG: WPB has made a good start in revoking limitation orders which control industrial activities. As many as 41 restraining orders have been lifted in a single day.

This marks the first significant reversal of a trend which since the early days of the defense program witnessed scores or more of new controls almost daily. That the peak of these regulatory orders has been passed and that their number is being reduced rapidly is good news to everybody in industry.

However, manufacturers should not count too much on the freedom permitted when an "L" order is revoked. Frequently the revocation removes only one of many restraints covering the use of a material or product. In some instances dozens of orders must be revoked before the manufacture of a simple product can be resumed.

Even when one is free of WPB regulations, he still is confronted by restraints imposed by other federal agencies. The road back to a reasonable degree of freedom of action will be long. —pp. 75, 89

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PERSONNEL PROBLEM: Most of the talk about reconversion deals with materials, equipment and methods, and ignores the factor of personnel. This is unfortunate, because competent executive supervision is going to be highly essential during the transition period.

A. H. Allen touches on this point in "Mirrors of Motordom." Commenting on the retirement of C. E. Wetherald, manufacturing manager of Chevrolet, after 40 years in automotive production, he points out that there are many able executives who, like Wetherald, will be retiring as soon as the pressure of war eases.

Hundreds of veterans have remained on the job long beyond normal retirement age and hundreds of others have resumed work after having retired—to do their bit in the emergency. Others, like T. M. Girdler of Republic, have assumed an additional job to help out.

These men will have earned a right to relax. Filling their places satisfactorily will be one of the problems of reconversion. —p. 91

SIGNS OF THE TIMES: Through March 31, 1945, RFC had sold surplus government-owned producers' and capital goods costing $180,630,000 for $115,303,000 (p. 85), netting a return of 64 cents on the dollar. . . . At President Truman's request, Secretary of Commerce Wallace has appointed a committee composed of William H. Davis, Francis Biddle, Charles F. Kettering and Vannevar Bush (p. 88) to study the working of the present patent system and to prepare recommendations for legislation to overhaul it. The outcome of this report could be extremely important. . . Mexico's output of 236,000 metric tons of finished iron and steel products and 217,000 metric tons of pig iron in 1944 (p. 80) represents gains of 43 and 128 per cent, respectively, over production in 1941. . . . P. W. Litchfield, chairman of Goodyear, estimates that three years after the national rubber plantations in the Far East are liberated (p. 92) the annual supply of rubber will be 2,700,000 long tons—1,400,000 from trees and 1,300,000 from synthetic plants, while world capacity for processing this supply will be 1,500,000 long tons. Here is an indicated surplus of 1,200,000 tons which will liven a competition between the natural and synthetic interests and affect the price of rubber manufactures. . . . Market authorities believe the pressure of demand following V-E Day will support a firm price structure (p. 84) for most materials purchased by the metalworking industries. Iron and steel scrap, always prophetic market-wise, is in a strong position as to supply and demand..... Federal Reserve's index of industrial production, which touched a wartime peak of 247 in October and November of 1943 (p. 198), stood at 236 in February and March, 1945. This happens to be the average index for the entire year of 1944 and reflects a maintenance of production at high levels in the first quarter. . . . With construction of new ships declining (p. 97), the San Francisco Bay area now boasts the greatest concentration of ship repair facilities in the world. . . . Bethlehem Steel will completely revamp and enlarge its bar-making facilities at Lackawanna (p. 83) at a cost of $15,000,000. . . . OPA is studying price regulating policies (p. 79) to ascertain whether they are affected by the Supreme Court's basing point decisions of April 23.

EDITOR-IN-CHIEF

Millions are "*Injured*" by a Single Accident

Not so many months have passed since an accident meant little more than some personal loss and a temporary, but easily adjusted, work schedule. Today, that situation is completely changed.

Every accident of the 9,000,000 that occur annually is a national liability, affecting, not only the output of the injured worker's shop, but also the production of other shops. Yes, a single accident "injures" millions —millions of other workers who are trying desperately to reach maximum war output—millions of American citizens who are striving to retain their freedom—millions of American fighting men who never can have all the equipment and supplies they need for Victory so long as America is careless on the home front.

Anything you can do to prevent accidents will be a real contribution to America's fight for freedom. Remove hazards at home, drive carefully, be considerate of others in traffic, observe safety rules when at work, promote safety and safety programs no matter what your position may be.

Start today! Think safety, promote safety! Keep more war workers on the job for Victory!

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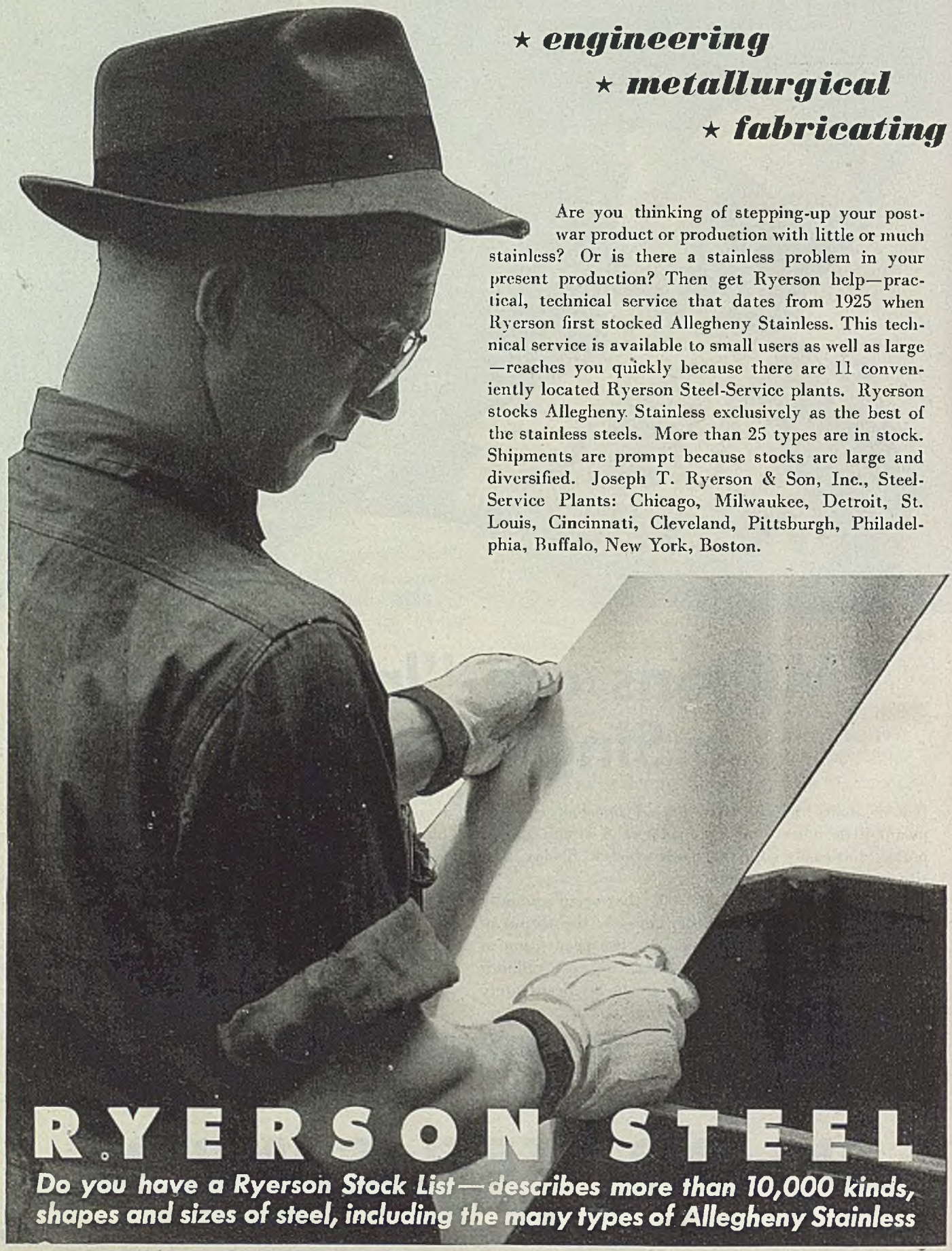

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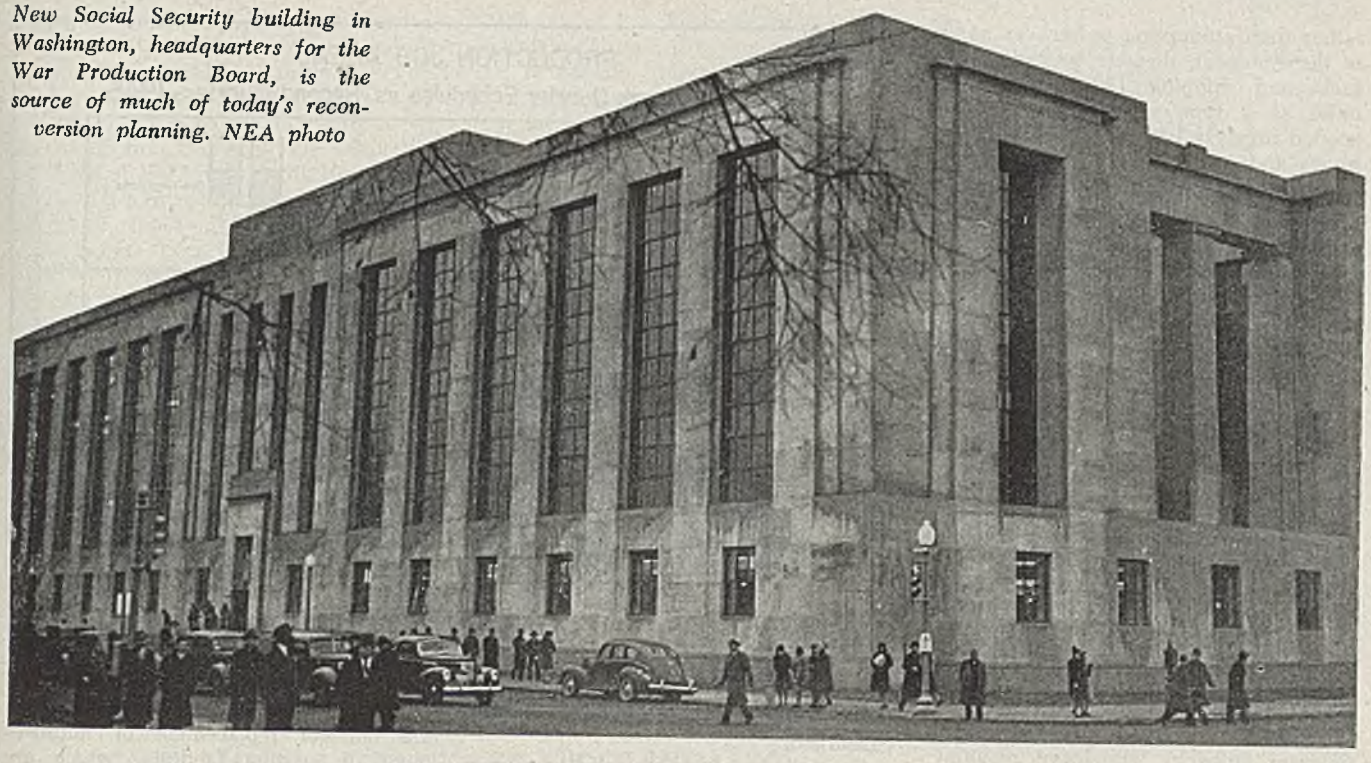


New Social Security building in Washington, headquarters for the War Production Board, is the source of much of today's reconversion planning. NEA photo

Pattern for Shift to One-Front War Drawn; Many Controls Lifted

Substantial reductions in military procurement programs already ordered. Extent of cutbacks to depend partly on amount of materiel that can be transferred from European to Pacific theaters. Post-V-E Day schedules still highly fluid

THE PATH over which industry will travel in adjusting to a one-front war is opening up.

Controls over materials are being relaxed. Military cutbacks are on the increase. Manufacturers are being helped in obtaining machine tools, equipment and construction necessary for a limited civilian output. Tentative estimates are being ventured by the war agencies as to the amount of formerly critical materials that will be made available for civilian production during the next few months. Restrictions on reconversion which were imposed last winter when the Germans started their counteroffensive are being lifted.

Taken together, these steps signalize that V-E Day for industry is at hand, regardless of whether or not a formal declaration of the cessation of organized resistance in Europe is issued.

The blueprint for the shift to the one-war economy has been prepared and awaits only final approval by the many war agencies whose activities must be co-ordinated in the program. Drafted by the War Production Board's Committee on Period 1, the interval between the fall of Germany and the defeat of Japan, the program is expected to become the official government policy in easing manufacturers back into peacetime production.

The CPO schedule calls for from four to six months to iron out all the kinks in the partial reconversion program. When the shift is completed, the present complex system of priorities and materials control will have vanished. Replacing it will be two simple priority ratings—MM for military orders and CC for civilian goods necessary to the domestic economy.

These plans have been revealed on a piecemeal basis over the past several weeks and include the lifting of restrictive orders by the score (see page 89), the open-ending of the Controlled Materials Plan, liberalization of manpower controls, and the retention of restrictions on items critically scarce. More than half the 420 limitation orders in effect a fortnight ago are expected to be revoked in the near future.

Substantial reductions in the military program have been made. These include cancellation of facilities for the production of artillery ammunition and tanks, cutbacks in the B-17 and B-24 heavy bomber programs, and the cancellation of some ship programs. Other reductions will be forthcoming over the next few weeks, and probably will amount to 15 per cent of the overall program in the next three months, and will gradually increase after the mopping up process is completed in Europe.

The extent to which the military program can be reduced over the next year or two will depend to large extent on the amount of goods that can be transferred from the European theater to the Pacific fronts. Some Army estimates hold out considerable hope that a large portion of the materiel in Europe can be recovered, possibly as much as 60 to 70 per cent. Others believe that a large portion of the goods in Europe should be written off and that the armies in the Pacific should be re-equipped. They argue time would be saved by producing new goods in this country and shipping it the 5000 or 6000 miles to the Orient,

rather than attempting to recover goods in the European theaters, reconditioning them and shipping 12,000 to 14,000 miles at a time when ships will be needed urgently both for the transfer of troops and materiel.

The reductions in the military programs will free a large amount of materials, manpower and plant facilities. Demands on these freed resources will, of course, be greater than their capacity to produce civilian products and their full utilization may be hampered by a scarcity of components, of transportation or other utilities.

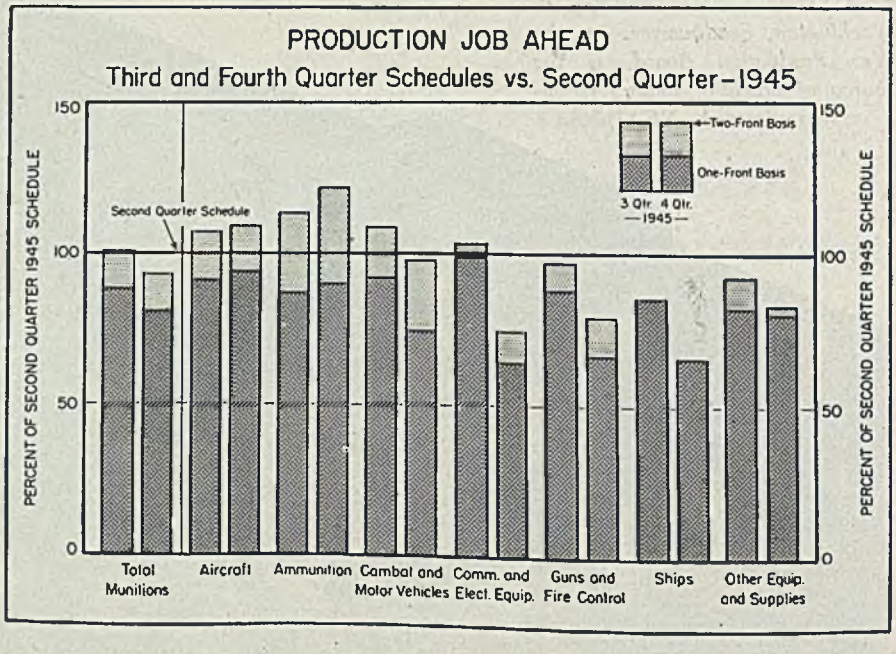
With post-V-E Day schedules still highly fluid, no exact quantitative estimates of the released capacity can be made. According to Hiland G. Batcheller, WPB chief of operations, the initial curtailment in components and basic materials, will be more than proportionate to the drop in the munitions program because of the inventory absorption. The degree of curtailment increases progressively down through the subcontracting chain from end-product factory to raw materials producer. In many cases, program cutbacks will leave manufacturers with more than enough inventory on hand to finish the remaining portion of their contracts, and procurement will stop. In many others, procurement of components and materials will be cut sharply below the level of consumption until inventories are brought down into line with the lower production schedules.

Sharp Cuts Anticipated

Mr. Batcheller estimates that military programs in the first quarter after V-E Day or its equivalent will take two to three million tons less steel and that cuts in most other metals will be proportionate. Similarly sharp cuts will be made in military requirements for such common components as electric motors and antifriction bearings, one of the chief obstacles in the way of production of many essential civilian items.

One important step taken by the WPB to adjust its policies to the easier military procurement program has been the restoration to complete operation of the Spot Authorization Plan for approving civilian production through the district and regional WPB offices. Such authorizations have been severely restricted in critical labor areas since last fall.

Civilian production under the spot authorization procedure may now be authorized in group I and II labor areas without the unanimous consent of the Production Urgency Committee for the locality. The action represents a modification of the Dec. 1, 1944, joint Army, Navy, War Manpower Commission and WPB agreement which was designed to restrict civilian production to instances where all concerned parties were agreed that there would be no interference with military and essential civilian output. The new policy places all areas on the same basis as far as spot authorizations are concerned.



Controlled materials—steel, copper and aluminum—will not be available in the immediate future for deferred allotments under the spot authorization procedure. However, idle and excess stocks may be used for the production of civilian goods immediately for authorized production.

The Controlled Materials Plan will be "open-ended" when conditions permit with the result that the spot procedure will become less important as a mechanism for authorizing civilian goods output.

WPB already has taken action to grant priority assistance to those industries which converted to war production and which have major tooling and facility problems in getting ready for peacetime production. This includes help in obtaining bottleneck machine tools, capital equipment or minor construction necessary to support a minimum practical production rate of needed civilian items.

The steps which the agency have taken are: 1. The issuance of direction 5 to order L-41, covering construction projects for reconversion. WPB is prepared to approve WPB-617 applications for the construction of, and assign preference ratings to, any project that will not interfere with the war effort and which satisfies the following criteria:

a. It is necessary to do the construction or acquire the facilities before the civilian production can be started, and postponement of construction would result in unduly delaying production when restrictions are removed.

b. The construction and facilities are a relatively minor addition to or alteration of the applicant's plant.

c. The construction and facilities are no more than what is needed for production at the minimum economic rate.

d. The construction and facilities are not for replacement or improvement of existing facilities, which are adequate though less efficient.

e. The product that will be manufactured must generally be one that is needed for the civilian economy.

2. The issuance of direction 2 to PR-24 provides for the assignment of an AA-3 rating for the procurement of machine tools and other capital equipment, provided the application satisfies similar criteria to those for construction applications. WPB pointed out that if capital equipment acquired under PR-24 can be installed under direction 2 to L-41 (generally speaking, if no new buildings or additions are required) no application under L-41 is required.

All such applications for reconversion preparation must be filed in WPB field offices, and manufacturers who can qualify are urged to file immediately. The applications for construction must be plainly marked "reconversion preparation."

Many "Bottleneck" Items on Order

The machine tool industry already has received many orders for bottleneck items from manufacturers preparing to reconvert, but builders are not optimistic over the industry's chances of increasing output at this time. They believe that production of machine tools cannot be expected to rise appreciably over the March output of $39 million, due to lack of skilled and technical manpower.

Needs for certain machine tools, forging presses and other metalworking equipment will be bottlenecks in reconversion, just as they were in conversion to war production, if the industry's manpower problem is not quickly solved.

The industry's advisory committee has recommended that companies producing machine tools and metal forming and

shaping machines be placed on the National Production Urgency List and be given every possible assistance in obtaining manpower and materials.

Another advance made toward civilian production has been the restoration by WPB of the severe April 10 cutbacks in the farm machinery production program. In restoring the cutbacks to the approximate level of the first quarter, WPB increased the original allocation of 195,000 tons of steel for the second quarter by an additional 53,662 tons of carbon steel and 2140 tons of alloy steel. To the advanced allotment authority of roughly 193,000 tons of steel for the third quarter, WPB has added 52,606 tons of carbon steel and 747 tons of alloy steel.

While the added steel is below the tonnage required by manufacturers of farm machinery to complete their currently authorized production programs, WPB said it is sufficiently large to prevent cancellations of orders to steel mills and to permit continued production of farm implements at approximately current levels.

While the WPB appears to be keeping fairly well abreast of military developments on the war fronts in modifying controls and readying assistance for manufacturers during the reconversion period, hitches may appear in the controls of other war agencies—notably the War Manpower Commission and the Office of Price Administration. While both these agencies are reported to have drafts of reconversion plans, neither has been made public in any definite form. Even though manufacturers may obtain materials, tools and facilities for resuming civilian production, they may encounter further delay if manpower controls are continued and if a definite reconversion pricing policy is not formulated.

Present, Past and Pending

■ CHICAGO BRIDGE & IRON CO. TO CLOSE SHIPYARD

OTTAWA, ILL.—Chicago Bridge & Iron Co. will close its Seneca, Ill., shipyard in June following completion of its present LST shipbuilding contract. The Navy has failed to accept the company's bid for a contract to build minesweepers.

■ NEW YORK SHIPYARD PAYROLLS DROP SHARPLY

NEW YORK—Take-home pay of 100,000 shipyard and ship repair workers in this area recently was reduced sharply by an order issued by the War Shipping Administration requiring contractors on WSA work to reduce hours of work. Workers are expected to ask for wage increases when current union contracts come up for renewal in June.

■ RFC SELLS SURPLUS MACHINE TOOLS FOR $80,991

WASHINGTON—Bids, aggregating $80,991, were received by the Reconstruction Finance Corp. last week for 108 machine tools which had been declared surplus by the Army. Offerings totaled 122 tools, originally costing the War Department $1,123,990.

■ INDUSTRIAL INVESTMENTS REMAIN HEAVY IN CHICAGO

CHICAGO—Special war production facilities and postwar plant construction in this area in April involved investment of $22,392,962, bringing industrial investments and expansions for the first four months of this year to $52,753,233.

■ MALLEABLE IRON PRODUCTION INCREASES SHARPLY

WASHINGTON—Malleable iron production in March rose to 86,000 tons, highest level since production figures have been compiled by the War Production Board. This compared with 79,100 tons in February, 1945, and 83,770 tons in January and 83,900 tons in March, 1944. Order backlog increased to more than 500,000 tons at the end of March.

■ IMPROVED PROCESS FOR TREATING ALUMINUM SCRAP

PITTSBURGH—A new process has been developed for converting scrap aluminum into new aluminum which is practically the same as aluminum manufactured from bauxite, according to Aluminum Ore Co., subsidiary of Aluminum Co. of America. In the final step of the process, aluminum oxide is electrolytically reduced to metallic aluminum.

■ DELCO-REMY BUYS SITE FOR BATTERY PLANT

ANDERSON, IND.—Delco-Remy Division, General Motors Corp., has purchased a tract of land in New Brunswick, N. J., as a site for a new storage battery manufacturing plant.

President Asks 10 Per Cent Cut In War Spending

Reduces shipbuilding authorizations $7365 million. Slashes $80 million from budgets of eight war agencies

IMPELLED by the "favorable progress of the war," President Truman last week recommended to Congress a 10 per cent reduction in war expenditures and pledged further economies.

The reductions recommended include the repeal of $7365 million in authorization for shipbuilding and curtailment of the budgets of war agencies totaling $80 million. All will apply to the fiscal year ending June 30, 1946.

The Office of Civilian Defense was abolished effective June 30 and its budget request of $369,000 rescinded.

Cuts for other war agencies include:

Office of War Information, $12,100,000.

War Production Board, $8,894,000.

Censorship, $4,800,000.

Office of Defense Transportation, $3,300,000.

Petroleum Administration for War, $345,000.

Federal Security Agency, $43,710,400.

War Manpower Commission, $9,339,900.

Office of Scientific Research, $13,200,000.

One increase was asked, $15 million to the FSA for increased state aid to old age assistance programs, bringing the overall reductions to $80,689,300.

The 1946 budget, submitted by President Roosevelt, originally called for about $70 billion for war purposes and $13 billion for normal functions.

J. D. Small Appointed Chief of Staff of WPB

John D. Small, executive officer of the War Production Board, has been appointed chief of staff of WPB by J. A. Krug, chairman. Both Mr. Small and Hiland G. Batcheller, chief of operations, will serve as deputies to the chairman. At the same time, Mr. Krug announced the resignation of Samuel W. Anderson, program vice chairman and chairman of the Requirements committee, and the appointment of Lincoln Gordon, deputy program vice chairman, to succeed Mr. Anderson in both capacities.

In addition to being chief of staff, Mr. Small already is chairman of the Production Readjustment Committee and heads the committee on Period 1 (CPO). This committee is shaping WPB's reconversion program for the transition period.

Expect Higher Steel Price Schedule

Steelmakers anticipate early announcement of upward revision in carbon products schedule. OPA study of industry's position completed

ANNOUNCEMENT of a new schedule of higher prices on carbon steel products by the Office of Price Administration is expected momentarily. Until late last week no official statement on the subject was forthcoming from OPA, however, though earlier in the week it had been predicted the schedule would be ready for presentation to the Office of Economic Stabilization for approval by Thursday.

In the steel trade generally it was expected that increases would be allowed on the various products, though the fear was expressed in some quarters that the advances would not be sufficient to meet the industry's higher production costs. The OPA's new schedule, it is reported, is based on industry data for the first nine months of last year. These data, in present circumstances, with the war in Europe at a virtual end and reconversion problems arising thick and fast, are considered obsolete as a basis for prices which will apply in the months ahead.

The new schedule, it is pointed out, may not take into consideration the increase in coal prices averaging 16 to 21 cents per ton resulting from the upward wage adjustments granted the bituminous coal miners only last week. Also other cost factors which have arisen since last year are said not to have been taken into consideration.

Only Interim Increases Granted

Steelmakers have been pressing for price relief for months past. Last January interim increases of $2 to $5 per ton in ceiling prices on five basic steel products at the mill level were allowed by OPA. These increases were: Hot-rolled carbon plates produced to sheared mill or universal mill width and length tolerances, 10 cents per 100 pounds; hot-rolled carbon steel sheets, 10 cents per 100 pounds; galvanized sheets, roofing and siding, 15 cents per 100 pounds; rails, all types and grades $3 per gross ton; nails and staples other than galvanized, 25 cents per 100 pounds.

These interim price increases were to apply until further cost studies could be completed by OPA. This study, it is said, was completed some time ago but promulgation of a new schedule has been delayed for one reason or another.

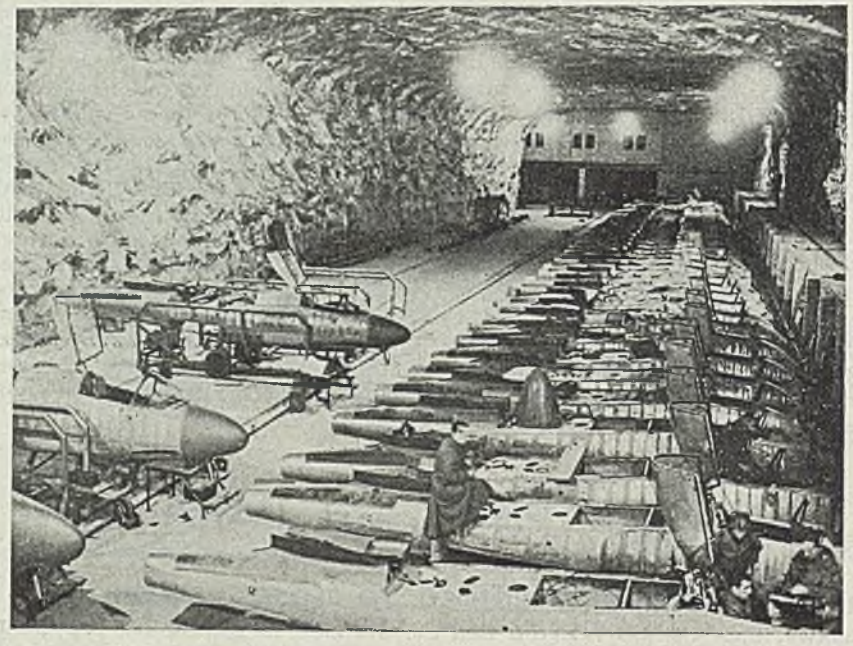
Right along the steelmakers have contended that they have been forced to absorb out-of-pocket losses on a number of carbon steel products. In some quarters this out-of-pocket loss is said to average as much as $7 per ton. While the interim price increase of last January was helpful, since then cutbacks in war orders, including shrinking shipbuilding demand, have more than wiped out the advantages accruing from the increase.

Last month a number of smaller steel producers evinced their concern in the price situation when they formed a committee with a view to obtaining an early decision on prices by the OPA, and to continue the fight for higher levels if the new schedule announced by OPA proves inadequate. Members of this committee consist of Robert W. Wolcott, president, Lukens Steel Co., Coatesville, Pa., Lauson Stone, president, Follansbee Steel Corp., Pittsburgh, and R. K. Clifford, vice president, Continental Steel Corp., Kokomo, Ind.

Office of Economic Stabilization and union labor representatives are said to be in opposition to a steel price increase, holding that such increases may open the door to inflation.

Significantly, it was reported last week that any increases in prices granted steel producers may not be extended to warehouse distributors, and that even the price advances permitted these latter on March 1 may be rescinded unless requested financial data are forthcoming shortly. The distributors had been asked to submit data by April 1 and now are asked to do so immediately.

In OPA circles it was said no action on warehouse prices in conjunction with new mill increases is likely because of failure of the distributors to submit these data upon which to base increases. Only 20 per cent of a cross section of the warehouse trade which had been requested to furnish data has complied, it was said, and it was indicated that unless the data are forthcoming OPA may find it necessary to rescind the March warehouse increase which was based on the interim advances granted the mills in January. Distributors were asked to provide cost and sales data on structural shapes, plates, floor plates, bars and bar shapes, hot-rolled and cold-finished bars, reinforcing bars, hot-rolled strip, hot-rolled sheets, cold-rolled sheets, galvanized sheets and coated iron or steel sheets, other than galvanized, galvanealed or long terne sheet.



UNDERGROUND PLANE PLANT: These Heinkle-162s, jet planes, were found in a Salt mine near Engels, Germany, by United States troops. The mine had been converted into an assembly plant 300 meters underground and had a monthly capacity of 50 planes. NEA photo

Soft Coal Price Increase Allowed as Wage Offset

Immediate bituminous coal price increases ranging from 4 to 55 cents a ton and averaging about 16 cents per ton were authorized last week by the Office of Price Administration to compensate for higher wages granted miners. The OPA acted under authorization of Wil-

liam H. Davis, director of economic stabilization.

Price increases, which are in producers' ceilings, will be passed on to the public. The national average increase of 16 cents does not represent the entire increase in wages allowed the miners since an additional 5 cents per ton will be absorbed by producers.

The increase in prices was approved for all but two of the nation's soft coal producing districts, while strip mines in five districts did not qualify for the boost. The two districts excepted from the increase are No. 16, northern Colorado, and No. 19, Wyoming and part of Idaho.

Airplane Cut of 2000 Per Month Asked by the Army

Revised plane production schedule of the Army may cut monthly output of military craft from the current 7000 to 5000 by the end of this year. The new schedule, submitted to the Production Readjustment Committee of the War Production Board for approval, involves only estimated needs in the Pacific. Navy production is expected to continue at present or even higher levels for some time.

Virtually all AAF combat planes, with the exception of the B-29 superfortress and the B-32 Dominator, are reported involved in actual or paper cutbacks under the new schedule.

The P-80 Shooting Star, new jet-propelled fighter, has been reduced by three-eighths from its scheduled peak it is reported, but remains on the critical list. The Lightning, 2-engine fighter, is scheduled to go out of production entirely by end of the year. Mustang output will be tapered off at the North American plant in Dallas, Tex. The AT-6, advance trainer, is scheduled to go out of production at the Dallas plant by the end of the year.

Another paper cutback involves the Douglas A-26, a new, high-speed two-engine attack bomber. Production will continue to rise for the rest of the year at Long Beach, Calif., and Tulsa, Okla., when it will be frozen at the year-end level.

The Lockheed plant at Burbank, Calif., which also builds the Shooting Star, will wind up P-38 production by the end of the year.

The new schedule, however, calls for elimination of P-38 production at the Consolidated Vultee plant at Nashville, Tenn., some time this summer.

Both the P-47 Thunderbolt plants, at Farmingdale, L. I., N. Y., and Evansville, Ind., are scheduled to continue in production, but with the output trimmed to meet Pacific needs only.

The reduction in output of P-51 Mustangs, if the production readjustment committee approves, will be brought about by closing the Dallas North American plant by the end of the year.

Study of OPA Price Regulations Follows Basing Point Decisions

Supreme Court rulings invalidating basing point in sugar cases may necessitate changes in maximum price regulations affecting other industries. Existing setup generally reflects normal industry pricing practice

STUDY is under way of Office of Price Administration price regulations to determine whether any changes in practice will be necessitated as a result of recent decisions of the United States Supreme Court involving basing point pricing. The Supreme Court ruled on April 23 that basing point pricing by two corn sugar companies resulted in discrimination in prices injurious to competition.

Whether the Court's ruling will necessitate changes in pricing methods in other lines, including iron and steel, as set up under government regulations was uncertain last week. The OPA said the Court's decisions in the sugar cases have no direct connection with price control, pointing out that the cases were initiated by the Federal Trade Commission in the normal course of its activities. However, it said, that wherever consistent with effective price control, maximum prices have been established by OPA to reflect the normal industry pricing practices.

"In a number of industrial lines," stated the OPA, "the basing point method of pricing had long been in effect when OPA price regulations were drawn, and consequently it was embodied in some regulations for those lines.

OPA Queried About Plans

"The decisions of the United States Supreme Court on Monday, April 23, 1945, in the cases of Corn Products Refining Co. v. Federal Trade Commission and Federal Trade Commission v. A. E. Staley Mfg. Co. have led to inquiries as to the plans of the Office of Price Administration with respect to certain of its maximum price regulations which use the basing point system in establishing maximum prices.

"The two decisions hold that adherence to a basing point system of pricing under circumstances such as were found by the Trade Commission to have existed in those cases constitutes unlawful discrimination violative of Section 2 (a) of the Clayton act, as amended by the Robinson-Patman act. It seems clear from the decisions, however, that basing point pricing is not violative of the law under all circumstances.

"Whether, and to what extent, if any, it may be necessary for maximum price regulations to be amended in view of the Corn Products and Staley cases can be determined only after careful study of the two Supreme Court opinions.

"While this study is being completed, compliance with the regulations will not compel any seller to violate the Robinson-Patman act. The price discrimination that might under some circumstances flow from charging the full maximum price permitted by a regulation can always be avoided by charging a lower price that will not cause discrimination in favor of the seller's other customers.

"A seller who has been found by the Trade Commission or a court to be in violation of the Robinson-Patman act and who would sustain substantial hardship if he eliminated price discrimination by lowering his higher prices to conform to that act may apply under Supplementary Order No. 41, issued by OPA two years ago, for permission to increase his lower maximum prices to those purchasers in whose favor he has been found to have discriminated."

Following the handing down of the Supreme Court's decisions the Federal Trade Commission issued a statement in which it said the Court's opinions appeared to be a confirmation of the FTC's condemnation of Pittsburgh-plus.

Labor Market Regroupings Reflect Production Cuts

Cutbacks and easing of some war production schedules in scattered localities coincident with the victories on the European battlefields are reflected in the War Manpower Commission's revised labor market classification, effective as of May 1, in which there is a shift of only one area into group I, WMC reported last week. The addition to group I (areas in which acute labor shortages exist or are anticipated that will endanger essential war production) from group II, is Mansfield, O.

In three areas, previously classified as group I, cutbacks and lowered estimates of labor needs, required reclassification as group II. These areas are: Bristol, Conn., formerly a part of the New Britain-Bristol area; Detroit and San Francisco Bay areas.

Increased production schedules and production lags required reclassification of two group III areas upward to group II. They are: McAlester, Okla., and Newark, O.

The following areas in group III in March were reclassified as group IV areas: Duluth, Minn.-Superior, Wis., Houston, Tex., and Panama City, Fla.

War Spurs Mexico's Steel Industry Growth

Nation's output of finished products and pig iron increased 43 and 128 per cent, respectively, since Pearl Harbor. Further expansion under way. Reflects difficulty of importing needs and trend toward industrialization

PARTLY because of the difficulty of obtaining needed materials from the United States during the war, and partly because of increased requirements stemming from the country's intensified trend toward industrialization, Mexico's iron and steel industry has expanded sharply since Pearl Harbor.

Her output of finished iron and steel products rose from 165,000 metric (2204 pounds) tons in 1941 to 236,000 metric tons in 1944, an increase of 43 per cent. Her output of pig iron rose from 95,000 metric tons in 1941 to 217,000 metric tons in 1944, an increase of 128 per cent.

Mexico's output of finished iron and steel products today is at a rate of approximately 300,000 metric tons per year. It will be substantially higher when two additional phases of the expansion program are carried to completion. One involves the installation of additional open-hearth facilities to provide a more adequate supply of ingots to existing rolling mills. The other involves additions to the present rolling facilities so as to turn out products in which Mexico now is wholly or in large part dependent on the United States. These additions should all be completed and ready for operation in the early months of 1946.

Contemplated additions do not include any new pig iron capacity since Mexico's three blast furnaces have annual capacity of 375,000 metric tons. This is more than sufficient to take care of all Mexican needs that now can be foreseen.

Before the war Mexico imported about half her iron and steel requirements. Now she imports only about one-third; current Mexican requirements are about 450,000 metric tons a year, of which Mexican producers are supplying some 300,000 metric tons, with the remainder coming from the United States.

In the course of time Mexico should become self-sufficient in iron and steel, for the country is supplied with the necessary raw materials. The objective of self-sufficiency in fact, should be reached—at least on the basis of the present development—when the expansion program now under way has been completed in 1946. The only imports that then will be necessary under normal conditions should be certain special products for whose production no provision yet has been made. These products include cold-finished bars, hot-rolled sheet and strip thinner than 24-gage and wider than 30 inches, boiler tubing, seamless tubing, tool and die steel, structural shapes larger than 14-inch sections, certain special shapes including car shapes, steel car wheels and axles, stainless and other alloy steels in various forms, and a number of specialty wire items. Of all these products Mexican requirements are small.

One of the interesting features of the Mexican industrialization program, including the iron and steel program, is the extent of American participation. To some extent this is a natural result of the "good neighbor" policy which characterizes Mexican-United States relations. To an even greater degree it is based on a belief that Mexico has a bright industrial future. United States businessmen and engineers who have visited Mexico of late believe that that country's present iron and steel per capita consumption of some 50 pounds annually is only a beginning.

Seen as Land of Opportunity

Mexico, they say, has a wealth of mineral resources, vast potentials for power generation, a plentiful supply of labor, fertile soil whose productivity now is being enhanced by construction of a huge irrigation system and, most important of all, a liberal and progressive government. They hail Mexico as a new land of opportunity.

Because the present ingot capacity is inadequate, Mexico is importing from the United States fair-sized tonnages of billets, wire rods and sheet bars, also concrete reinforcing bars. She is importing smaller tonnages of other products which she does not now make in sufficient volume; these include heavy-gage sheet and strip, barbed wire, large structural sections, pipe and tubing of various kinds, special rolled sections, and a miscellaneous assortment of gray iron, steel and malleable castings.

In addition to the products above mentioned which Mexico does not make at home, she now is importing substantial tonnages of a number of products which she will be producing in volume prior to the end of 1945 or in the early months of 1946. These include cold-reduced sheet and strip, tin plate and small-diameter welded pipe.

This aerial view shows Mexico City as a metropolitan and modern city. It is the seat of a progressive government which is now planning a considerable industrial expansion

For certain reasons imported iron and steel may be a more important factor in the Mexican market in the postwar period than now is indicated. One is that Mexican consumers have been accustomed to United States products and may prefer to buy them as compared with their home products when the metal supply becomes easier. Another is that some of the new producers in Mexico have been encountering the usual trouble in trying to meet certain requirements; Mexican mills, for example, find it difficult to roll sheets thinner than 24-gage, and they as yet have been unable to supply sheets for deep-drawing and crimping operations. Another is that some of the smaller Mexican mills have high costs and will need some sort of government assistance if they are to meet postwar competition.

Another reason is that United States delivery costs to northern Mexico, Lower California and to Yucatan and other Gulf of Mexico destinations are favorable, so

that a large portion of the requirements of those areas probably should continue to be imported after the war.

Largest Mexican producer is the Compania Fundidora de Fierro y Acero de Monterrey, S. A., with headquarters and plant at Monterrey in the state of Nuevo Leon. Prior to the war this company had a blast furnace with daily pig iron capacity of 350 metric tons. In July, 1943, it completed and placed in operation a new blast furnace with 600 metric tons daily capacity. The new unit now is producing at about 80 per cent of its rated capacity, which is sufficient to supply the company's requirements for use and for sale. The original furnace has been idle excepting for an occasional run on ferromanganese, of which metal the country consumes some 2000 to 2500 metric tons annually.

The Monterrey plant's melting department consists of five 55-ton open-hearth furnaces and three bessemer converters, with present ingot production at about 150,000 metric tons annually. Two more 55-ton open-hearth furnaces are being added. The plant also includes a steel foundry and a gray iron foundry. Finished products include steel rails in 60 to 112-pound sections, structural sections up to 14-inch, hot-rolled merchant bars, concrete reinforcing bars, wire rods, plain wire, tie plates, fish plates, splice bars, spikes, bolts, nuts, rivets, grinding balls, cast iron car wheels and other gray iron castings, manganese steel frogs and other manganese and carbon steel castings.

Second-largest Mexican producer, slated to become third-largest on completion of the construction program of Altos Hornos de Mexico, S. A., is La Consolidade, S. A., with headquarters in Mexico City and in Piedras Negras in the state of Coahuila. At Piedras Negras the company has a 25-ton Stevens type open-hearth furnace which operates largely on scrap brought in from Texas, and natural gas piped from Texas. Ingots are shipped to the Mexico City plant for preheating and rolling. At Mexico City the company has two electric furnaces of 3 and 6-ton capacity, respectively, which are used almost exclusively in production of alloy steels. The company's ingot capacity is about 32,000 metric tons annually.

La Consolidada's products include concrete reinforcing bars, carbon and alloy steel merchant bars, wire rod, grinding balls, bolts, nuts, rivets, washers, spikes, track bolts, staybolts, bolts, automobile springs, car springs, welding electrodes and welding rods, nails, frogs and switches and miscellaneous carbon and alloy steel castings. The company has a department for drawing about 2400 metric tons of copper wire annually in diameters up to 1-inch. It has a small brass and bronze foundry. Sideline products include commercial oxygen and hydrogen.

Shields & Co., New York, are associated with the management and operation of La Consolidada.

Altos Hornos de Mexico, S. A., a new enterprise launched since Pearl Harbor, has headquarters and plant at Monclova in the state of Coahuila. It has a 350-ton blast furnace which was placed in operation in July, 1944, and which at present is producing at about 70 per cent of its rated capacity. The melting department has one 100-ton open-hearth furnace now lined to produce 70-ton heats due to present crane limitations and which is to operate on 100-ton heats when adequate crane facilities are obtained. A second 100-ton open-hearth furnace now is being installed and a third of the same size is due for installation in the first half of 1946.

The first rolling mill at the Altos Hornos plant was placed in operation in October, 1944, on plates, rolled from slab ingots. The mill can roll sheared plates up to 72 inches wide and universal plate up to 40 inches wide. Plate demand in Mexico is not sufficient to keep this mill busy, so it will also roll hot strip for cold reduction on two new mills which have been promised for delivery in the summer of 1945 and which should be in operation by the end of 1945 or early in 1946. They are 4-high reversing mills. One is a 44-inch reducing and tempering mill and the other a 34-inch reducing mill. Product will be cold-rolled sheet and strip for the manufacture of tin plate. The plant will have two hot-dip tinning lines. Altos Hornos also has a department for the manufacture of cast-iron pressure pipe; this was placed in operation in July, 1944.

Armco International Corp., Middletown, O., has charge of the construction and operation of the Altos Hornos enterprise.

Continental Can To Operate Plant

It is of interest to note that a substantial portion of the tin plate produced by Altos Hornos will be used in the manufacture of sanitary cans for food packers whose business has received great impetus since Pearl Harbor. These cans will be produced in the new plant of the Envases Generales Continental de Mexico, S. A., to be erected in Mexico City this year under the supervision of the Continental Can Corp. and to be operated by the latter. About 10,000,000 sanitary food cans have been shipped from the United States to Mexico annually for a number of years and when the new plant is completed this movement largely will come to an end.

In addition to the three producers mentioned above, three other Mexican steelmakers produce ingots from electric furnaces; they are Hojalata y Lamina, S. A., Hierro y Acero de Mexico, S. A., and Fundidora y Laminadora Chapultepec. Output of these three companies does not

(*Please turn to Page* 222)

Steel Earnings in First Quarter Show Slight Gain Over Year Ago

Combined net profit of producers representing 84 per cent of industry's ingot capacity amounts to $42,828,975 compared with $40,531,966 in like 1944 months. Tax provision and postwar reserves lower

COMBINED net profit of the first 18 leading steel producers, representing 84 per cent of the industry's ingot capacity, to issue financial statements for the initial three months this year, amounted to $42,828,975. This represents a slight gain over the $40,531,966 net earnings reported by the same group in the like quarter of 1944, and compares with $43,223,083 earned in the like 1943 period.

Two of the 18 steel producers had a net loss last quarter, while in the comparable 1944 and 1943 months all companies reported profits.

The two companies with finishing capacity only that have to date reported for the first quarter, showed an opposite trend in earnings for the period; one recording a decided drop, the other a moderate increase.

A slight upturn in net income was registered by two merchant iron producers, Woodward Iron Co. and Sloss-Sheffield Steel & Iron Co., but Interlake Iron Corp.'s earnings were off about 50 per cent.

Tax provisions for 15 of the companies reporting were slightly lower last quarter compared with a year ago, totaling $74,864,199. This is less than half the first quarter 1943 tax requirements for the identical producers.

The net profit showing for some steel interests last quarter was benefited somewhat by either a reduction or omission of provision for postwar contingencies during the period. The directors of U. S. Steel Corp. omitted adding $6 million last quarter to this reserve, for they felt that the $100 million already provided over the past four years was adequate in the light of present conditions. However, reductions in these provisions were generally offset by increases in employment and other costs.

Some steel producers were given slight relief from steadily rising production costs through an increase in prices on a few steel products granted by the Office of Price Administration earlier in the year, but a number of companies did not benefit from these adjustments.

INDUSTRIAL EARNINGS

Industrial Groups	Net Income 1943 (000 omitted)	1944 (000 omitted)	Per Cent Change
Steel	$198,547	$186.510	— 6.1
Electrical	128,549	143,697	+11.8
Machinery	95,293	86,377	— 9.4
Autos	202,185	223,887	+10.7
Auto Equip.	54,463	57,863	+ 6.2
Hardware	45,808	40,993	—10.5
Agric. Impl.	61,134	60,297	— 1.4
Bldg. Heat., Plumb Equip.	34,005	35.689	+ 5.0
Rail Equip.	36,390	38.528	+ 5.9
Aircraft	65,161	69,130	+ 6.1
Shipbuilding	5,309	5,421	+ 2.1
Metal Mining	25,183*	21,354*	—15.2
Coal Mining	23,697*	29,384*	+24.0
Construction	5 245	2.531	—51.7
Trade	235.334	244.597	+ 3.9
Transpt.	953,966	747.285	—21.7
Paper	51,157	51.932	+ 1.5
Publishing	10,151	11.378	+12.1
Chemicals	187,718	200,379	+ 6.7

*Before depletion charges in some instances. Source: National City Bank of New York.

The present breakeven point for the industry is substantially higher than in prewar years.

Steel interests generally believe that the industry is not faced with a serious reconversion problem from the standpoint of operations. The industry will continue to make substantially the same products as it is now supplying for the war effort.

First Quarter Steel Earnings Gain Indicated

	Net Profits First Quarter 1945	1944	1943	Federal Income Taxes First Quarter 1945	1944	1943
United States Steel Corp.	$15,379,000	$17,027,616	$15,406,597	$14,500,000	$15,200,000	$28,100,000
Bethlehem Steel Corp.	7,695,909	6,432,538	6,228,693	20,880,000	24,310,000	28,880,000
Republic Steel Corp.	3,084,548	2,216,611	3,666,557	11,175,000	9,725,000	17,450,000
Jones & Laughlin Steel Corp.	2,013,489	1,708,352	2,399,369	3,567,000	2,417.000	6,389,050
Youngstown Sheet & Tube Co.	1,959,412	1,636,369	2.147,027	3,767,000	4,222,000	6,761,000
National Steel Corp.	3,429,988	2,550,143	2,680,850	9,650,000	4,850,000	6,325,000
Inland Steel Co.	2,472,734	2,512,396	2,796,321	3,894,000	4,503,000	5,100,000
American Rolling Mill Co.	1,875,502	1,229,035	1,535,205	NA	NA	NA
Wheeling Steel Corp.	1,201,881	992,945	961,391	NA	1,205,000	1,658,000
Crucible Steel Co. of America	803,558	1,279,302	1,915,905	3,798,768	6,100,831	10,706,642
Colorado Fuel & Iron Corp.	787,839	663,225	416,389	522,300	612,620	618,200
Sharon Steel Corp.	301,760	166,512	445,564	827,000	595,000	1,593,000
Alan Wood Steel Co.	8,893*	77,829	174,786	8,000	127,000	356,000
Allegheny Ludlum Steel Corp.	936,690	800,110	936,135	NA	NA	NA
Continental Steel Corp.	151,892	155,806	118,159	119,000	115,000	138,000
Keystone Steel & Wire Co.	336,492	269,600	220,854	854,489	619,500	253,654
A. M. Byers Co.	41,740*	269,510	350,600	30,642‡	968,100	887,200
Rustless Iron & Steel Corp.	448,914	544,067	822,681	1,271,000	1,494,000	2,220,000
Totals†*	$42,828,975	$40,531,966	$43,223,083	$74,864,199	$75,859,051	$115,786,746
FINISHING CAPACITY ONLY						
Superior Steel Corp.	$ 67,324	$ 123,612	$ 151,015	$ 266,300	$ 845,175	$ 1,953,925
Acme Steel Co.	588,351	420,987	422,316	1,784,496	1,537,598	1,045,072
PIG IRON CAPACITY ONLY						
Woodward Iron Co.	$ 287,327	$ 252,728	$ 251,815	NA	$ 6,357	$ 261,758
Sloss-Sheffield Steel & Iron Co.	192,703	170,522	354,367	NA	NA	NA
Interlake Iron Corp.	92,528	182,573	260,430	86,000	302,000	446,000

* Loss. NA—Not available. ‡ Tax refund due. †* Tax totals are for 15 companies.

Bethlehem Plans Improvements at Lackawanna Mill

President Grace says bar-making facilities will be completely revamped at cost of more than $15 million

PLANS for completely revamping and enlarging Bethlehem Steel Co.'s bar-making facilities at Lackawanna, N. Y., at a cost of $15 million or more, were revealed by President Eugene G. Grace recently. Funds have been appropriated and work will be started just as soon as the company has authorization to obtain the materials. No steelmaking units will be added, he said.

This is the major item in a program that increased unexpended authorizations for new construction and improvements from $58 million at the end of last year to around $75 million at the end of the first quarter of this year. Mr. Grace stated actual expenditures of $1,400,000 during the first quarter would likely be stepped up to a rate of around $5 million quarterly over the remainder of 1945.

Mr. Grace went on record as strongly favoring the scrapping all surplus war materials that could not be readily salvaged for peacetime requirements. He made clear, however, that he did not suggest the scrapping of specially built war plants, adding that many of these facilities should be kept ready for use at a moment's notice for at least five years, or "until we know just where we stand." He was convinced "we should keep our war machinery oiled" and never let it deteriorate to the extent that the country had at one time.

Predicts Wave of Construction

He saw considerable civilian work ahead, once war requirements eased materially. He enumerated particularly civilian automobiles, household appliances and railroad needs, and believed there would be a wave of new construction, and especially in the housing field. How quick these demands would be on the uptake depends greatly upon the extent of cutbacks following the end of the war in Europe and upon the speed with which limitation regulations could be withdrawn. At the moment there is still much uncertainty on this general score. For instance, he said, no one yet knows to what extent the automobile industry, a leading consumer of steel, will be permitted to get back into civilian production once the war in Europe is officially over.

Asked if he looked for a drop of as much as 25 or 30 per cent in steel production during this readjustment period, Mr. Grace replied that that was possible, but added it was difficult to make any very definite predictions under the circumstances.

Replying to another question raised at his press conference, he said he thought that once the war was over and most of those in the military services had returned, the manpower problem would be one of excess supply.

Bethlehem orders on hand at the end of the first quarter showed further shrinkage, amounting to $1,194,000,000, against $1,240,000,000 at the end of the preceding quarter and $2,394,000,000, the alltime peak, at the end of the fourth quarter of 1942. The decline, Mr. Grace explained, may be accounted for by the drop in ship work—by the completion of contracts, adding there had been no important cancellations of ship work in the Bethlehem yards. Mr. Grace said that of the $1,194,000,000 of unfilled orders on hand at the end of March, $790,000,000 represented ship work.

Responding to a question, the Bethlehem president said his company was not competing for the Geneva or Fontana steel plants on the West Coast, nor was it contemplating doing so. He pointed out that Bethlehem was already strongly entrenched along the Pacific.

Average weekly earnings of Bethlehem wage employes of $65.45 reached a new high last quarter, comparing with $64.85 in the preceding quarter and $61.29 in the corresponding period of 1944. Average weekly hours of 46.9 represented a new wartime record, and is compared with 45.9 in the previoius quarter and 45.2 in the first period of last year.

First quarter employment averaged 237,370, against 239,765 in the previous quarter and 282,969 in the first quarter of last year; payrolls amounted to $199,779,960, against $204,317,445 and $225,475,365. The drop in both cases was ascribed to the decline in ship work. Average hourly pay was $1.396, against $1.413 and $1.355.

Interestingly, Bethlehem paid out $21,616,000 in overtime during the first quarter and $4,758,000 in retroactive wages.

The company now has 77,780 men in military service, and is employing 22,300 returned veterans, of whom 6700 are former Bethlehem employes. The company is employing 18,000 women.

GM Delivers War Materials Valued at $899,210,386

Deliveries of war materials by General Motors Corp., Detroit, in the first quarter of 1945 totaled $899,210,386 compared with $879,168,936 in the fourth quarter of 1944 and $1,048,456,895 in the first quarter of last year, the corporation report indicates.

POSTWAR PREVIEWS

RECONVERSION— Pattern for shift to one-front war emerging. Many controls on materials lifted or modified. See pages 75, 89.

MEXICAN STEEL— War needs spur growth of steel industry south of Rio Grande. See page 80.

MODERNIZATION— Bethlehem Steel Co. will revamp bar mill facilities at Lackawanna works after the war. See page 83.

PRICES— Heavy postwar demand is expected to support raw material prices. Civilian goods requirements seen developing rapidly to offset cutbacks in military orders. See page 84.

RUBBER— Surpluses in natural and synthetic rubber supplies envisioned when hostilities end. High-cost plants may be eliminated. See page 92.

AIRCRAFT— West Coast manufacturer establishes reconversion and overhaul centers to reconvert Army transports to peacetime use. See page 98.

CLEANING METAL— New oxidizing-reducing process makes it possible to silver solder or braze cast iron for the first time. Also produces effective bond for porcelain enameling low grade steel and points toward the solution of many other difficult surface preparation jobs. See page 104.

HEAT IN MACHINING—Study of heat generated in machining operations may yield rich rewards in prolonged tool life and lower power consumption. See page 107.

"CONVEYORIZED" ASSEMBLY— Automotive methods used in production of aircraft have proved practical and economical. Future operations should benefit from centralized control found in conveyorized assembly. See page 125.

Post V-E Day Demand to Support Raw Material Price Structure

Markets expected to be buoyed up by demand arising from civilian goods requirements seen developing quickly in more than sufficient volume to offset cutbacks and cancellations of military orders

WHAT will happen to raw material prices come V-E Day? That's a question that currently is cause for much conjecture in industrial and governmental circles as Germany hovers on the brink of military and political collapse.

For the past four years, squeezed between official ceiling price levels and rising production costs, some industries have been having a difficult time keeping their heads above water. In steel, for example, producers have been pressing for price relief on certain items on which they have been losing consistently. Were it not for the fact profit margins are liberal on large-volume war products, the industry would be hard pressed to return a profit. Much the same situation exists in other fields. The profit cushion has been so small few producers will be able to absorb the shock of a declining market should such be experienced when cutbacks come thick and fast.

Just what the Office of Price Administration has up its sleeve as to pricing policy for the interim between V-E and V-J Days is yet to be announced, though Chester Bowles said the other day that his agency has its plans well laid for that period. Lacking definite knowledge as to OPA policy, however, industry can only speculate on what is ahead, charting its course on conditions as they develop from day to day.

Price Trend Keyed to Activity

Raw material prices, of course, will follow in step with industrial operations. Consequently any speculation as to the V-E Day trend must take into consideration the possibilities and prospects for production over coming months. To what extent industrial operations will be adversely affected by order cutbacks after hostilities cease in Europe continues a large question mark. "Cap" Krug, as he is called by his intimates in the War Production Board (he served as commander in the Navy), has been doing his best in recent weeks to convince the public the end of the German war will not mean immediate sharp contraction in military production schedules. Only last week, Hiland G. Batcheller, WPB chief of operations, said V-E Day would not be the deciding factor in determining military procurement cutbacks nor would it be the determining factor in speeding reconversion. He declared a V-E Day of the kind envisioned last fall, that is, a single day on which production would suddenly shift from supplying two full-scale wars to supplying only one, was highly improbable.

Mr. Batcheller estimates that within a year after Germany's collapse military procurement will shrink to $3400 million a month compared with a peak of $5200 million monthly in the second quarter this year. This $3400 million monthly rate, he emphasizes, is equivalent to about 80 per cent of total output of manufactured goods in our best prewar year, 1937. Further, he points out this lessened production rate still is a year away.

Conditions may change the picture as presented by Mr. Batcheller. The fact remains that as things now stand the prospect of an abrupt slump in raw material demand with resulting sharp sag in prices is slight. The situation as regards steel production prospects emphasizes this. Based on WPB Chairman Krug's estimate that military procurement programs will be cut no more than 15 per cent immediately after V-E Day and no more than 40 per cent within a year, it is assumed that on the average, military programs over the next few months will be cut back about 20 per cent. Just what does a 20 per cent cutback mean to steel production? Well, here are some interesting figures advanced by an OPA executive.

In the first three months of this year ingot production averaged 7,193,953 net tons. Of this, it is estimated Army and Navy requirements took about 48 per cent, or roughly 3,450,000 tons. The remaining 52 per cent, some 3,750,000 tons, was channeled into essential civilian goods and production of items indirectly related to the war effort. This latter class of production will continue at unabated pace even though the fighting should end tomorrow.

Naturally, any cutback experienced will be solely in military procurement, so that the steel tonnage affected would be only that going into direct military work. Consequently only some 690,000 tons of steel would be cut off by a 20 per cent cutback, leaving military steel production after the cutbacks to 2,762,400 tons and essential civilian steel output at 3,700,000 tons, or a monthly total of over 6,400,000 tons. That's large production at any time.

Rate May Drop to 65 Per Cent

Some steel authorities estimate ingot operations will drop off after V-E Day as much as 30 per cent before a rise in demand will be experienced. If this should prove true, it would mean that at the bottom of the slump the industry would be operating at 65 per cent of capacity, as against 95 per cent currently. Such a relatively sharp drop, however, does not stack up with an average cut of 20 per cent in military steel procurement. Based on monthly production of 3,500,000 tons of direct war steel, average cutback in military steel over the next 12 months or so should not affect

NEW LOAN ADMINISTRATOR: John W. Snyder, left, St. Louis banker, takes oath of office as federal loan administrator at the White House. Administering the oath is Supreme Court Justice William O. Douglas, and in center is President Harry S. Truman. NEA photo

more than 700,000 tons, or about 10 per cent of total current monthly output of 7,100,000 tons. Ingot operations, consequently, should not drop below 80 per cent of capacity at any time during the next year.

All of this, of course, is purely conjecture. Developments from here on, which are likely to come thick and fast, can make these figures far wide of the mark, either way. Nevertheless, informed opinion in Washington leans to the view that the raw material markets will be well supported throughout the period between V-E and V-J Days.

Indicative of the feeling in business circles, scrap, probably the most mercurial of the raw material markets, continues strong in the face of the German collapse. The situation in this market today is just the reverse of that of last fall, a fact teeming with significance for the future.

It will be recalled that last year when "end of the war" talk was rife, scrap went into a nosedive, falling several dollars a ton under OPA ceilings when steelmakers withdrew from the market and material began piling up in dealers' yards. For several months prices were very weak and dealers were desperate in their efforts to move supplies. It looked for a while as though the bottom were going to fall right out from under the market. Well, the war didn't end last winter. In fact, when the German drive started just before Christmas it looked as though the end of the war was many, many months away, and the scrap market immediately reversed its trend, with prices bouncing back to ceiling in a rush of buying orders from the steel producers who had permitted their stockpiles to drop to dangerously low levels.

Limited Scrap Supplies

Today the end of the war in Europe is just a matter of days, maybe hours away. Scrap, however, is showing no signs of cracking. Why? A variety of reasons are advanced for this display of strength, but the most plausible is that of an OPA official to the effect the market never was in stronger position from the standpoint of supply and demand. Even should steel operations drop, 10, 20 or 30 per cent over the next few months, he says, the supply of good steelmaking scrap is so limited there is no danger of a buying strike on the part of steelmakers. They need good scrap and must build their stockpiles to care for even a depressed production rate. At the same time he feels there is little prospect of any severe drop in ingot operations in the near future. Cutbacks in the military program naturally will be reflected in cancellation of some steel orders, but the producing capacity thus released can, and will be, immediately diverted to the production of steel for such civilian uses as the railroads, farm implements and badly needed repair work of all kinds. This new steel volume, he says, will more than offset any immediate loss of steel orders resulting from the cutting back of the military procurement programs though some lag is likely in operations during the readjustment to civilian production.

No estimates are available as to the potential demand for civilian steel likely to come out immediately after V-E Day. No doubt, however, it will be tremendous. And the volume will grow steadily as consumer goods lines are released from war production and government restrictions are lifted to permit resumption of normal manufacturing. Some lines of manufacture may be longer getting back into their peacetime groove than others. The railroads, farm implement field, building construction and a number of other large steel consuming lines, however, face relatively no reconversion problem and will be able to launch into their civilian activities just as soon as the steel is made available to them. And demand in all of these lines promises to be huge. Heavy buying of steel by these fields will hinge almost entirely on how speedily the government removes its curbs on production for the civilian economy.

In view of this heartening outlook there is little wonder the sensitive scrap market is displaying unusual strength. But there also is another factor behind the strength in this market. Coupled with the strong demand for material which seems well assured in the days ahead is the fact that there is little promise the stringency in heavy steel scrap supply will be relieved for some time to come. Good grade scrap will not be coming onto the market for months since production by the civilian goods industries, wherein a large volume of scrap is generated, will not get going at a good gait for some time. As a result the supply of high grade steelmaking scrap promises to shrink rapidly as consumers build up their inventories in preparation for the heavy civilian goods demand which is certain to follow promptly upon termination of the war with Japan. Before new scrap supplies are generated in volume to relieve the existing shortage reconversion to civilian manufacturing will have been pretty well completed.

This accounts for the fact that no substantial easing in scrap iron prices is anticipated in the near future. Demand, if anything, will intensify as month succeeds month, serving to lend support to even the less desirable grades of material which will be in demand in lieu of the scarce heavier material. Discussing scrap last week, an OPA official said the situation in this market, in his opinion, is so strong he is confident that should ceiling prices be removed anytime in the near future it would be only the matter of a few weeks when we would have a $25 scrap market.

Finished Steel Prices May Rise

Conditions in scrap may not be entirely reflective of those in other raw materials since different circumstances apply peculiar to the individual materials. Still, basically, from a supply and demand standpoint the situation in all should parallel that in scrap. Certainly, finished steel prices will find as much, even more, support from the enlarging demand for civilian goods as will scrap. Further, the very fact that steel production costs have continued to rise throughout the war and are not likely to recede soon, warrants the belief that higher, rather than lower, prices are a distinct possibility. For months past OPA has been investigating the steel price situation. Its ruling as to whether price advances, as sought by producers, are justified is expected momentarily.

PRICE CONTROL

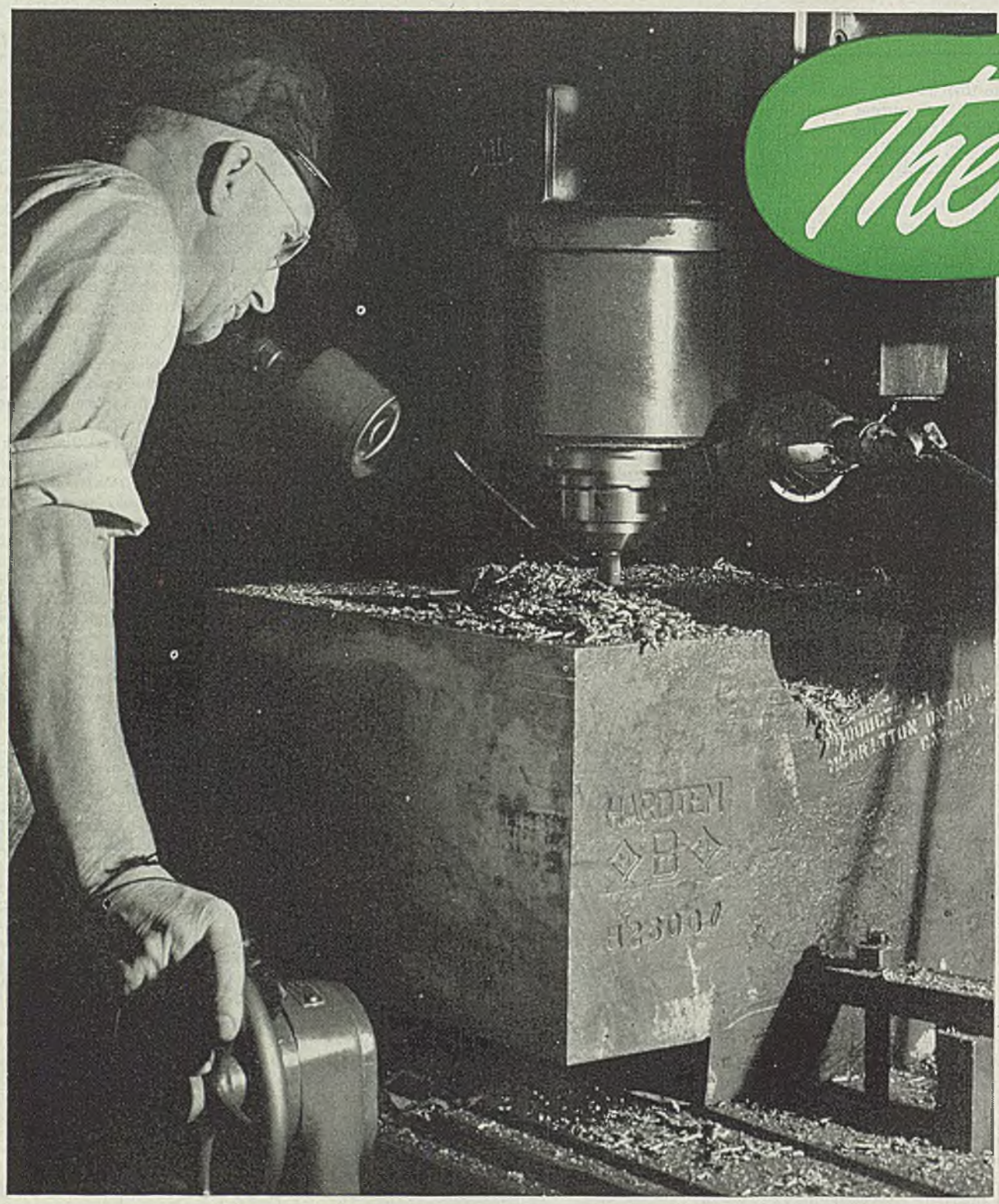
Price controls must continue after V-E Day until there are more normal supplies of consumer goods on the market or until supply and demand are about equal, the Office of Price Administration announced last week. Only through such control will a disastrous post V-E Day boom be avoided.

If price controls are removed too soon, states the OPA, we will have a repeat performance of the conditions following World War I. At that time prices rose twice as fast after the armistice as they did during the war.

As manufacturers scrambled for raw materials they bid against each other, forcing prices up. Retailers ordered more goods than they needed. In a few months, production caught up with demand, and since retailers were over-ordering, supply became greater than consumer purchasing power. Then, orders were canceled; inventories piled up; over 105,000 firms went bankrupt, and over 5,500,000 workers lost their jobs.

RFC Sales of Capital Goods Now Exceed $115 Million

Reconstruction Finance Corp. has sold through March 31, 1945, surplus government-owned producers' and capital goods costing $180,630,000 for $115,303,000. The surplus property and materials groups showing the largest acquisition gains included: Machine tools, $6,263,121; metalworking machinery, $3,447,599; electrical machinery and apparatus, $1,682,450; steel, $1,181,228; special industry machinery, $491,328; fabricated basic metal products, $339,538; nonferrous metals, $299,208. Salable property acquisitions made to RFC up to and including March 31 totaled $681,833,000.



CINCINNATI *Vertical Hydro-Tel Milling Machine, arranged with Automatic Depth Control Attachment, mills the cavities in a heavy steel die. The time saving on a variety of work performed on many Hydro-Tel Millers averages 40%.*

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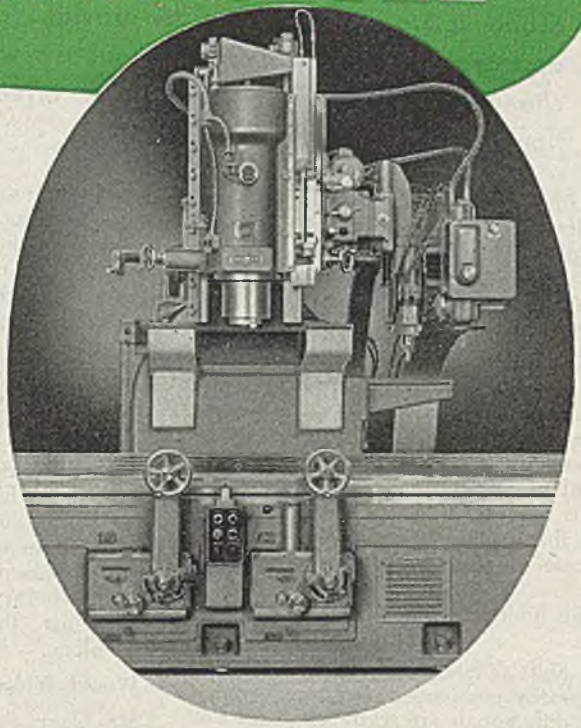
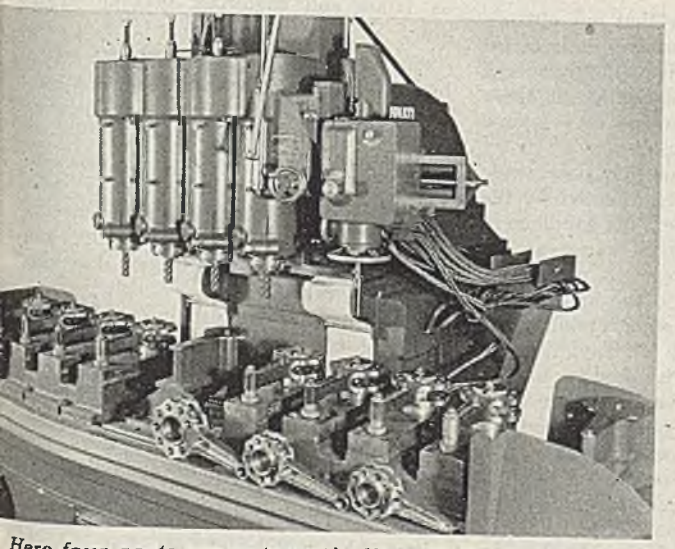
Versatile CINCINNATI HYDRO-TEL

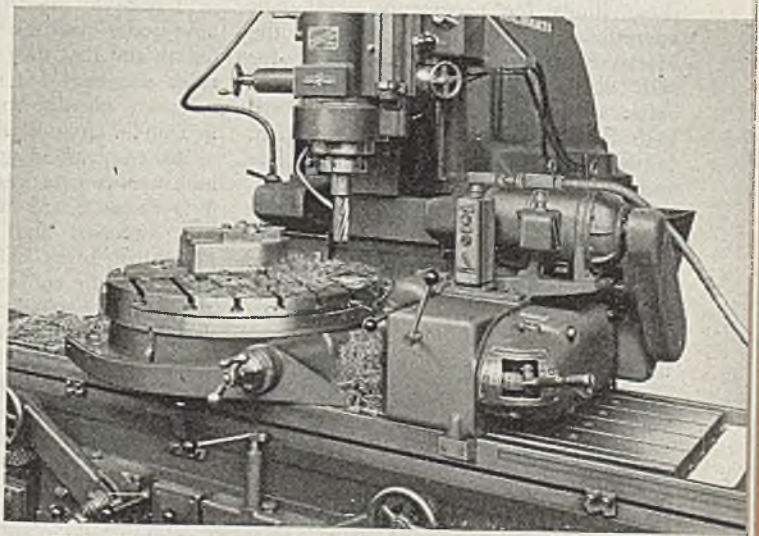
● To begin with, standard Hydro-Tels have the capacity to handle an unusually wide range of milling. Then there are three basic deviations from standard machines: 1) Hydraulic Automatic Depth Control for die sinking; 2) Selective 360° Automatic Profiling for automatically milling profiles from a master template, with arrangement to by-pass the profiling unit; 3) Non-Selective 360° Automatic Profiling for automatically milling profiles from a master template. The three illustrations on these pages give you an idea of how CINCINNATI 28″ series Vertical Hydro-Tels may be equipped for specific types of milling operations, thus converting them from general purpose millers to special or semi-special production machines. ¶ Perhaps some of your jobs could be handled more efficiently and economically on a CINCINNATI Hydro-Tel Milling Machine. Our engineers will be glad to talk it over with you and give you the benefit of many years' experience.



28″ Series CINCINNATI Vertical Hydro-Tel Milling Machine. Available in three table travels, 60″, 96″ and 120″. Catalog M-1284 contains complete specifications.



Here four parts are automatically milled each cycle. The machine is a CINCINNATI 28-72 Vertical Hydro-Tel equipped with a Four-Spindle Head and a 360° Automatic Profiling Attachment. Duplicate fixtures eliminate idle time loading and unloading.



This Hydro-Tel is equipped with a 36″ Power Driven Circular Milling Attachment. Through the movement of a single lever, the feed change unit at right provides 16 changes of feed. Completely self-contained, the equipment on this machine may be removed whenever desired.

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

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Supplementary Directive Defines Fringe Wage Adjustment Limits

Economic Stabilizer Davis' order provides for War Labor Board approval of specified types of nonbasic wage adjustments or changes in working conditions that affect earnings. Additional stabilizing limits outlined

DIRECTIVE, further defining stabilizing limits under which nonbasic wage adjustments might be approved or directed by the National War Labor Board, was issued last week by William H. Davis, director of economic stabilization.

The order supplements a directive issued on March 8 and provides for WLB approval of specified types of nonbasic wage adjustments or changes in working conditions that affect earnings. Approval of the economic stabilization office is required if there is reason to believe that such adjustments will cause an increase in price ceilings or production costs.

The additional stabilizing limits provide:

1. Shift differentials in industries with necessarily continuous operations, where shift differentials are warranted, may not exceed four cents an hour for the second shift and six cents an hour for the third shift except as provided in the next paragraph.

2. Adjustments higher or lower than these limits for necessarily continuous operations or the limits provided in the March 8 order for vacations and for shift differentials in noncontinuous operations may be approved if the board finds that the amount of the adjustment follows an already established "clear and well-defined practice" in the industry or the area and therefore would not be unstabilizing to the area or industry involved, and that it would be fair and equitable to the employer and the employe.

The March 8 order provided for vacations up to one week after one year of service and two weeks after five years; shift differentials in noncontinuous operations not to exceed four cents an hour for the second shift and eight cents for the third shift; merit increases in automatic progressions "no more liberal" than the board's present standards, and reclassifications and job revaluations not to exceed an average increase of one cent or one per cent for all employes in the plant or plants covered by the WLB ruling.

3. Other nonbasic rate wage adjustments or changes in working conditions affecting earnings may be approved where WLB finds an established substantial industry or area practice, the extension of which to the particular case would not be unstabilizing to the industry or area, or where the adjustments are equitably required to meet unique situations and consequently would not be precedent-making.

Adjustments under points 2 and 3 requiring the director's approval must be accompanied by special findings as to the nature and extent of the industry or area practice on which the adjustments are based, in addition to other supporting data.

"This directive," Mr. Davis said, "is a carrying forward of the policy of setting definite firm ceilings on so-called 'fringe' adjustments in all wage cases. It is a further extension of general rules, equally applicable in all cases, in place of the arbitrary determination of such adjustments through price considerations alone."

Would Widen Application of Rules

Mr. Davis said that his experience in the Office of Economic Stabilization has intensified his conviction that the whole stabilization program needs to be covered by such general rules to the maximum possible extent.

"I believe," he said, "that our citizens now understand the dreadful evils of inflation and that they will willingly accept rules necessary for stabilization if these rules are equally applicable to everyone in similar circumstances."

He emphasized again that only wage adjustments approved or directed by the War Labor Board under this supplementary directive, and which cause an increase in price ceilings or production costs, will be subject to the approval of the Director of Economic Stabilization.

In a letter to George W. Taylor, chairman of WLB, Mr. Davis asked for monthly reports from WLB on the nature of its actions on nonbasic rate wage adjustments or changes in working conditions affecting earnings under point 3.

"In the light of the accumulated experience they will represent," he said, "it may be determined whether further action in regard to such issues ought to be taken or whether the procedures adopted to deal with them ought to be modified."

Wallace Names Committee To Study Patent System

Appointment of a committee to study the working of the present patent system and prepare recommendations for legislation to overhaul it was announced last week by Secretary of Commerce Wallace following receipt of a letter from President Truman criticizing the present system.

The President suggested a full objective study, and in line with his suggestion, the secretary invited Director of Economic Stabilization William H. Davis, Attorney General Francis Biddle, Dr. Charles F. Kettering, chairman, National Patent Planning Commission, and Dr. Vannevar Bush, director of the Office of Scientific Research and Development, to serve as a committee. Mr. Davis was asked to assume chairmanship of the committee.

Secretary Wallace asked the group to submit its recommendation no later than June 30.

Western Governors Adopt 10-Point Program

RENO, NEV.

The Conference of Western Governors, meeting here recently, adopted a ten-point program, designed among other things to encourage mining, federal-state highway improvements and airport developments.

Their program included these resolutions:

1. To urge the War Production Board to provide adequate, equitable contract termination procedures in mining that contracts may be ended without loss.

2. To recommend revocation of WPB order L-208, and relaxation of the order as labor and materials become available.

3. To endorse "stockpiling" as a means of massing adequate mining materials against future national emergencies.

4. To urge government agencies to provide each federal contractor with sufficient notice of contract cancellation to permit orderly, accurate, and prompt settlement of wages due discharged workers.

5. To endorse legislation authorizing building of western plants for processing phosphate rock into fertilizer, to build up soils depleted by agriculture.

6. To urge inclusion of Alaska under the federal aid and highway acts to assure construction of good roads in the territory.

7. To support airport development along the principles of federal-state highway construction programs, and to oppose plant or airport construction bypassing constituted aeronautics commissions or state boards.

8. To express support and best wishes to the San Francisco United Nations Conference.

9. To assure President Truman cooperation and extend sympathy to Mrs. Roosevelt.

10. To work together to avoid postwar unemployment of returning servicemen and women.

War Production Board Steps Up Revocation of Regulations

Rate of cancellation jumps to high of 41 for one day. Controls over allocation of critical materials remain in force. Manufacturers will be permitted to resume production of wide variety of civilian goods when materials and manpower are available

OFFICIALS of the War Production Board are revoking government controls over industrial activities at a rate in tempo with the rapid disintegration of Germany's military machine. The board's policy now is to eliminate production controls as quickly as possible while maintaining those which are essential to meet fully military needs for aggressive prosecution of the Japanese war.

A survey of recent WPB actions showed that 41 controls were removed during one day. Issuance of orders has been so heavy recently that publication of official documents in the Federal Register has been lagging.

However, the cancellation of controls will not necessarily mean that the affected industries will be able to resume immediately production of goods for civilian consumption. Shortages in manpower and critical materials preclude any substantial expansion of output of many products.

Tin Reserves Dwindle

The supply of tin, for instance, is at the lowest level since the United States' entry into the war and must be reserved for high priority needs. Total stocks of tin, other than smelter working stocks and consuming industries' working stocks, have been cut from more than 105,000 tons in 1942 to less than 70,000 tons at present. This stockpile is in danger of complete exhaustion and, even after the Allies recover the Far Eastern sources, two years or more will elapse before these mines can be expected to provide a normal supply of tin. No relaxation in WPB tin conservation orders will be possible for many months.

There have been only slight revisions in the system for rationing materials, especially those affecting steel and copper. Lumber supplies remain extremely tight and will tend to restrict the expansion of many civilian products.

The importance of the revocation of many of the production controls is that industry is thereby free to plan its expansion of peacetime products as soon as munitions cutbacks make materials and manpower available.

Twelve of the revocations filed recently affected steel mills. They removed wartime restrictions on the size and type of that many types of steel products including railroad rails, pipes and reinforcing steel for construction jobs. The following compilation lists orders which have been revoked recently:

STEEL PRODUCTS: All schedules under order L-211, except schedules 9 and 16, have been revoked. Order L-211, issued Oct. 23, 1942, empowered WPB to establish sizes, shapes, and specifications and other qualifications of steel products to which all steel producers were required to conform. Restrictions of the order are still in effect on oil country tubular goods and steel wire rope and strand under schedules 9 and 16, respectively.

Steel products affected by the revocation are: Concrete reinforcement steel, steel wheels and tires, structural steel shapes, steel axles and forgings (railroad and transit service), mechanical steel tubing, rails and track accessories, carbon steel plates, water well tubular products, steel pressure pipe, steel pressure tubes, steel pipe, steel fence posts, and hot-rolled carbon bars. (L-211)

METAL SIGNS: Order governing the use of materials in production of metal signs has been revoked but other controls that may affect the acquisition and use of materials for sign production remain in effect. Under order M-126, use of iron and steel to make sign hanger frames and sign posts still is prohibited, except as may be permitted under "spot authorizations." (L-29)

SPRINKLER HEADS: Order which placed shipments of sprinkler heads on a quota basis has been revoked. (L-39-a)

FIRE APPARATUS: Order L-43, governing production and delivery of new motorized fire apparatus, has been revoked. Manufacturers still are subject to the restrictions of certain other WPB orders, including priorities regulations and CMP regulations. Control over the use of materials will continue to be exerted by applicable "M" orders. (L-43)

INDUSTRIAL EQUIPMENT: Order L-108 has been revoked. It restricted finishes on metalworking equipment to one coat of primer and not more than two coats of paint, enamel or lacquer. Fillers were entirely prohibited. (L-108)

ANTIFRICTION BEARINGS: Orders L-145 and L-145a have been revoked. They restricted the number of sizes of antifriction bearings a manufacturer might produce. Production and delivery of antifriction bearings remain subject to the provisions of E-10 and table 12 of M-293. (L-145, 145a)

MECHANICAL BINDINGS: Restrictions on the use of iron, steel, aluminum and zinc in manufacture of mechanical bindings, loose-leaf metal parts and units have been removed by revocation of order L-188. (L-188)

UTILITY EQUIPMENT: The following schedules of order L-154, which were designed to conserve scarce metals in manufacture of various types of utility equipment, have been revoked: Schedule I, covering water meters; schedule II, covering steam surface condensers; and schedule V, covering high-voltage insulators. (L-154)

X-RAY EQUIPMENT: Restrictions on shipments of medical X-ray equipment for civilian purposes by manufacturers have been eliminated through revocation of the controlling order. (L-206)

LIGHTING EQUIPMENT: Orders covering airport lighting equipment (L-235) and aircraft lighting equipment (L-327) have been revoked. (L-235, L-327)

HARDWARE: Schedule II (marine joiner hardware) and schedule III (marine fittings hardware) of the hardware simplification order have been revoked. (L-238)

SUN GLASSES: Order L-238, restricting the use of critical materials in production of sun glasses, has been revoked. (L-238)

PHYSICAL THERAPY EQUIPMENT: Restrictions on production and distribution of physical therapy equipment have been removed through revocation of order L-259. (L-259)

STERILIZER EQUIPMENT: Order L-266 has been revoked. It limited production of sterilizer equipment to 13 permitted types, in specified sizes, and limited use of certain materials in their production. (L-266)

MEDICAL EQUIPMENT: Order L-214 has been revoked. It permitted issuance of schedules to effect simplification of various types of medical equipment and supplies. Schedules 2 and 3 to the order were revoked. (L-214)

VALVES AND PIPE FITTINGS: Order L-252, which established specifications of size and material for production of valve and valve parts, subject to use exceptions; order L-278, which limited the manufacture of steel pipe fittings to specified types, sizes and specifications; and order L-288, which restricted the manufacture, sale and delivery of gray cast iron, malleable iron and brass and bronze pipe fittings to specified types, sizes and specifications, have been revoked. (L-252, 278, and 288)

POWER BOILERS: Order L-299, governing the design of pressure parts for power boilers, has been revoked. (L-299)

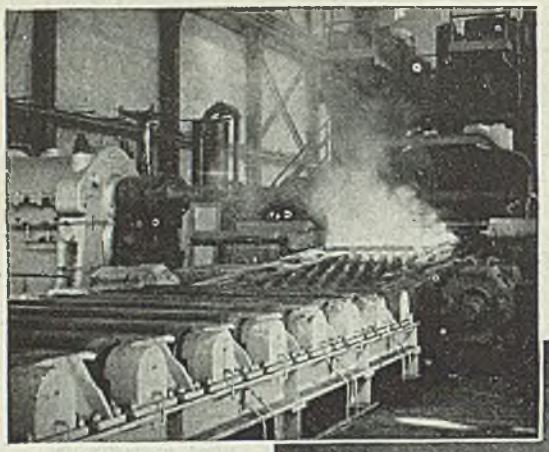
TELEPHONE, TELEGRAPH EQUIPMENT: Order U-5, which prohibited deliveries of listed types of telephone and telegraph equipment except on orders bearing a preference rating of AA-5 or higher, has been revoked. Priority ratings will continue to determine precedence in making deliveries. Order U-6, which limited installations of new telegraph and teletypewriter service to listed essential users, has been revoked. Order U-8, which established production quotas for the manufacture of telephone instruments, also has been revoked. (U-5, 6 and 8)

Other actions taken by WPB recently in clarifying and amending existing regulations include the following:

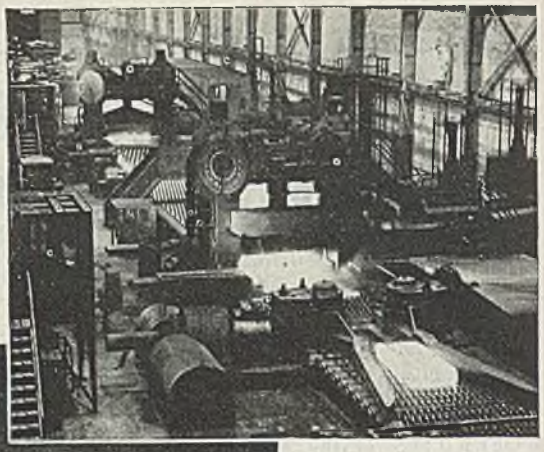
CANNING CLOSURES: Quota restrictions on the use of zinc for the manufacture of home canning closures in each of the second and third quarters of 1945 are limited to no more than 30 per cent of the weight of zinc used by manufacturers for similar purposes during the period of Oct. 1, 1940, through Sept. 30, 1941. (L-103-b)

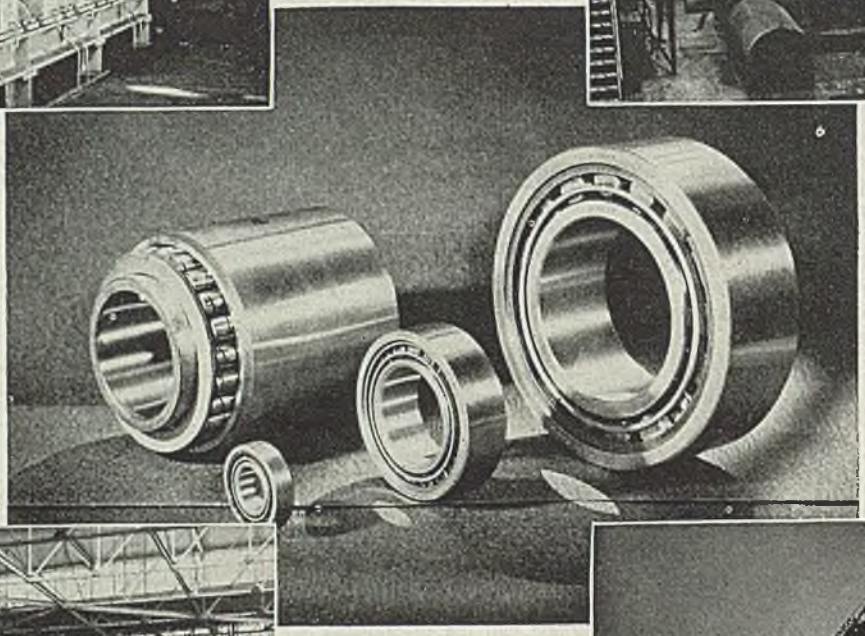
LAUNDRY, DRY CLEANING EQUIPMENT: Production and delivery of commercial laundry, dry cleaning, and tailors' pressing equipment, as well as the use of metal parts to rebuild such equipment, to fill Army, Navy, and War Shipping Administration orders are exempt from general restrictions of order L-91, subject to provisions of priorities regulation No. 17. Orders from post exchanges and ships' service departments for equipment for overseas use automatically bear an AA-5 preference rating, under PR-17.

CHROME PIGMENTS: Manufacturers of class A chrome pigments will receive in May about 60 per cent of their requirements of sodium bichromate for the manufacture of class A chrome pigments controlled by order M-370. The following pigments are affected: Chrome yellows and oranges, chrome greens, molybdate chrome oranges and hydrated chromium oxide. Small order exemptions for class B pigments will be entirely eliminated in May, necessitating manufacturers to file form WPB-2945 to acquire less than 25 pounds of chrome oxide or 50 pounds of zinc chromate for military uses.

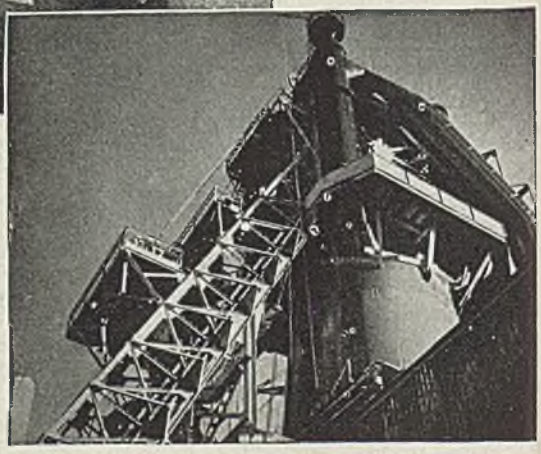


Opposite and below, some of the Kaiser equipment which HYATT serves.





Above, some of the sizes and types of HYATT wound and solid roller bearings used in the Kaiser Company Steel Plant at Fontana, California.



AT FONTANA TOO — BEARINGS: *HYATT*

• Serving the steel industry over several decades, you would naturally expect to find Hyatt Roller Bearings in the newest of mills. Wherever suited for the application Hyatt Roller Bearings were generously used throughout the Kaiser Steel Mill, near Fontana. Again proving that Hyatts are ideal for heavy steel mill service. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Disposal of war-born surpluses of materials, supplies and equipment to require bold approach. Program developed for distributing surplus cutting tools may furnish pattern which may be applied in disposing of other equipment

RETIREMENT of C. E. Wetherald, Chevrolet manufacturing manager, after 40 years of directing various phases of automobile production, points up a management problem which may become increasingly more acute as the industry relaxes its war load and accelerates the conversion to output of motor cars. Many a veteran production executive has remained on the job, driving himself often to near-exhaustion, simply because he believed it necessary to further the war effort. Now that war production has started to taper, these men turn their attention to the countless headaches of switching over vast plants to new work, relocating machinery, conveyors and other equipment, and at the same time to making strenuous efforts to placate a touchy labor force, in the face of which they cannot be blamed for a numbing weariness which persuades many to retire and turn the reins over to younger executives.

Wetherald and Chevrolet production have been synonymous for a good many years now, but he is fortunate in having a capable assistant to carry the ball in the person of Hugh Dean, himself a veteran of 30 years' experience in automotive plants. Chevrolet, like most all General Motors divisions, is fortunate in that its executive ranks generally are staffed two and three deep, so that the retirement of a top man does not leave a gaping hole in the front line, but can immediately be followed by stepping up assistants who in truth often are more intimately connected with the direction of plant activities than the No. 1 man himself.

Policy Has Been Profitable

Much of the credit for this organizational continuity goes to Alfred P. Sloan Jr., chairman, who in his dealings with the GM administrative committee has always made a strong point of maintaining extra strength in top ranks. It is an expensive policy and one which is often productive of more than ordinary friction in executive teams, yet in the case of GM it has paid off handsomely for there are few corporations of comparable size which have performed so consistently financially and which appear to have such capable direction in every division.

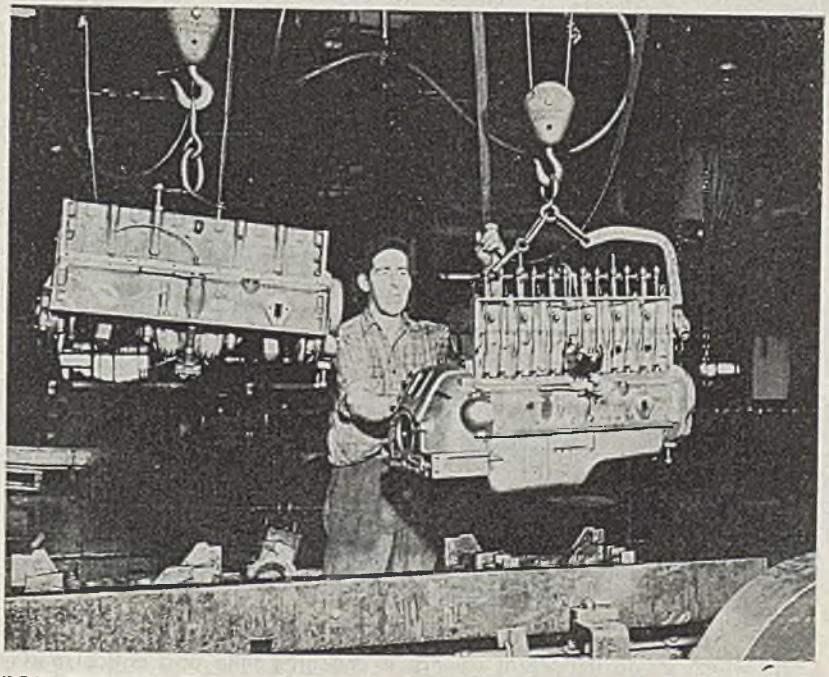
It is to be expected the reconversion of automobile plants will see an accompanying reconversion of management on a considerable scale as war-worn leaders step down and let their assistants take over. Not only has the war taken its toll, but ten difficult years in labor relations as well, and the outlook for any panacea on the latter score is not bright. Many of these production veterans of the Wetherald and Dean caliber, are by nature reticent individuals, and over the years have kept pretty well out of the limelight of publicity. Yet their influence and ingenuity have played tremendous roles in bringing the U. S. motor industry to worldwide eminence in the past four decades. Though they would not like it, they should be accorded full measure of praise.

Disposal of war-born surpluses—in materials, supplies and equipment, exclusive of finished products—has yet to be tackled with the boldness and aggressiveness it will increasingly demand. There is tendency to gloss over the matter and to consider it secondary in character to other more immediate questions. Half a million machine tools, a few million of this and few more of that—these are just figures in a tabulation, and there is little concerted effort to appreciate the eventual impact of surpluses on the economy.

One encouraging sign is the recent approval of plans by the Department of Justice and the Surplus Property Board, and drafting of contracts between the DPC and manufacturers of cutting tools covering the disposal of hundreds of thousands of surplus cutting tools. Under the plan, which some consider as a model which might well be applied to other surpluses, the manufacturer which originally supplied the tools will act as agent for the DPC in disposing of surpluses through normal trade channels. Speed and orderliness of disposal are emphasized, speculation being eliminated by requiring the sale of a minimum of one surplus tool for every three new tools of the same type produced by each manufacturer. No restriction is placed on the maximum ratio of surplus tools to new tools.

It is believed the setup will make available immediately through regular trade channels surplus tools which otherwise might be frozen, and thus will make unnecessary a widespread duplication of tools on an emergency production basis while similar tools lie idle in warehouses. The plan provides for efficient segregation through co-operation of the original manufacturer of tools into several classifications—for immediate resale, for reconditioning, for alteration and for scrapping. Allowance is made the manufacturer for appropriate charges to cover handling, reconditioning and storage, and normal trade discounts are granted distributors. As a further insurance against increase in surplus tools, orders for new tools from the government or military services will be filled first from such stocks of surplus tools as are available from the manufacturer-agent.

This entirely logical method of sur-



FOR CIVILIAN TRANSPORTATION: Good news for owners of Chevrolet cars and trucks grown old during the war. Shown on the assembly line at left are "short blocks" being produced in volume for replacement of worn out engines in passenger cars and trucks

plus disposal, it would appear, could be applied to other materials and equipment, granting one important thing that manufacturers and distributors would be willing to handle resales. The latter probably would agree, but in the case of plans to dispose of surplus aircraft materials and components, it was found many manufacturers were unwilling to accept surpluses for resale, maintaining that this was the field of jobbers and distributors and should not be imposed on manufacturers.

Surpluses are visioned as the approaching problem of the rubber industry in a recent memorandum by P. W. Litchfield, Goodyear board chairman. His observations are of particular interest to the automotive industry and to other industry as well, because of the increasingly important position held by rubber as a basic material. The problem can best be summarized by some informed estimates covering supply and demand in the three years succeeding liberation of natural rubber growing areas in the Far East:

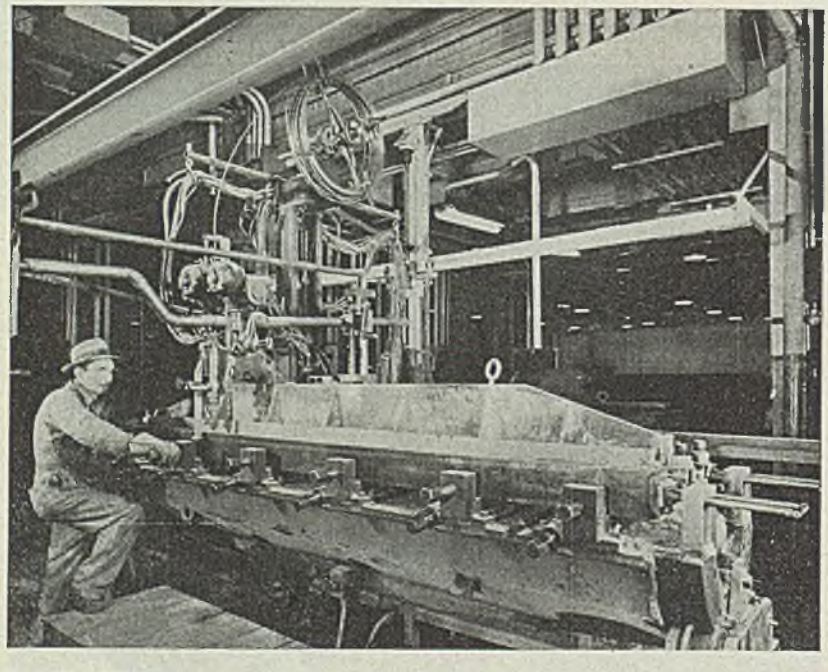
	(Long Tons)		
	1st Year	2nd Year	3rd Year
Natural Rubber Available	350,000	900,000	1,400,000
Capacity of Synthetic Plants	1,300,000	1,300,000	1,300,000
Potential Supply—Total	1,650,000	2,200,000	2,700,000
World Capacity of Manufacturing Facilities for Processing This Supply (Peak Demand)	1,400,000	1,500,000	1,500,000

Thus, while it appears the synthetic rubber production capacity now permits a balance of supply and demand, in view of the shutting off of shipments from the Far East, in three years after liberation of the plantations an excess of supply over demand nearly equivalent to the capacity of synthetic plants seems in store. The synthetic industry may prove to be an ace in the hole, however, from a price standpoint when natural rubber shipments are resumed. In the past, natural rubber has fluctuated between 3 cents and $1.25 per pound in a matter of seven years, a highly unstable and hazardous condition for the large rubber industries. With the likelihood of automobile tires eventually being made of 50-50 mixtures of synthetic and natural rubbers, and with the possibility of 25 per cent of the synthetic plant being converted to production of the plastics type, plus the recommended elimination of both high-cost plantations and high-cost synthetic plants, a reasonable measure of stability might be worked out, without destroying either the economy of the rubber-growing areas of the Far East or the synthetic industry in this country.

Nonetheless, the whole picture is heavily vested with conflicting international interests, and a spirit of sympathetic understanding and goodwill, coupled with an appreciation of the surplus problem, will be necessary if complications are to be avoided.

Complications were building up in the Detroit area last week over the matter of hours to be worked in plants with reduced war contracts. WMC regulations call for maintenance of a 48-hour week, but approval was given the Murray Corp. of America to scale down to 40 hours to avoid additional layoffs. When Ford announced a similar schedule at the Willow Run bomber plant which is slated to terminate operations Aug. 1, the WMC demurred and insisted a 45-hour week be maintained. The Ford management claimed it could avoid laying off 5000 by trimming the work-week immediately. The WMC position appears untenable in the face of contract cutbacks. The manpower agency has approved a reduction to a 40-hour week at the Ford Rouge, Highland Park and Lincoln plants.

The Willow Run Bomber plant, incidentally, topped all other primary airframe manufacturers in 1944 production by a wide margin, supplying 97,883,000 pounds, including spares, against the second-highest plant, Consolidated Vultee at San Diego, Calif., which produced 78,206,000 pounds. The list includes 73 prime contractors, covering the entire aircraft industry.



SAVES STEEL: Adaptation by Fisher Body Division of General Motors Corp. which made important savings in machine time and critical material in the production of 155-millimeter gun cradles is this machine and fixture setup for automatic welding (Unionmelt process) of the gun cradle guide plate assembly at the Pontiac plant. Substitution of a three-piece weldment for a single 3600-pound billet resulted in a saving of one ton of steel

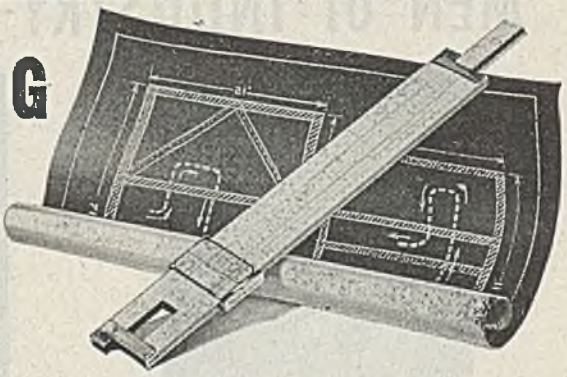
Dodge Plant Gets New Contract

Countercurrent to the trend of war contracts, the Newcastle, Ind., plant of Dodge has received a new assignment, covering production of 20-millimeter armor-piercing shot at a rate of 500,000 a month. In peacetime this plant built special machinery for Chrysler but during the war turned out millions of rounds of ammunition, including cores for .50-caliber shells at 12 million a month, 20-millimeter shot at 625,000 a month, 20-millimeter high-explosive projectiles at 500,000 a month and finally the armor-piercing variety just mentioned. Special heat treating furnaces and magnaflux inspection equipment are required, and other machinery is being moved from Detroit plants.

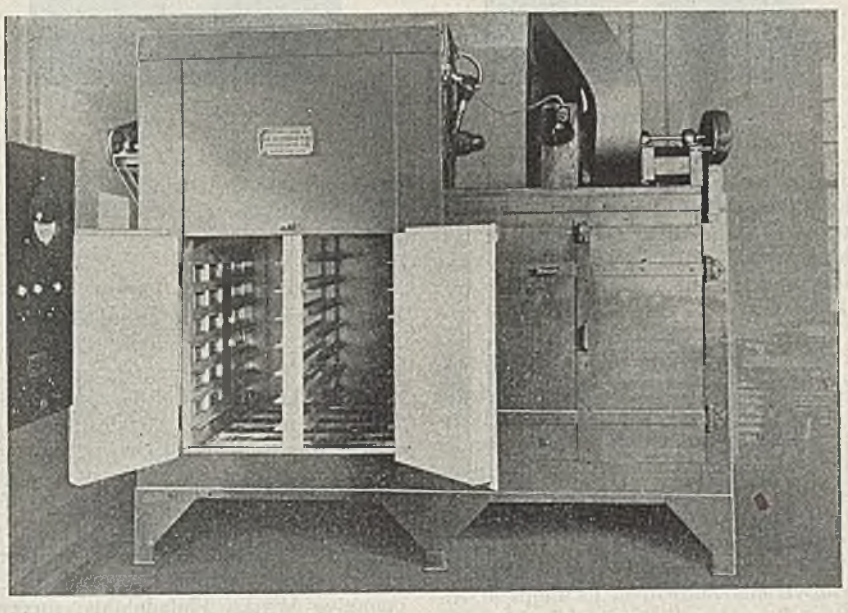
Ford has announced plans for an $800,000 parts depot in Seattle as one unit of its $150 millon postwar program; about 12 acres have been purchased 22 miles south of the heart of the city.

Gradual termination of production of liquid-cooled engines at the Allison Division plant in Indianapolis will be accompanied by concentration on manufacture of GE turbojet engines for the Lockheed P-80, as well as on production of a variety of special bearings of the type developed by Allison engineers for use in the V-1710 engine. Reports are heard around Indianapolis that 10,000 may be laid off over the next few weeks.

OVEN ENGINEERING NEWS



IOE Box Ovens Speed Work, Cut Cost and Reduce Hazard In Evaporation of Solvents



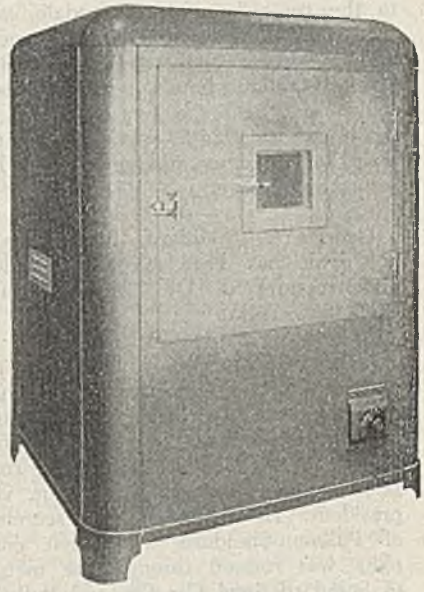
New conceptions of speed, economy, simplicity and safety in the evaporation and drying of inflammable and explosive materials are being brought to industry by installations of the Industrial Oven Engineering Company. Good examples are the two box ovens shown on this page, engineered specifically for their respective jobs but built along standard **IOE** designs.

The one above is used by the Cleveland Container Company to dry fabricated paper parts which have been dipped in a finishing solution consisting of approximately 50 per cent alcohol and 50 per cent solid matter. This oven has cut the drying time from 25 minutes to 5 minutes, at the same time relieving brittleness and increasing hardness of the finish, and effecting a substantial reduction in drying costs. One of the features responsible for the production set-up is the auxiliary pre-heating zone which uitilizes exhaust air from the oven proper.

Despite the fact that the oven is direct gas fired, constituting a seeming hazard in the evaporation of large volumes of alcohol, it is perfectly safe and has insurance company approval. Whether the problem is the evaporation or drying of alcohol, acetone, naphthas, methyl-ethyl-ketone, or any other highly volatile solvent, the same safe operation can be expected. This type of system can be used also for drying, finishing, heat treating or any other heat processing where materials can be handled in trays, jigs or baskets. It is especially adapted for dense loads where air stream resistance is high. Completely automatic high-precision controls hold temperature variation to ±2° F.

At the right is shown a laboratory oven used by the general research laboratories of the Owens-Corning Fiberglas Corp. for polymerization of test samples of resin-bonded Fiberglas laminates. Specific requirements of this job are (1) the ability of the oven to operate within a temperature differential of 1½° F., and (2) its ability to evaporate large quantities of various solvents whose volatility ranges from inflammable to explosive. It is also necessary that the oven harmonize in outward design and appearance with other equipment in this most modern research laboratory. In several cases, these units have been furnished with baked japan exterior finishes in a variety of colors.

If you have a heating or oven processing problem which is not yet satisfactorily solved, why not get in touch with **IOE?** It is quite probable that one of our standard designs can be quickly adapted to your needs.



FREE ENGINEERING DATA

"Blueprint For Industry" is the name of an 18-page book of engineering information on high-production convection-heated ovens for batch and continuous heating processes used in several types of industrial operation. It contains much general data of value to engineers, metallurgists and research men. Write today for your copy.

(This is No. 18 of a series. Reprints of previous advertisements sent free upon request.)

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MEN of INDUSTRY

W. D. TRUESDALE

T. V. BUCKWALTER

COL. G. LARNER

William D. Truesdale has been elected vice president in charge of finance, Inland Steel Co., Chicago, **Russell L. Peters** has been elected treasurer and **E. A. Horne** has been elected assistant to the treasurer. Mr. Truesdale, who joined the company in 1907 as general auditor, was elected treasurer in 1919. Three years later he also was named secretary and held the two positions for ten years. In 1924 he was elected to the board of directors and since 1931 has served as treasurer.

—o—

George C. Stoddard, formerly vice president, has been elected president and treasurer of De Laval Separator Co., New York.

—o—

Henry G. Macdonald has been appointed assistant vice president of Pullman-Standard Car Mfg. Co., Chicago. Mr. Macdonald was with Standard Steel Car Co. from 1902 to 1930, rising from sales engineer to assistant to the vice president. He became assistant secretary of Pullman-Standard when that company was formed through the merger of Standard Steel Car Co. and Pullman Car & Mfg. Co. in 1930. His headquarters are at the company's New York office.

—o—

David E. Jenkins Jr., has become assistant manager of sales for Tate-Jones & Co. Inc., Pittsburgh.

—o—

R. Louis Pike has been appointed general sales manager, Narragansett Machine Co., Providence, R. I. Mr. Pike had been associated with the Liberty Tool & Gage Works of Providence in an executive capacity.

—o—

Chester D. Stanaro has been appointed veterans counselor for the Alameda, Calif., Fabricating Works of Bethlehem Steel Co.

—o—

Clark H. Johnson has been transferred to the city office staff of United Engineering & Foundry Co., Pittsburgh. **Howard B. Cummings** replaces Mr. Johnson as superintendent of the company's New Castle plant. **William Hagel**, vice president and manager of machinery sales, has been appointed a vice president of Adamson-United Co., Akron, O.

—o—

Tracy V. Buckwalter, who for the past 25 years has served as chief engineer and vice president, Timken Roller Bearing Co., Canton, O., has retired under the company's retirement annuity plan, effective April 30. He, however, will serve in a consulting capacity. Mr. Buckwalter came to Timken in 1916 as chief engineer after 16 years with the Pennsylvania railroad in its shops at Altoona, Pa., where among other things he developed the motor baggage truck which carried his name, and from which idea resulted most of the motor-driven baggage trucks. For many years Mr. Buckwalter's work embodied engineering and development in the automotive and general industrial fields, outstanding among which was the development of large bearings and their application to ferrous and nonferrous rolling mills. Elected vice president in 1925, a large part of his time thereafter was devoted to development of the company's railroad activities.

—o—

John S. King has been appointed manager of Pump Division, Fairbanks, Morse & Co., Chicago. Since 1937 Mr. King has been manager of the firm's New Orleans branch.

—o—

H. Lester Freeman has been appointed Washington representative for the Export Division of Oil Well Supply Co., U. S. Steel subsidiary.

—o—

A. C. Bekaert has been appointed comptroller, Wickwire Spencer Steel Co. and subsidiaries, with headquarters in New York. **Theodore A. Havens Jr.** has been appointed tungsten engineer at Wickwire Spencer Metallurgical Corp., Newark, N. J. subsidiary of Wickwire Spencer Steel Co. **Armon N. French** has been appointed assistant sales manager of Wickwire Spencer Metallurgical Corp. Newark, N. J.

—o—

Col. G. deFreest Larner has been elected assistant to the president of H. K. Porter Co. Inc., Pittsburgh.

—o—

Maj. Philip M. Judson, former San Francisco manager of Metalead Products Corp., Sunnyvale, Calif., has been awarded the silver star for gallantry in action in fighting in Burma.

—o—

C. A. Campbell has been appointed export sales manager of Baldwin Locomotive Works, Philadelphia, succeeding the late Clyde G. Pinney. Mr. Campbell joined Baldwin as a shop apprentice in 1919. A year later he was assigned to foreign sales and spent 12 years in various assignments for the firm in South and Central America and the West Indies before returning to foreign sales headquarters in Philadelphia in 1932. Shortly after Pearl Harbor he was made district manager at Washington. He will be succeeded in that post by **Milton W. Brooks** who has been associated with Mr. Campbell handling Navy and Maritime locomotive and marine products for several years.

—o—

Claude M. Nelles, associated with Ford Motor Co., Dearborn, Mich., since 1913, for many years steel buyer and supervisor of open-hearth steel production, has resigned due to ill health. His work in direction of Ford steel mills will be assumed by his assistant, **Frank Curtis**, while steel buying will be handled by **Charles H. Carroll**, purchasing executive. The Ford by-products sales department will take over Mr. Nelles' responsibilities in steel sales. Mr. Nelles began work with Ford in a production job, and after three years was transferred to time, costs and sales department. Following construction of the open-hearth department in 1918 he took over supervision of production there, later becoming steel buyer. In recent years he served for a time

J. O'H. ANDERSON

H. B. SPACKMAN

W. E. REMMERS

with Messrs. **Carroll** and **Howard Kellogg** as co-directors of purchases, and later undertook the development of an incentive pay system which is being introduced in the steel mill departments.

—o—

J. O'H. Anderson and **H. B. Spackman** became assistant general managers of sales, Jones & Laughlin Steel Corp., Pittsburgh, May 1. Mr. Anderson has been manager of sales, Tubular Products, and Mr. Spackman has been district sales manager, Philadelphia office. Other Jones & Laughlin sales office appointments effective May 1 were: **V. A. Jevon,** assistant general manager of sales, who will be in charge of Pittsburgh district sales office activities; **C. T. Hapgood,** assistant manager of sales, Tubular Products, who has become manager of sales, Tubular Products; **E. W. Harwell,** district sales manager, Chicago office, who has become district sales manager, Philadelphia office; **L. C. Berkey,** district sales manager, St. Louis office, who has become district sales manager, Chicago office; and **C. C. Wehling,** district sales manager, Pittsburgh office, who has become district sales manager St. Louis office.

—o—

W. Hunter Russell has been appointed southwestern district sales manager for Baldwin Locomotive Works, with headquarters in Dallas, Tex.

—o—

John H. Hassinger has been appointed to succeed **Henry M. Hale** as director of WPB's Construction Machinery Division. Mr. Hassinger was formerly a lieutenant colonel in the U. S. Corps of Engineers. Mr. Hale is returning to private industry as a dealer in construction machinery in Albany, N. Y.

—o—

Charles White Merrill, has been appointed chief of the Metal Economics Division, Bureau of Mines, Department of the Interior. Associated with the bureau since 1928 when he joined the staff of the Economics and Statistics Branch as a mineral economist, Mr. Merrill has served as supervising engineer at San Francisco since 1933. He succeeds **Thomas H. Miller** who recently was made assistant chief of the Economics and Statistics Branch of the Bureau of Mines.

—o—

R. B. Smith recently was elected vice president of engineering for the Elliott Co., Jeannette, Pa., and not vice president in charge of sales as was inadvertently reported in the caption accompanying his photograph in the April 23 issue of STEEL, page 80.

—o—

Keen Johnson, for the past year an assistant to the president, Reynolds Metals Co., Richmond, Va., has been made a vice president, with offices in Washington. Mr. Johnson succeeds **W. G. Golden** as vice president, who is retiring because of ill-health. **M. A. J. Phillips,** vice president of Reynolds Alloys Co., Listerhill, Ala., a Reynolds Metals subsidiary, has been named general manager; **David P. Reynolds** has been named a director and **Robert Weiller** a vice president. Mr. Reynolds is vice president of Reynolds Metals Co. in charge of advertising and public relations and aluminum sales.

—o—

C. E. Mason has been appointed technical director, Bristol Co., Waterbury, Conn. From 1925 until 1941 he was associated with Foxboro Co., Foxboro, Mass. and from 1940 until joining the Bristol Co., he was director of engineering of Mason-Neilon Regulator Co., Dorchester, Mass.

—o—

L. H. Fischer has been appointed Cincinnati engineer for the Vilter Mfg. Co., Milwaukee, with headquarters in the Ingalls building, Cincinnati.

—o—

Eugene Holland, vice president in charge of operations, has been elected president of Florence Stove Co., Gardner, Mass., succeeding **R. L. Fowler,** who became chairman of the board. Mr. Fowler served as president since 1931. **William T. MacKay,** assistant vice president, in charge of the Kankakee plant has been elected a vice president. **G. B. Colburn,** vice president, and **A. E. Luke,** treasurer, were elected directors.

—o—

W. E. Remmers has been elected vice president, Electro Metallurgical Co., New York. Mr. Remmers joined Electro Metallurgical Sales Corp. in 1936, soon becoming Chicago district manager and later division manager. He was transferred to the New York office in 1941 and in 1944 was elected vice president of Electro Metallurgical Sales Corp.

—o—

Ernest C. Low, general manager of sales, John A. Roebling's Sons Co., Trenton, N. J., who has been associated with the company since 1910, has been named vice president in charge of sales; **John D. Thompson,** works manager, who has been with Roebling since 1940, has become vice president in charge of production; and **Charles M. Jones,** manager of engineering and connected with Roebling since 1926 has been named vice president in charge of engineering. **Archibald W. Brown,** treasurer and with the company since 1902 has been elected a member of the board of directors.

—o—

F. Cyril Greenhill, Toledo, O., was elected president of the Pressed Metal Institute at a meeting of the trustees last week. Other officers named are: **Tom J. Smith Jr.,** Cleveland, executive vice president; **J. H. Robins,** Philadelphia, first vice president; **J. H. Boehm,** Cleveland, secretary-treasurer.

—o—

Earl W. Pierce has been appointed chief metallurgist and **Tom J. Peters** has been appointed assistant to general superintendent at the South Chicago plant of Carnegie-Illinois Steel Corp. Associated with the plant for the last 15 years, Mr. Pierce started as a metallurgist in the plant laboratory. For the past three years he has been assistant to the general superintendent. Mr. Peters, also with the South Chicago plant for the last 15 years, started as a testing engineer in the electrical department ad-

vancing through various positions to his most recent one as superintendent of the Maintenance Division.

—o—

L. E. Meidinger, who was reported in STEEL, April 16 issue, as having retired from the district managership at Milwaukee for Bliss & Laughlin Inc., Harvey, Ill., continues to represent in that area the Granite Steel Co., Continental Foundry & Machine Co. and several other companies. The L. E. Meidinger Co., 606 West Wisconsin avenue, Milwaukee, which was established in 1914 continues in business.

—o—

H. G. Hilton, formerly executive vice president, has been appointed president, the Steel Co. of Canada Ltd., Montreal. Mr. Hilton started his career with Pickands Mather & Co., Cleveland, at their blast furnace plant in Chicago and held several other blast furnace positions in the United States before returning to his native Canada in 1919.

—o—

Commander John J. Bergen, USNR, inactive, chairman of executive committee of Gar Wood Industries Inc., Detroit, has been elected chairman of the board of directors and also chairman of St. Paul Hydraulic Hoist Co., Minneapolis, a subsidiary. Commander Bergen, who is president of John J. Bergen & Co., Ltd., New York, is also chairman of the executive committee of United Aircraft Products Inc., Dayton.

J. A. HOLLADAY

Who has been elected a vice president of United States Vanadium Corp., New York, unit of Union Carbide & Carbon Corp. as announced in STEEL, April 23, p. 79.

B. F. COURTRIGHT

Who has been appointed sales manager, Wisconsin Steel Division, International Harvester Co., Chicago, noted in STEEL, April 23, p. 80.

E. T. Sharon, who was formerly associated with the Salvage Department, Ford Motor Co., Dearborn, Mich. is now active in an executive capacity with Grant Iron & Metal Co., Detroit, scrap broker.

OBITUARIES . . .

William R. Webster, 77, chairman of the board, Bridgeport Brass Co., Bridgeport, Conn., since 1930 and associated with the company for 48 years, died in Philadelphia, April 29. Mr. Webster joined Bridgeport Brass Co. in 1897 and served successively as department superintendent, general superintendent and vice president. For many years he was chairman of the employment relations committee of the National Association of Manufacturers, New York.

—o—

Rollin C. Shurmer, sales manager for Lake City Malleable Co., Cleveland, died April 28. He had been associated with the company 35 years.

—o—

Walter W. Marting Sr., 68, vice president of the Ohio River Co. and a director of West Virginia Coal & Coke Co., Cincinnati, died April 22 in that city. He was formerly associated with the Columbus Iron & Steel Co. and the Marting Iron & Steel Co.

—o—

Robert M. Sanford, 56, manufacturing superintendent of Monsanto Chemical Co.'s plant at Monsanto, Ill., died April 24 in St. Louis.

—o—

John Arthur Earhuff, 63, who established the Los Angeles Spring & Forge Co., died in Los Angeles April 28.

—o—

James Fentress, 74, founder and honorary chairman of the Chicago Metal Hose Corp., Chicago, died recently in Sarasota, Fla.

—o—

L. B. Ross, 45, president of Eclipse Lawn Mower Co., Prophetstown, Ill., died April 30 at Moline, Ill.

—o—

Joseph M. Kurtz, 27, public relations counsel in Cleveland, died May 1 at his home in that city. Before going into public relations work, Mr. Kurtz was an assistant editor on the staff of STEEL.

—o—

Dr. Fred A. Harvey, 63, director of research for the Harbison-Walker Refractories Co., Pittsburgh, died April 27 in that city. Between 1910 and 1916, Dr. Harvey was at the University of Syracuse, first as instructor and later as associate professor. He joined Harbison-Walker in 1926 and became research director in 1932. He was a fellow of the American Ceramic Society, Columbus, O., and vice president in 1929. He also was a member of the Canadian and British Ceramic Societies and the Deutsche Keremische Gesellschaft.

—o—

Edward G. Weed, executive vice president, Pyrene Mfg. Co., Newark, N. J., died April 23 at Toronto, Ont. His death occurred at the offices of Pyrene Mfg. Co. of Canada Ltd., of which he had been president since 1923 when he joined the Pyrene organization. In 1929 he came to Newark as vice president and also served for a number of years as secretary, but continued his guidance of the Canadian company. In addition to being a director of both of these companies he was a director of the C-O-Two Fire Equipment Co., Newark, C-O-Two Fire Equipment of Canada Ltd.

—o—

John T. Stanier, 80, a founder of West Penn Steel Co., Brackenridge, Pa., who served as vice president and general manager of the company, died April 11 in Alliance, O. He was an operating official with the United States Steel Corp. during the early development of its plants when they were established in Homestead, Vandergrift and Sharon, Pa.

—o—

Charles Wells Shartle, vice president and sales manager of Texas Electric Steel Casting Co., Houston, Tex., died April 25. He was 53.

—o—

William Morris Imbrie, 64, formerly assistant to the president, New York Shipbuilding Co., Camden, N. J., died at Woodbury, N. J., April 29.

—o—

George Harms, 85, secretary and chairman of the board of directors of F. Meyer & Bros. Co., Peoria, Ill., died April 19. Mr. Harms, who had been associated with the company since 1887, was also secretary of Rock Island Register Co., Rock Island, Ill.

—o—

John H. Champion, 71, retired foundry superintendent, Nordberg Mfg. Co., Milwaukee, died April 30 in that city. He was awarded a plaque by American Foundrymen's Association three years ago for 50 years as a foundryman.

Ship Repair Work Accelerated on Coast as Shipbuilding Declines

Greatest concentration of repair facilities in world assembled in San Francisco Bay area. Thirty shipyards enrolled in district program. Facilities are divided roughly into three main units. Much new construction planned

AS PRODUCTION of new ships declines, emphasis is being accelerated on repairs of Navy and merchant vessels to fight the war in the Pacific.

To handle this job, the greatest concentration of ship repair facilities in the world have been assembled in the San Francisco Bay area. In all, 30 separate shipyards have been enrolled for repair work under the general supervision of Rear Adm. Mahlon S. Tisdale.

The San Francisco Bay facilities roughly are divided into three main units. First, and key to the whole setup, is the Mare Island Navy base, a huge installation covering 1821 acres and filled with millions of dollars of equipment to handle every sort of marine work.

More than 39,000 persons now are employed at Mare Island, other than Navy personnel. More than 15,000 families and 5000 single men, the latter in dormitories, are housed at the base. Its buses, which cover 50 cities in 10 neighboring counties, transport 17,000 workers a distance of 28,000 miles a day. Operations go on seven days a week, 24 hours a day.

In addition to repair work, the Mare Island yard has launched nearly 400 ships, including tankers, submarines, submarine tenders, landing craft, destroyer escorts and smaller vessels. The destroyer base is the main repair depot for ships damaged in the Pacific, and Mare Island is one of the two Navy yards in the country which regularly build and repair submarines.

Will Expand Hunters Point Base

Second unit in the overall setup is the Hunters Point Naval drydocks. This installation which has grown tenfold since start of the war now covers 440 acres. It has six graving docks, piers, shops to repair vessels of any size and a working force of 16,000. Another $43,419,000 will be spent on Hunters Point within the next two years, and a new $10 million drydock will be completed within the next year. As a permanent postwar naval base, it will rank with the largest in the nation. Approximately $65 million has been spent on Hunters Point since start of the war.

Third of the three units in the Navy's repair system here is made up of 28 private shipyards, all except a few of which were not in existence at Pearl Harbor time.

At present, according to the Navy, the San Francisco repair facilities are handling work on about 100 vessels each week. By the middle of the summer, this number is expected to increase to about 150 a week.

Including the large sums still to be spent on Hunters Point, the Navy expected to do about $100 million of new construction at its bases on the West Coast in the next two years. Much of this process will be preparations for making the coast a permanent postwar Navy center.

Approximately $34,599,000 will go for expansion of Terminal Island in southern California so that facilities will accommodate repairs to battleships. Other expenditures will include dredging of San Francisco Bay at six points at a cost of $2 million to enlarge facilities for repair work.

Northern California Plant Expansions Continuing

Thirty new factories and 25 plant expansions were reported in northern California during March. These additions and expansions represented outlays totaling $6,264,700. During the month, seven factories were established in San Francisco with total investment of $1,213,000, and there were nine expansions of existing plants at a cost of $238,000.

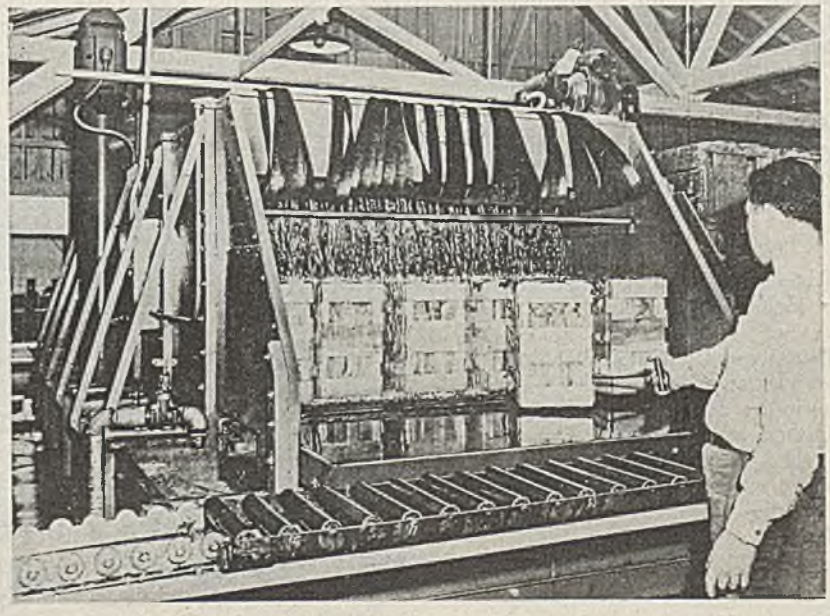
More new corporations filed articles in California in March than in any month since 1941, according to Frank M. Jordan, secretary of state.

Labor Stringency Fades in Los Angeles Territory

Southern California office of the War Manpower Commission has voted to recommend the area be reclassified from a No. 1 stringency labor region to a No. 2. Data showed that about 65 per cent of Los Angeles plants have idle capacities. Only 10 per cent reported skilled workers were still needed. The rest are operating at full capacities.

Search for Idle Materials Pressed on West Coast

Search for idle materials, particularly sheet steel and plate in all thicknesses, has been started by the Los Angeles office of the War Production Board. Firms having idle stocks of steel, copper, aluminum and other scarce metals are being asked to make reports of their holdings, so that such data can be transmitted to war plants where bottlenecks on materials are most critical.



ICE SHOWER MACHINE: Quick chilling of fresh vegetables and other produce, essential when they are shipped long distances, is made possible by this Steri-cooler, now being produced commercially by Food Machinery Corp., San Jose, Calif. Cooling is achieved by showering with cold water

WING TIPS

Douglas organizes program to reconvert surplus Army transports to peacetime use. Will supply technical aid, supervision, tools, drawings and "know-how" to co-operating companies at four "reconversion and overhaul centers"

TO TRANSFORM surplus army transports from war to civilian use, Douglas Aircraft Co., Santa Monica, Calif., is establishing a system of "authorized conversion and overhaul centers."

To initiate the program, Douglas selected four long-established aircraft firms to which Douglas will supply technical aid, supervision, drawings, tools and "know-how" for the conversion of the planes. Each of the four company's productive capacities has been carefully analyzed and will be employed to the best possible advantage in the new program.

The four firms are: Globe Aircraft Corp., Ft. Worth, Tex.; Grand Central Airport Co., Glendale, Calif.; Timm Aircraft Corp., Van Nuys, Calif.; and Canadair Ltd., Montreal.

If the reconversion venture is successful, it may be expanded into a globe-circling system, according to Douglas officials.

Douglas will maintain a master schedule of jobs placed or initiated at each center and work referrals will be coordinated in the interests of maximum output and efficiency.

The initial organization was limited to four firms largely through Douglas inability at this time to supply sufficient supervisory personnel, other technical aid and tooling for a larger number of centers.

Douglas has set up six administrative groups to aid the associated companies in details of operational planning, licensees' accounts, quality control, tooling and equipment, data and records, shipments and procurement, and specialized assistance. A Douglas resident representative at each center provides liaison with the home office.

Permitted To Make Parts

All technical data supplied the centers, including drawings, documents, tables and other reports, are serially-numbered and labeled so that pre-determined information kits will be available to any other domestic or foreign centers established at later date. Douglas has granted a blanket approval to each center to manufacture parts for installation on those airplanes undergoing conversion.

A central control system has been developed at Douglas which incorporates the use of master records containing information on all tools or parts which may have been manufactured by each center, and thus available for use at one of the three other centers. This arrangement avoids duplication of tooling or man hours in the duplicate manufacture of identical parts at more than one center.

This control system contains all information necessary to direct the conversion work to the authorized center at the appropriate time.

The co-operating four firms enjoy a long-standing and enviable reputation in the aircraft industry. Globe designed and built two of its own airplanes, both of which were certificated by the C.A.A., and at least one of which has definite postwar possibilities. With the advent of the war, the Army picked Globe to build 600 twin-engine advanced trainers which rolled off their assembly line in record time, substantially ahead of schedule. This was followed by other contracts with the Army and with other aircraft companies — Curtiss-Wright, Lockheed, Fairchild, North American, to name a few.

Grand Central, formerly known to many as Aircraft Industries Co., was established in 1929, and has engaged extensively in airplane and engine overhaul, repair, and alteration since that time. During the war it has been under contract to both the Army and Navy, and is still engaged in military engine and transport overhaul and conversion work. It also constructs mobile training units for both the Army and Navy, and in addition has conducted all maintenance of hundreds of airplanes used since 1939 in the AAF pilot training program in the Los Angeles area. The experience Grand Central has thus gained in overhaul and repair work, plus quality interior work on personnel transports for the Navy, is proving invaluable on their DC-3 conversion line.

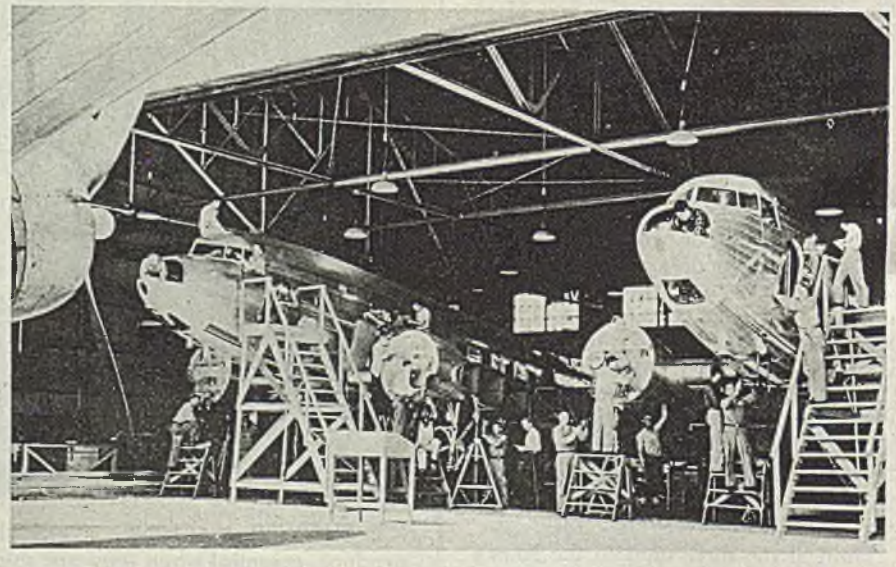
Canadair is, of course, well-known to all connected with the aircraft industry as Canadian-Vickers. It is one of the foremost aircraft factories in Canada, and has turned out numerous Consolidated PBY-5s. It has also done subcontract jobs for various Canadian and American aircraft companies. In addition it has been engaged for some time in conversion and overhaul of C-47 planes for the RAF. To a concern of this size, with its long and varied experience, DC-3 conversion and overhaul work is just another job.

Reservoir of Information Built Up

When Douglas decided to design a quick conversion of a C-47 to a standard DC-3 airplane, it looked to Timm Aircraft to supply the larger part of engineering personnel required. This work enabled Timm engineers to build up a valuable reservoir of information on the DC-3 type plane, which is now proving invaluable in their conversion program. In addition, Timm has had considerable experience with various types of all-metal airplanes. For example, they have built subassemblies for the B-17, P-38 and several other types, including Douglas designs. Although Timm has other work in its shops, special pains have been taken to streamline the DC-3 conversion line.

Douglas started its conversion work in mid-1944 when the first DC-3s originally taken over by the Army were returned to the airlines. The company then was able to assume these projects due to a temporary gap in the military requirements at its Santa Monica plant.

As the volume of C-53s and DC-3s



Facilitating speedy reconstruction of Douglas DC-3s taken over by the Army for war service and now being returned to airline operators, Douglas Aircraft has established four conversion centers. Above photo shows activity at Grand Central Airport center in Glendale, Calif.

GEARS FOR AIR POWER
12 MORE PER TOOL GRIND

SUNICUT improves finish of gears . . . tool life increased from 8 to 20 pieces

The outstanding progress of metal working in the aviation industry may be credited to the ready adoption of new and better methods. This is especially true in cutting lubricants!

Short Tool Life and inferior finish were slowing production in a plant machining airplane gears. Several well-known cutting lubricants were used up to seven months ago. Then a Sun Cutting Oil Engineer stepped in, studied operating conditions and recommended Sunicut.

Output increased 150% per tool grind. With Sunicut they increased tool life from a previous average of 8 pieces per tool grind to 20 pieces. Results . . . longer tool life . . . improved quality of finish . . . less time lost for tool resetting.

Experiences of operators of machine tools prove the production value of Sunicut — developed to make tools hold their edges longer, cut faster and produce better finishes. Put this transparent, free-flowing, sulphurized cutting lubricant to work in your shop. Write for details to . . .

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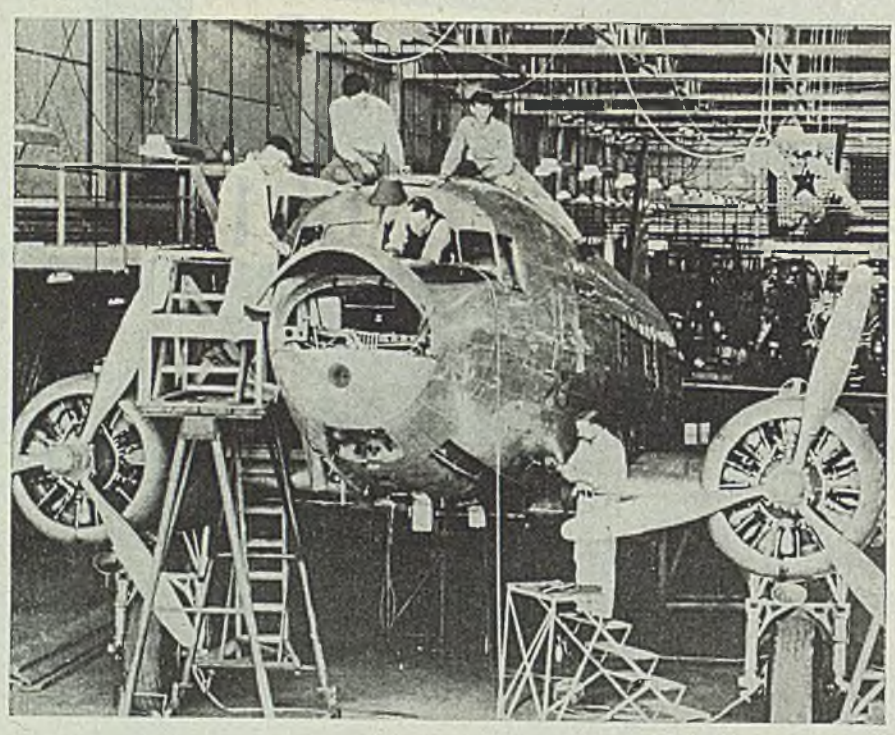

Closeup of the complete overhaul work in converting a war transport into a deluxe DC-3 airliner at Timm Aircraft Corp.'s Saticoy plant in California's San Fernando valley

being returned to the operators increased, it became evident that the capacity of the parent plant to do the work was inadequate because of boosts in its high priority military schedules.

After converting 20 Army transports into airliners at the Santa Monica plant, Douglas discontinued this work and began organizing the system of qualified conversion centers throughout the United States and Canada.

Airline operators currently taking advantage of the facilities offered at the four Douglas-approved conversion centers include American, Braniff, Eastern, Hawaiian, Mid-Continent, Transcontinental and Western Air, United, Western, Swedish ABA, Norwegian government, French government and Iberia Spanish.

The C.A.A. has also placed its DC-3 in a Douglas-approved conversion center for modification and major overhaul. This conversion and overhaul is presently being accomplished at the centers, Douglas officials declare, "at a faster pace than if the work were limited to one large plant and to a standard of workmanship comparable to that of the original manufacturer."

Newest Model of Catalina Patrol Bomber Given Test

Newest model of the Catalina PBY patrol bomber, known as the PBY-6A, recently roared out over Lake Pontchartrain on its first shakedown flight from the New Orleans Division of Consolidated Vultee Aircraft Corp., where it is being built for the Navy. Four distinguishing features of the latest design are:

1. It is equipped with a new turret and in general has heavier armament.
2. Through inclusion of auxiliary droppable fuel tanks, range has been extended.
3. A V-shaped bomber window contributes to streamlined appearance.
4. Appearance has been changed by a revised tail design, featuring a higher tail in which the rudder overtops the vertical stabilizer, assuring more versatile maneuvering.

The Catalina is one of the first military ships to be supplied by Consolidated in the war period, has been retired several times "on paper," but each time was reordered in a modified version. Basically it is a two-engine seaplane.

Development of Aircraft Electric Motors Discussed

Some of the problems solved in developing high-frequency 400-cycle electric motors for aircraft and their application are discussed in a paper by G. O. Schwandt of the horsepower motor engineering division of General Electric Co., Schenectady, N. Y.

Mr. Schwandt points out that the new 400-cycle motors are more compact and approximately 40 per cent lighter than existing 24-volt direct current motors, one of the reasons why they are expected to be used more extensively on future airplanes.

Five kinds of engineering were involved in designing the 400-cycle motors: Electrical, mechanical, thermal, airflow, and lubrication. High-speed operation, better material utilization, and varying conditions in which the motors operate were complicating factors.

Nash-Kelvinator Avoids Layoff After Cutbacks

Faced with a 20 per cent cutback of propeller production, the Nash-Kelvinator plants in Lansing, Mich., swiftly averted layoff for about 1000 employes by substituting increased schedules and other contracts, according to Campbell Wood, general manager of the company's propeller division.

Governors for Aircraft Transmissions Studied

Results of an analytical study of performance specifications for governors for variable-ratio transmissions have been presented by W. K. Boice and L. G. Levoy Jr. of the industrial engineering division of General Electric Co., Schenectady, N. Y., in a paper entitled "Governor Requirements for Aircraft Alternator Drives."

Development of alternating current electrical systems for aircraft has given rise to a need for variable-ratio transmissions, which can receive mechanical power from main aircraft engines and deliver it at substantially constant speed to alternating current generators despite wide variations of engine speed. Governors for such drives, the authors point out, require sufficient response to maintain generator speeds within close limits even during periods of engine acceleration and deceleration.

The authors confined their study to accelerations during parallel operation of alternators, since accelerations have a more adverse effect upon performance, and parallel operation also has a pronounced influence on governor requirements. The constants selected were typical of large airplanes, and the method described in the paper is one which can be used for calculating performance under a variety of conditions.

Among conclusions from this study were that a free-wheeling device in each output shaft, or a small amount of slip in the transmission, helps to maintain synchronism during short, moderate accelerations, even without governor action. For maximum accelerations, however, governor action is necessary.

Correction

An incorrect identification was made in the caption accompanying photo showing company officials and an Army Air Forces officer examining bearing balls in the plant of Strom Steel Ball Co., Chicago, on page 80, STEEL, April 30. George A. Strom Jr., works manager of the plant, was misidentified as his father George A. Strom, president.

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...how Miracles of War Production are being Performed by *"Simplified"* ARC WELDING

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greater achievements in the future from arc welding, the same as greater achievements are expected of our gallant fighting men. Hobart "Simplified" Arc Welding is continually performing Miracles of War Production and everyday more and more production obstacles are being eliminated through the use of arc welding. The result is increased production of war materials vital to the achievements of our fighting forces. These achievements will extend into the post-war period and you'll find Hobart "Simplified" Arc Welding doing the same "bang-up" job on post-war building and production of civilian goods.

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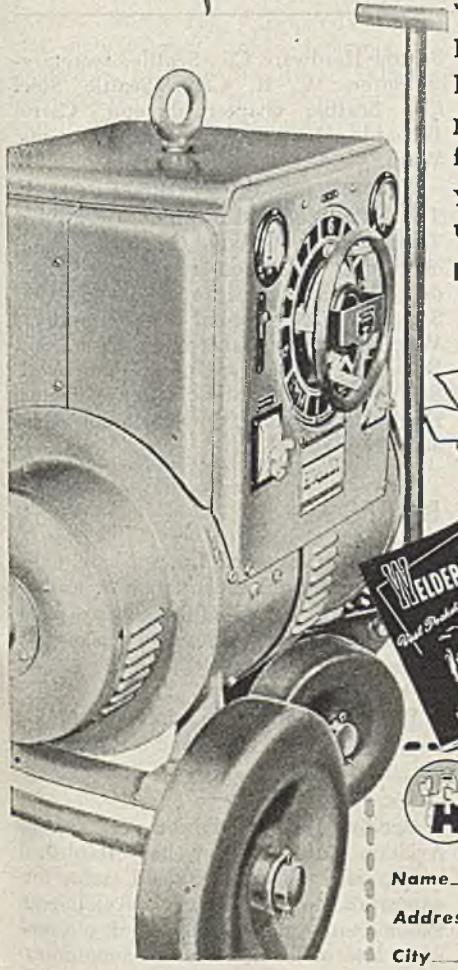

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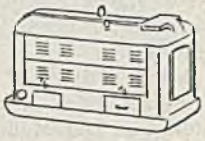

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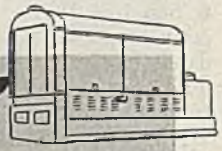
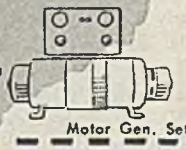


35 KVA Elec. Power Unit



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New Officers for Steel Warehouse Chapters Elected

11 additional groups hold elections, president of American Steel Warehouse Association announces

AMONG chapters of the American Steel Warehouse Association Inc. which have elected officers recently are the following, according to Walter S. Doxsey, president of the association, Cleveland:

BUFFALO CHAPTER — President, Clarence S. Gedney, Joseph T. Ryerson & Son Inc., Buffalo; vice president, David C. Parks, Smith & Caffrey Co., Syracuse, N. Y.; secretary-treasurer, A. Stanley Vedder, Brace-Mueller-Huntley Inc., Syracuse; chapter director, J. Frederick Rogers, Beals McCarthy & Rogers Inc., Buffalo.

CINCINNATI CHAPTER—President, Charles Brown, Brown Steel Co., Columbus, O.; first vice president, G. MacPartlin, Union Iron & Steel Co., Cincinnati; second vice president, John A. Thiele, Miami-Dickerson Steel Co., Dayton, O.; secretary, John W. Miller, SAE Steels, Cincinnati; treasurer, J. E. Merchant, Edgar T. Ward's Sons Co., Cincinnati; chapter director, John A. Thiele, Miami-Dickerson Steel Co., Dayton.

CONNECTICUT CHAPTER — President, R. B. Shearer, the C. S. Mersick & Co., New Haven, Conn.; vice president, S. H. Hascall, the Blodgett & Clapp Co., Hartford, Conn.; secretary-treasurer, C. S. Brousso, the C. S. Mersick & Co., New Haven; chapter director, R. B. Shearer, the C. S. Mersick & Co., New Haven.

MISSOURI VALLEY CHAPTER—President, R. B. Kenworthy, Des Moines Steel Co., Des Moines, Iowa; vice president, J. A. Rudisill, G. C. Christopher & Son Iron Works, Wichita, Kans.; secretary-treasurer, K. P. Saxton, Consolidated Supply Co., Picher, Okla.; chapter director, Henry B. Neef, Gate City Iron Works, Omaha, Nebr.

NEW YORK CHAPTER — President, Charles Kramer, United States Steel Supply Co., Newark, N. J.; vice presidents, H. B. Royer, J. & L. Steel Service Inc., Long Island City, N. Y., and J. P. Donnelly, Atlas Supply Co. Inc., Bronx, N. Y.; secretary-treasurer, William C. Hughes, Bright Steel Corp., New York; chapter director, P. O. Grammer, Grammer, Dempsey & Hudson Inc., Newark.

NORTHERN OHIO CHAPTER — President, R. J. Foster, Republic Structural Iron Works, Cleveland; vice president, E. C. Bartlett, Wheelock, Lovejoy & Co. Inc., Cleveland; secretary-treasurer, J. W. Reichert, the Decker-Reichert Steel Co., Cleveland; chapter director, R. M. Beutel, the Paterson-Leitch Co., Cleveland.

NORTHWEST CHAPTER — President, J. B. Greve, Minnesota Steel Supply Co., Minneapolis; vice president, H. J. Turnstrand, Minneapolis Iron Store, Minneapolis; secretary, S. C. Brennom, Paper, Calmenson & Co., St. Paul; chapter director, J. B. Greve, Minnesota Steel Co., Minneapolis.

PHILADELPHIA CHAPTER—President, J. J. Hill Jr., Hill-Chase & Co. Inc., Philadelphia; vice presidents, W. H. Franklin, Edgcomb Steel Co., Philadelphia, Arthur Collins, Horace T. Potts Co., Philadelphia, and John J. Drummond, Peter A. Frasse & Co. Inc., Philadelphia; secretary-treasurer, J. M. Mead, Joseph T. Ryerson & Son Inc., Philadelphia; chapter director, Leslie Edgcomb, Edgcomb Steel Co., Philadelphia.

PITTSBURGH CHAPTER — President, H. E. Williams, Williams & Co. Inc., Pittsburgh; vice presidents, W. C. Shuck, Lockhart Iron & Steel Co., Pittsburgh, and Bennett Oliver, McKee-Oliver Inc., Pittsburgh; secretary, T. L. Lawry, Steel Products Co., McKees Rocks, Pa.; treasurer, F. B. Lorenz, Edgar T. Ward's Sons Co., Pittsburgh; chapter director, H. E. Williams, Williams & Co. Inc., Pittsburgh.

WASHINGTON CHAPTER — President, Harold Barde, Barde Steel Co., Seattle; vice president, Arnold S. Allen, Seattle Hardware Co., Seattle; secretary-treasurer, W. R. Case, Seattle Steel Co., Seattle; chapter director, Carrol Richards, Hunt & Mottet Co., Tacoma, Wash.

NORTHERN CALIFORNIA CHAPTER—President, Howard M. Tayler, Tayler & Spotswood Co., San Francisco; first vice president, Curtiss Hayden, Dunham, Carrigan & Hayden Co., San Francisco; second vice president, Wakefield Baker, Baker & Hamilton, San Francisco; secretary, R. D. Cortelyou, San Francisco; and chapter director, Hugh E. Oliphant, Tay-Holbrook Inc., San Francisco.

PRESENT TO VETERANS: A painting by Douglass Crockwell, picturing the welcome being given a returned soldier, has been presented to Crile General Hospital, Cleveland, by Republic Steel Corp., and hangs over a writing desk in the hospital's library. Shown standing by painting are Col. R. D. Harden, head of the hospital, and D. B. Gillies, Republic vice president. Sitting is Pvt. William F. Fleming, Pittsburgh

BRIEFS . . .

Mack Trucks Inc., Long Island City, N. Y., has started construction at Fullerton, Pa., of a half-million dollar plant for production of the new Mack C-41 buses.

—o—

Reynolds Spring Co., Jackson, Mich., has acquired the Cleveland Wire Spring Co., Cleveland.

—o—

Bendix Radio Division of Bendix Aviation Corp., Detroit, has established a separate engineering and sales organization to co-ordinate development, manufacture and marketing of a complete line of low cost radio communica-

tions and navigation equipment for personal airplanes.

—o—

Joshua Hendy Iron Works, Sunnyvale, Calif., has received a contract from the Maritime Commission for 24 diesel-generator auxiliary sets for coastal tankers.

—o—

Southern Pacific Railroad's repair program for motive power and rolling stock amounts to $32,120,000 for the first six months of 1945. Of that amount, about $18,600,000 is expected to be spent on locomotive repairs and about $9 million on freight cars. The rest, about $4,500,000, will be for repairs to passenger train equipment.

—o—

Gar Wood Industries Inc., Detroit, has appointed General Machinery Co., Spokane, Wash., and Equipos Hobbs S. A., Mexico City, Mexico, as new distributors for products of its hoist and body and tank divisions.

—o—

R. K. LeBlond Machine Tool Co., and its subsidiary, the Cincinnati Electrical Tool Co., both of Cincinnati, have moved their New York offices to the Singer building, 149 Broadway.

—o—

C. R. Jahn Co., Chicago, sustained fire damage of $100,000 recently in its main assembly plant which has been manufacturing heavy-duty trailers for the Navy.

—o—

White Motor Co., Cleveland, has issued an illustrated booklet depicting the company's part in the war. Vehicles manufactured by the company are shown in action on both the war and home fronts.

—o—

Square D Co., Detroit, reports immediate reconversion needs of the manufacturing industry for special purpose machine tools and of the building industry for electrical equipment for factories, laboratories and homes will make it possible for the firm to bridge the period between wartime and normal activity with minimum disruption.

—o—

Graham-Paige Motors Corp., Detroit, has received an order for 120,000 units of a new type 76-millimeter antitank ammunition that utilizes tungsten carbide as an effective armor-piercing core.

—o—

Hickman, Williams & Co., have moved their New York offices to 70 Pine street, New York 5.

—o—

Jones & Laughlin Steel Corp., Pittsburgh, has moved its Chicago district office and the Chicago office of Jones & Laughlin Supply Co. to the Field building, 135 South LaSalle street, Chicago 3.

—o—

Thomas Flexible Coupling Co., Warren, Pa., has appointed the Brooks Equipment Co. as exclusive sales representative in Oregon, Washington, and northern California, with district sales offices in Portland, Oreg., Seattle, and San Francisco. W. A. Hoppe, Los Angeles, continues as exclusive representative for southern California.

—o—

Aluminum Co. of America, Pittsburgh, has issued a booklet giving details about its war veterans re-employment and rehabilitation plan.

—o—

National City Bank, Cleveland, will observe on May 17 the one hundredth anniversary of its founding.

—o—

The P. & H. Tool & Die Mfg. Co., Baltimore, has equipped a machine shop at 2417 East North avenue.

Steel Sales Corp. Continues With Plans for Expansion

Steel Sales Corp., Chicago, is proceeding with plans for postwar expansion of its facilities in Chicago, Detroit, and St. Louis by approximately 50 per cent and the construction of three additional warehouses in other midwestern cities.

The proposed expansion is a continuation of a program started by the company some years ago and which was interrupted by the war. The additional facilities would enable the company to handle an increased volume of sales on present products as well as distribution of new products including stainless steels.

Directors of the corporation have authorized a committee directed by E. W. Whiteway, executive vice president, to proceed with the expansion program.

Business Press Seeks To Boost Scrap Collection

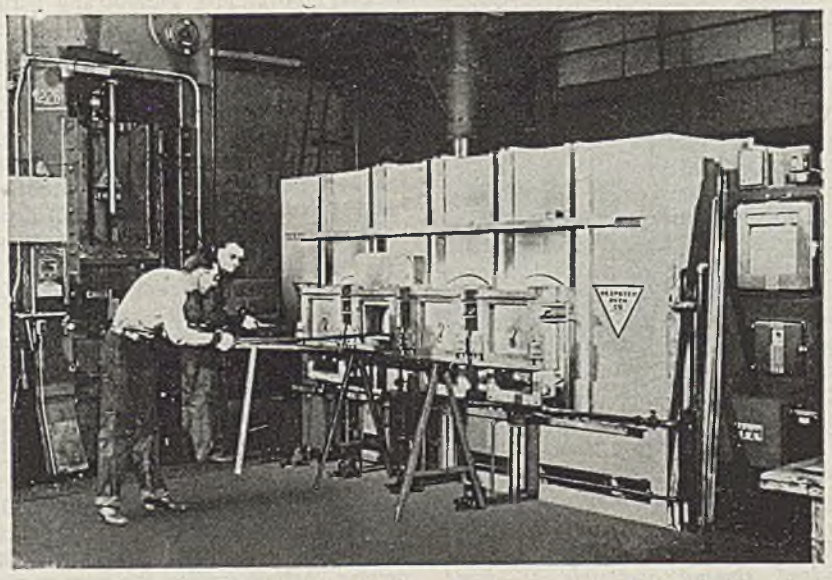
Committee is reorganized to stimulate flow of heavy scrap to mills. Need of 45-day inventory emphasized

THE Business Press Industrial Scrap Committee, New York, has been reorganized to stimulate collections to make up the lag of almost a quarter of a million tons between scrap inventories and production.

Pointing out that the need for heavy iron and steel scrap is spotty but real, the committee emphasized the importance of obtaining additional heavy scrap from industry on a broad front and of building a 45-day inventory.

Spokesmen for the committee pointed out that while some mills have a sufficient inventory the supply at others is at the vanishing point. They compared the need for scrap to the need for blood plasma; it is not only a matter of collecting sufficient supplies but of seeing that the supply is at the right place at the right time.

Chief efforts will be centralized in fields which produce the great bulk of heavy scrap — railroad, oil, shipyard, mine, and auto graveyard.



SAVES FLOOR SPACE: Using only half the floor space formerly required by three smaller furnaces, this new controlled atmosphere forging furnace, made by Despatch Oven Co., Minneapolis, produces a third more than the combined output of the three units previously used. Processing hard steel forgings for aircraft at 2250 degrees Fahr., the unit handles more than 2300 pieces daily

Cleaning Metal with NEW OXIDIZING-REDUCING

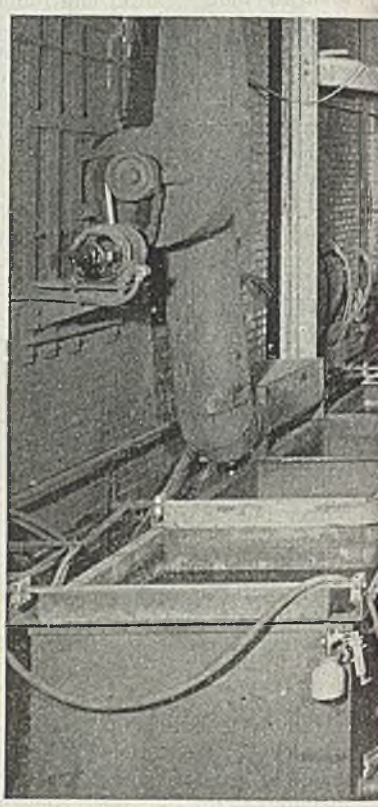
——removes colloidal graphite, facilitating subsequent porcelain enameling of deep drawn sheet steel parts

——cleans out residual core sand from castings, permitting casting designs heretofore impracticable

——makes possible good silver soldered or brazed joints between cast iron and steel (or other metals) for the first time

——prepares cast iron surfaces so they "tin" easily, thus extending use of high-lead babbitts in heavy duty bearings

——employs a single electrically activated molten salt bath to handle many other difficult surface preparation jobs



WARTIME demands account in large measure for the amazingly wide adoption of a new cleaning and surface preparation process, for its use enables many jobs to be handled easily and quickly that would otherwise involve great difficulties and expense.

One of its most important contributions to the war effort is found in production of babbitt bearings for diesel engines and other heavy duty equipment. J. H. Shoemaker, president, Kolene Corp., Detroit, in a recent interview related how this application resulted in the development of "Kolene Kleaner No. 4", the new Kolene process. Originally the corporation made solvents for degreasing work.

When the Japs over-ran world tin sources, some way had to be found to greatly reduce the amount of tin required in bearings for diesel engines and similar heavy duty applications. Instead of tinning the steel backing or bearing shell with pure tin, followed by a *thick* application of *high-tin* babbitt to form the bearing, the Kolene process has made it possible to both tin and babbitt with a *high-lead* alloy and to use only a *thin* application of babbitt. This cuts amount of tin needed to only 1 per cent of that formerly used . . . yes, that's a saving of over 99 per cent . . . report engineers from Cooper-Bessemer Corp.'s Mt. Vernon, O., plant.

The problem was *how to get the high-lead tinning materials to bond properly with the cast iron.* In trying to develop a solvent that would clean the cast iron for direct bonding, certain elements such as rust were found whose presence prevented proper bonding. Further work on this problem resulted in development of the process being described.

Diesel Engine Bearings: The process has proved so successful for this work that practically every large diesel engine manufacturer now has installations in operation. Cooper-Bessemer Corp. has large installations at Mt. Vernon, O., and Grove City, Pa., shown in accompaning illustrations.

T. E. Eagan, chief metallurgist, Cooper-Bessemer Corp., points out, "It has been a general rule that gravity cast bearings be made of thick babbitt with anchor grooves and without any particular attempt to do much about bonding. However, no bearing is any better than its bond."

In describing how his company successfully reduced their tin requirements 99 per cent, Mr. Eagan explains that the new process makes possible perfect bonding between babbitt and shell thereby allowing the shell to take the mechanical loads and the babbitt to serve entirely as friction material. Under such conditions an extremely thin layer of babbitt can produce an excellent bearing. And when this reduced babbitt demand is coupled with the fact that the process allows use of high-lead babbitt instead of a high-tin alloy, the tremendous tin savings mentioned are obtained.

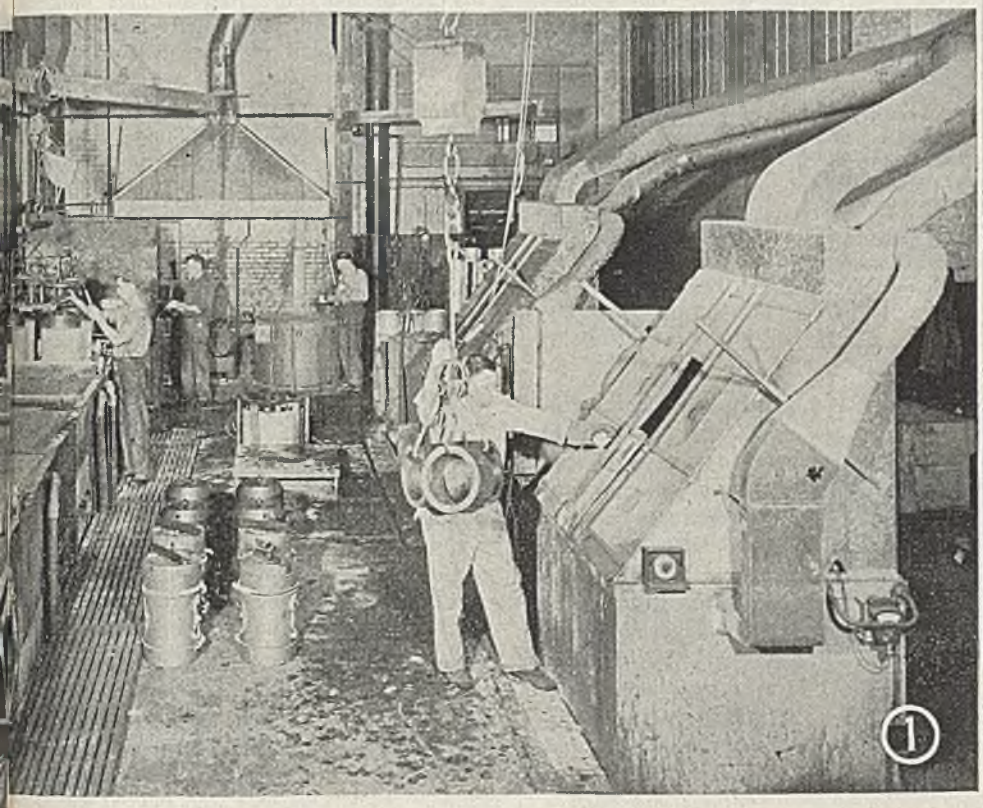
Other Bearing Surfaces: Other heavily loaded bearing surfaces such as crossheads and crosshead shoes for large compressor engines employ the new surface preparation process to obtain similar savings in tin. In one instance bearing thickness was reduced from 3/8 to 1/16-inch, better than an 80 per cent saving in amount of material. The process is being widely used in producing bearings for diesel engines and other heavy duty engines for trucks and busses.

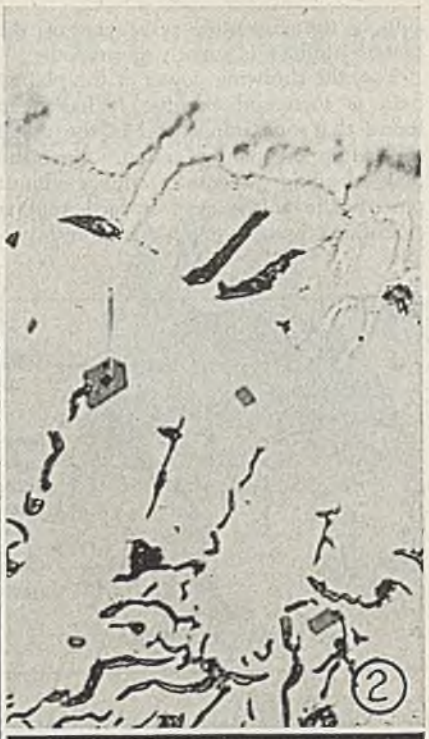
Many users have found these bearings so satisfactory that they say they will never go back to bearings of genuine babbitt (89 per cent tin) but will continue to use the low-tin bearings because of their low cost and excellent performance. In fact certain lead-base babbitts are reported to be better than high-tin babbitts on many applications, particularly the alloy containing 17.5 per cent antimony, 1 per cent tin, 1 per cent arsenic and 0.4 per cent copper with the remainder (70.1 per cent) lead, also known as ASTM specification B-23-26—emergency alternate specification No. 16 or No. 13.

With demands for more power from diesel engines, bearing loads have increased from 800 to as high as 1900 p.s.i., reports Mr. Eagan. Allowable pressure on tin-base babbitt of 1/32-inch is not over 1500 p.s.i. Seeking a bearing that would run under these higher pressures, a set of the lead-arsenic bearings were made up and tested at 1350 p.s.i. in an engine operating at 375 r.p.m. They showed considerable improvement over tin-base babbitted bearings, according to Mr. Eagan. "Our conclusion," he says, "is that lead-arsenic babbitt is the equivalent of high-tin babbitt in every

By G. W. BIRDSALL
Associate Editor, STEEL

PROCESS





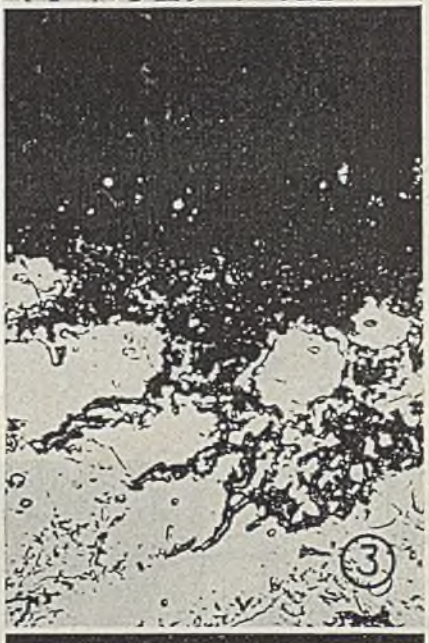


Fig. 1—Metal cleaning department at Cooper-Bessemer's Mt. Vernon, O., plant employs separate baths for oxidation and reduction cycles, located in hooded vats at right. Large amount of production here warrants use of separate baths

Fig. 2—Electro-tin coating deposited on machined cast iron surface after cleaning. At 750 diameters

Fig. 3—Porcelain enamel on Kolene cleaned cast iron. Resulting excellent finish indicates process may lend itself to production of good one-coat porcelain enamel finishes on cast iron

Fig. 4—Porcelain enamel on Kolene cleaned steel. As in Fig. 3, excellent results indicate a one-coat enamel may be entirely satisfactory for many applications. Figs. 3 and 4 at 750 diameters

case that we have investigated."

The successful use of such bearings is largely attributed to the perfect bond obtainable with the Kolene process, for it permits use of a thinner application of babbitt. And when steel for bearing shells became difficult to obtain, they found the process could be used to *bond the babbitt direct to the cast iron* and obtained amazingly good results. End result is that cast iron backs with only a 1/32-inch thickness of the lead-arsenic are now successfully handling heavy duty bearing applications that formerly required special high-tin tri-metal bearings . . . . . and saving 99 per cent of the tin formerly needed.

Improves Electroplating: Another important field for the new cleaning process is found in electroplating work. Because it not only cleans the steel surfaces perfectly but also removes certain impurities in the metal at the surface (as will be explained further along), the process has been found to eliminate many of the minute electrochemical cells formed by different elements existing side by side in surface layer of the steel. Re-

sult is the corrosion resistance of the plated product is greatly improved.

Too, the throwing power of the plating bath is increased because it has been found that some impurities in the metal surface oppose plating action. Since the new cleaning process produces almost pure ferrite at the steel surface, plating conditions thus become much more favorable.

Plating Forgings: As an example of what is being done in electroplating work, Mr. Shoemaker describes one installation of the new process being used on steel forgings subsequently electroplated in a cyanide zinc bath. After cleaning, using a single bath and water rinse, forging scale is completely removed. In fact, both rough and machined surfaces of the forged parts plate so uniformly that is difficult to tell which surfaces are which.

Other parts made from SAE-9260 steel were cleaned after heat treatment and successfully electroplated with zinc. It was found that they could also be given a good coating with a high-lead alloy by dipping in a molten lead bath.

Gray Iron Castings: Similarly one bath and a rinse are employed in the new process to completely remove foundry scale from gray iron castings and to prepare both machined and unmachined surfaces of castings so they take electrodeposited zinc perfectly.

High Carbon, High Alloy Steels: The system can be used to clean high carbon, high silicon-manganese and other alloy and spring steels, provided the operating temperature of the bath (850 degrees Fahr.) will not produce undesired tempering or other action. And work so treated is said to be much easier to plate or hot dip than parts cleaned by usual methods. Also thorough removal of scale makes the work much easier to machine.

Another application is to clean for deposition of a thin coating (1 to 5/1000-inch) of nickel to prevent decarburization of the steel during subsequent heat treating or forging operations. It has been found that such thin layers of nickel will stand up well and afford good protection to the steel even when the parts are heated to forging temperatures and given considerable hot working.

Simplifies Porcelain Enameling: An application of the process being investigated by several large porcelain enameling companies is its use to replace conventional degreasing and pickling operations in preparing parts for application of porcelain enamel. Preliminary tests indicate that the improved cleaner with its one bath and rinse is equal or superior to any conventional cleaning setup regardless of its extent.

The result is a great interest has been shown by a number of important producers of porcelain enamelware. One large company planning the addition of a new and larger pickling room heard of the process, investigated it and completely changed their plans. It is reported to have cut the cost of their contemplated additions by a huge figure.

Removes Colloidal Graphite: Tests have shown that colloidal graphite as well as any other drawing compound is removed completely in a properly operated Kolene bath, reports Mr. Shoemaker. It is well known that the merest trace of graphite or any other form of carbon is "poison" to porcelain enamel. In fact, a light pencil mark will prevent application of porcelain enamel over a large area of adjoining surface. Yet sheet steel parts deep drawn with colloidal graphite as lubricant have been

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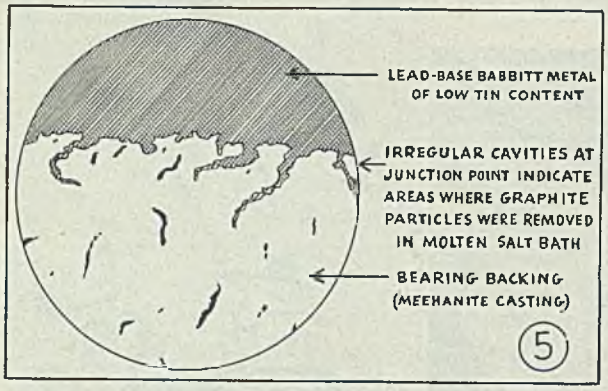

Fig. 5—Taken from an actual photomicrograph at Cooper-Bessemer laboratory, this drawing shows how the low-tin lead-base bearing metal readily flows into irregular cavities in the gray iron (Meehanite) backing to provide good mechanical anchorage for it

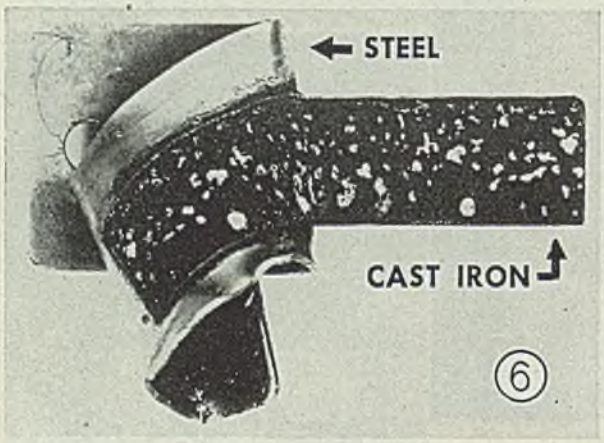

Fig. 6—Steel strip silver brazed to treated cast iron cleaned by new method produces such a high strength joint that a pull test ruptures the cast iron as shown here. This great strength indicates why process is being used to join steel stampings, tubing, pipe and the like to cast iron fittings and parts

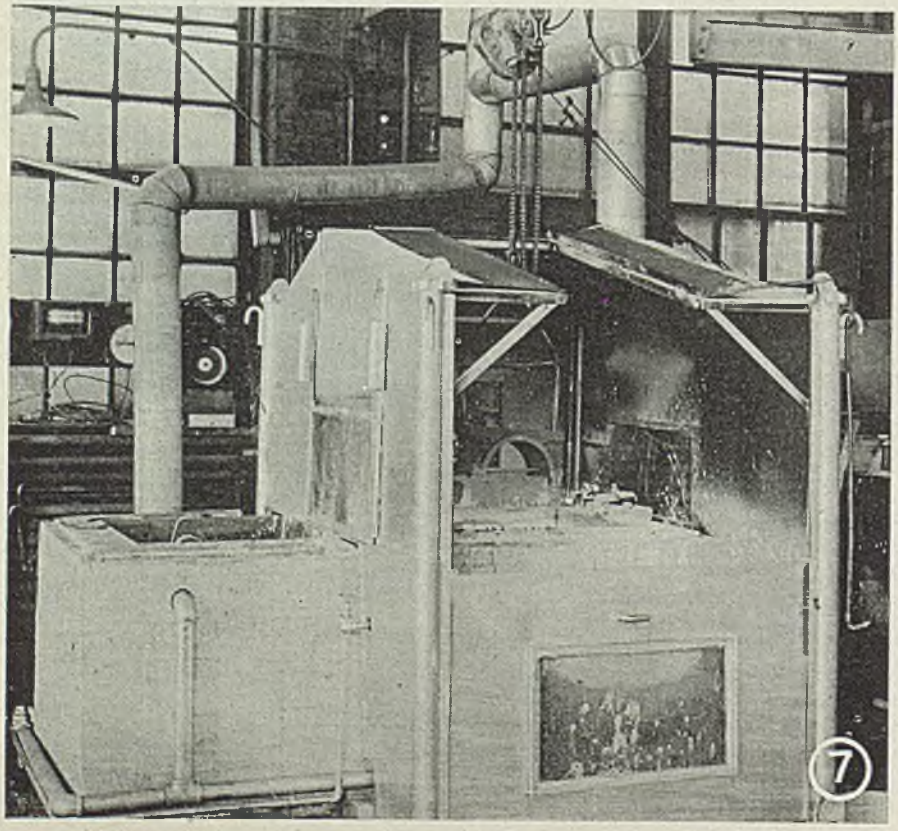

Fig. 7—In this installation, a pot 4 x 6 x 3 feet deep is employed for both oxidation and reduction cycles

By A. O. SCHMIDT
Research Engineer
Kearney & Trecker Corp.
Milwaukee

THERMODYNAMIC RESEARCH POINTS WAY TOWARD Faster and Better Milling

DURING the last 45 years, engineers have carried out a large amount of research which has influenced and improved not only machine tool design, but manufacturing processes in general. The true significance of heat in a machining operation has often been overlooked or misinterpreted.

A machine tool is the inverse of a heat engine. While heat, in some form, is used to produce mechanical power in a heat engine, the machine tool is supplied with mechanical power which generates heat. A machining operation produces chips and by that action accomplishes a desired result, but the less heat generated in the chips, workpiece, and tool, the better the cutting operation. Minimum heat generation is synonymous with minimum power consumption.

Cutting metal with less power means smaller forces acting at the cutting tool. Such forces, when unduly great, not only introduce undesirable torque and bending moments in the cutter and spindle, but also affect, undesirably, other members of the machine. The smaller these forces are, the lower will be the stresses in the frame, spindle, bearings, gears, and workpiece. In many cases, tool life will be longer, because it is concentration and accumulation of heat in cutting tip which is an important factor in tool failure.

About 150 years ago an inquisitive American conducted the first recorded experiments on machine tools. He was Benjamin Thompson, better known as Count Rumford, born in Woburn, Mass. Leaving this country during the revolution, he gained high position, titles, and honors in Europe. While a lieutenant-general and commander-in-chief of the general staff of the army of the Duke of Bavaria, he was also in charge of the military arsenal in Munich. In 1798 before the Royal Society, he reported his experiments in a paper, "An inquiry concerning the source of heat which is excited by

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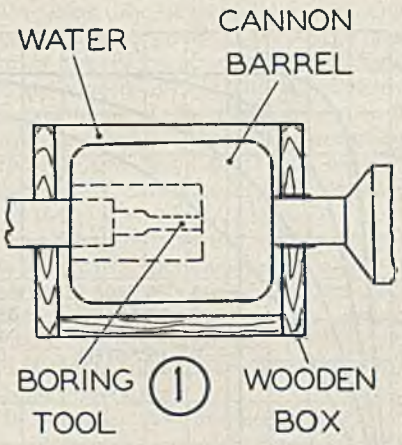
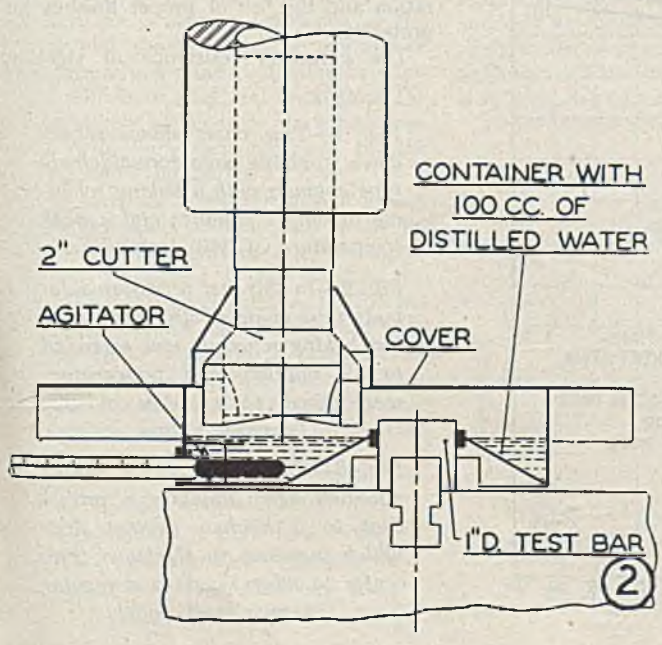
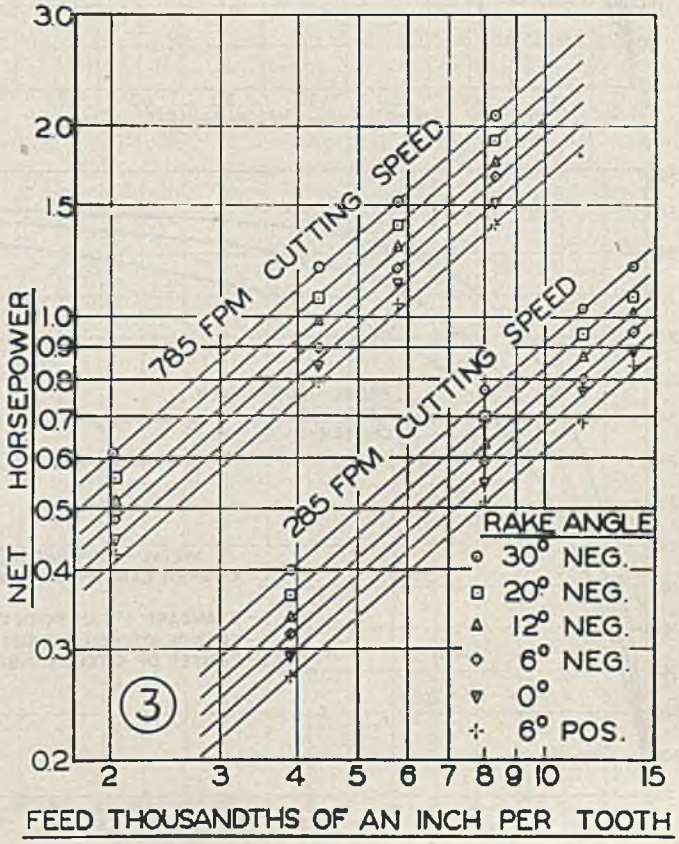


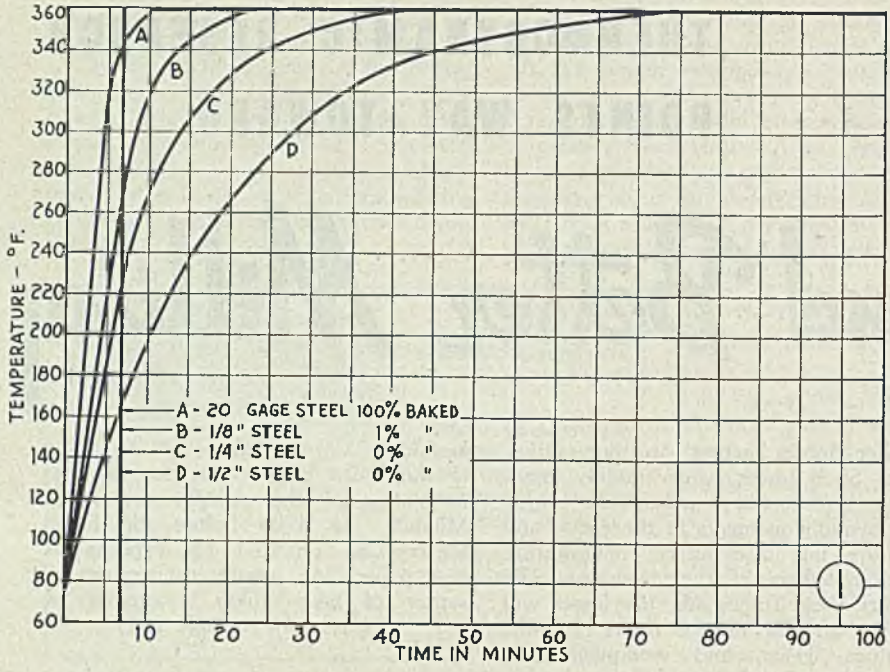
Fig. 1—Cannon boring calorimetric setup as used by Count Rumford

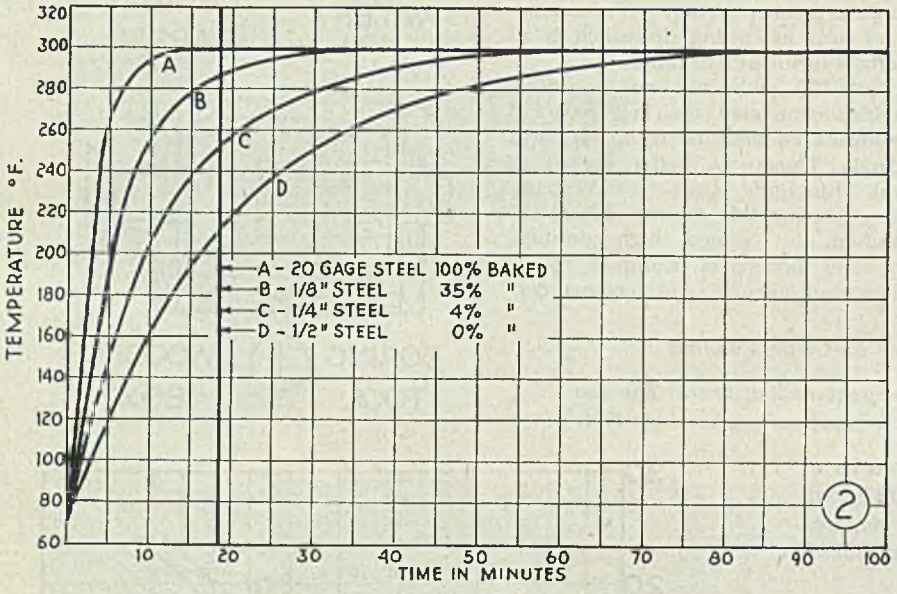
Fig. 2—Calorimetric apparatus as used in high-speed milling tests. The test bar is held in a three-jaw chuck mounted on a vertical milling machine table

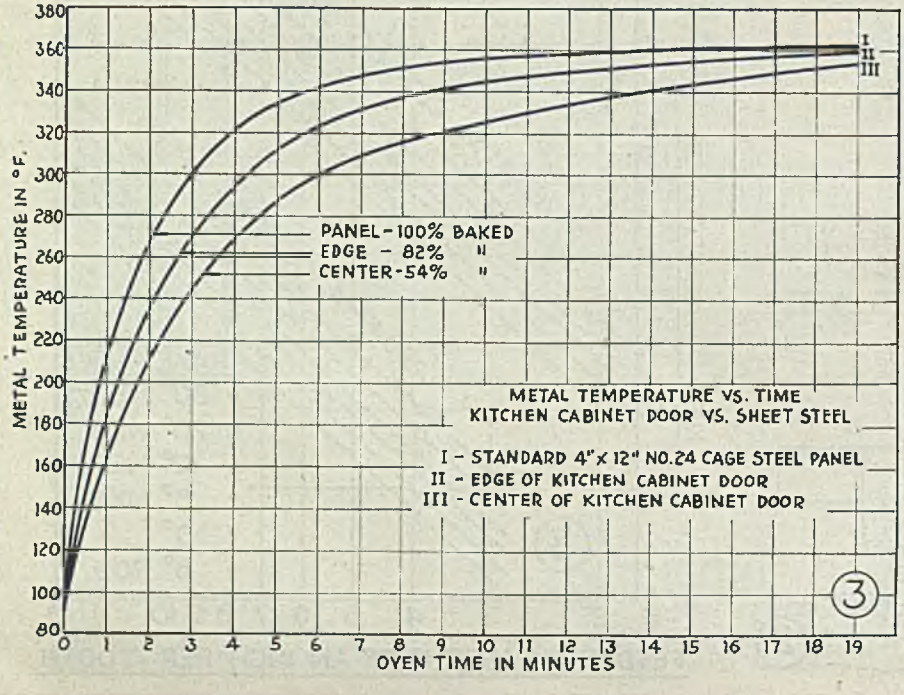
Fig. 3—Comparison of net horsepower requirements of different radial rake cutters operating at constant speed, 0.125-inch depth of cut, and various feeds as computed from heat in chips. Material: SAE-1055, normalized, Bhn-205











Application

By C. R. E. MERKLE, Manager
Technical Sales Development
E. I. du Pont de Nemours & Co. Inc.
Philadelphia Laboratory
Philadelphia

ADEQUATE protection and decoration of metal surfaces by the proper application and selection of finishes enhance the value of pressed metal products. The techniques used in their application determine to a great extent the value of the finished product.

The task of the stamper and finish producer during the past few years has been to manufacture and finish the tools, instruments and accessories necessary for the armed forces. While the protection and camouflaging of instruments of war like tanks, trucks, gunmounts, combat planes and war ships are a far cry from the protection and decoration of pressed metal objects like automobiles and refrigerators, many of the problems in the application and selection of organic finishes are similar.

A subject of this breadth and scope can only be "high lighted" with regard to the factors to be considered in the limited space available.

Choice of Metal: There is, of course, a wide choice of metal substrates encountered in various fields served by E. I. duPont de Nemours & Co. Inc., but our discussion will be limited to only a few of the more important types.

Steel is one of the most common metals used because of its low cost, stength and availability. Except for rather limited uses, it should be free of mill scale, such as the familiar cold rolled sheet or some form of pickled sheet. One of the chief problems presented by steel is corrosion, which necessitates careful metal preparation and the use of proper finishes for protection.

The corrosion resistance of steel is

Fig. 1—This chart shows results when applying urea formaldehyde type enamels with a baking schedule of only 7 minutes and a peak temperature of 360 degrees Fahr.

Fig. 2—In this test urea formaldehyde type enamels also were used, but baking schedule was extended to 19 minutes and temperature was raised to a peak of 300 degrees Fahr.

Fig. 3—This chart shows results obtained when applying a primer coat to a kitchen cabinet door which increases in thickness from center to edges, and to a regular 24-gage steel panel

and Selection of ORGANIC FINISHES

The selection of special finishes to meet the criteria of performance required in protecting and decorating sheet metal parts such as refrigerators, stoves, agricultural equipment, and other articles fabricated from various metals is simplified by the detailed analysis of factors affecting service functions presented here, along with the most effective techniques for proper application of suitable finishes

sometimes improved by coating with protective metals, such as zinc, lead, cadmium, tin, etc. The most important coated metals in this category are zinc coated. Zinc may be applied as a hot dip coating which results in the familiar spangled galvanized iron. The same type of hot dip coating may be applied and then annealed slowly at elevated temperatures, which is the process used for Galvanneal, a patented coated steel sheet produced under license by several steel manufacturers. Zinc may also be applied to steel by electroplating.

It recently has been in the form of very thin coatings sometimes referred to as a flash coat. A number of coated sheets of this type are on the market sold by various steel companies under such trade names as Cold Rolled Paintgrip, Paintlok, Bethanite, Weirzin and others. Electroplated zinc sheets of this type possess much better drawing properties than sheets coated by hot dipping, partly due to the light coating of zinc metal. While the flash coated sheet does not have the corrosion resistance of the hot dipped sheet, the light coating of zinc does afford some protection as compared with bare steel and because of the comparatively satisfactory drawing properties will find extended use in the pressed metal industries.

Zinc surfaces, however, present a very definite adhesion problem due to the reactivity with the vehicles of most finishes. This can be solved in the building industry on galvanized surfaces by the use of special primers containing zinc dust pigmentation. This type of primer, however, is not fine enough in texture for use on metal stampings where appearance is an important factor. Because of this zinc, whether it is hot dipped or electroplated, requires treatment to promote adhesion. Most manufacturers of zinc coated sheet recognize this and supply treated metal where they know finishing is required but it is important that this point be determined where the use of finishes is involved.

Aluminum is among the popularly considered corrosion resistant metals that appear to have much expanded postwar use because of its increased availability, reduced cost and light weight. It is not, however, as corrosion resistant as most people believe and, for many uses, will require a protective coating. When considering aluminum, most people fail to recognize that most of the aluminum used in industry is really alloys varying in composition, in structural properties and paintability. The adhesion characteristics of finishes to a 17S or 24S alloy are quite different from those of a 3S or 52S and unless treated properly for the type of alloy and the service required, unsatisfactory performance is likely to result. It is, therefore, important that the designation of the precise alloys we are dealing with be determined in any problem involving the application of finishes.

Other metal substrates, such as tinplate and terneplate, are also frequently encountered and require primarily a clean grease-free surface for satisfactory results. Others, such as brass, copper, nickel and chromium will require special treatment that may vary with the proposed use and it is, therefore, necessary that detailed requirements concerning the use of these substrates be recognized.

Preparing the Foundation: Having considered selection of the metal, the next step is the preparation of the surface. We are concerned here with the cleaning and treatment of the metal in order to provide a clean, uniform, paint receptive surface to give good inital and retained adhesion. The first point in connection with the preparation of the surface consists of the removal of dirt, oil, grease and miscellaneous contamination, such as drawing compounds and similar materials which may be deposited on the surface while it is being fabricated in the shop and being handled prior to reaching the finishing operation.

In the past this frequently has been accomplished by hand washing with petroleum solvents, which is a rather ineffective and somewhat hazardous operation with the quality of the cleaning job depending largely upon the thoroughness of the worker.

A burn-off operation has been used in many plants to oxidize grease and oil, which is accomplished by passing the work through an oven at a temperature of 500 to 600 degrees Fahr. This method has the disadvantage that it will not remove substances which cannot be oxidized, such as salts and other inorganic matter which may later serve as focal

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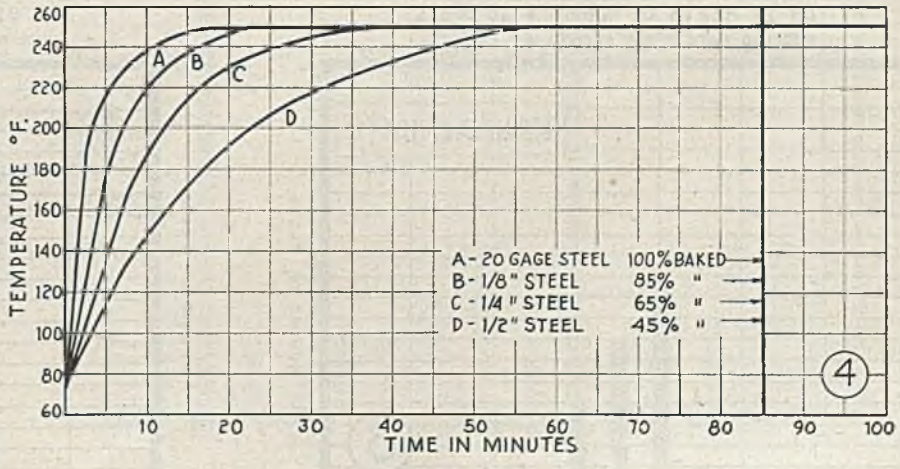
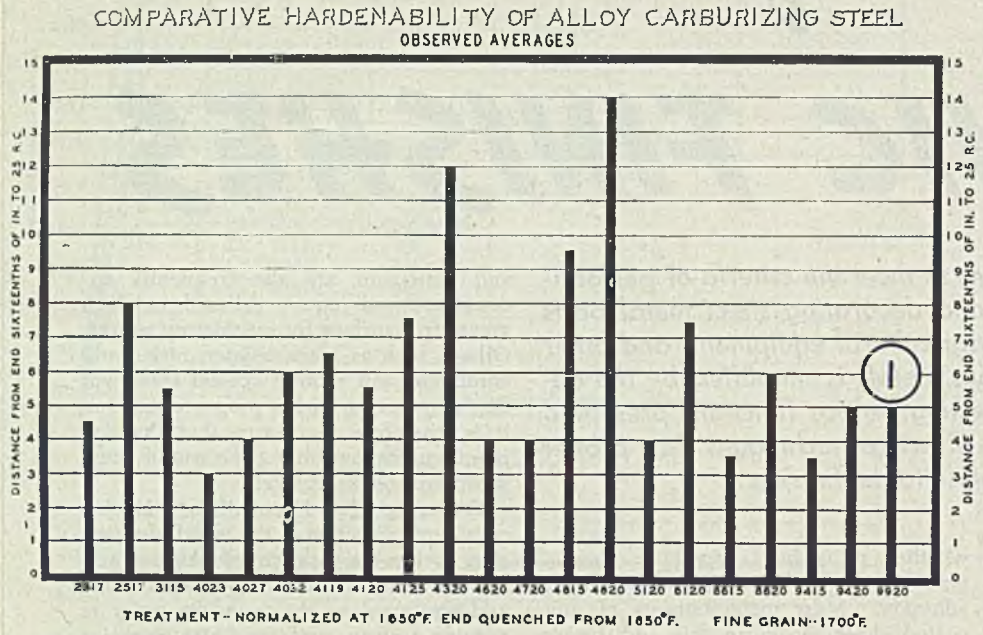
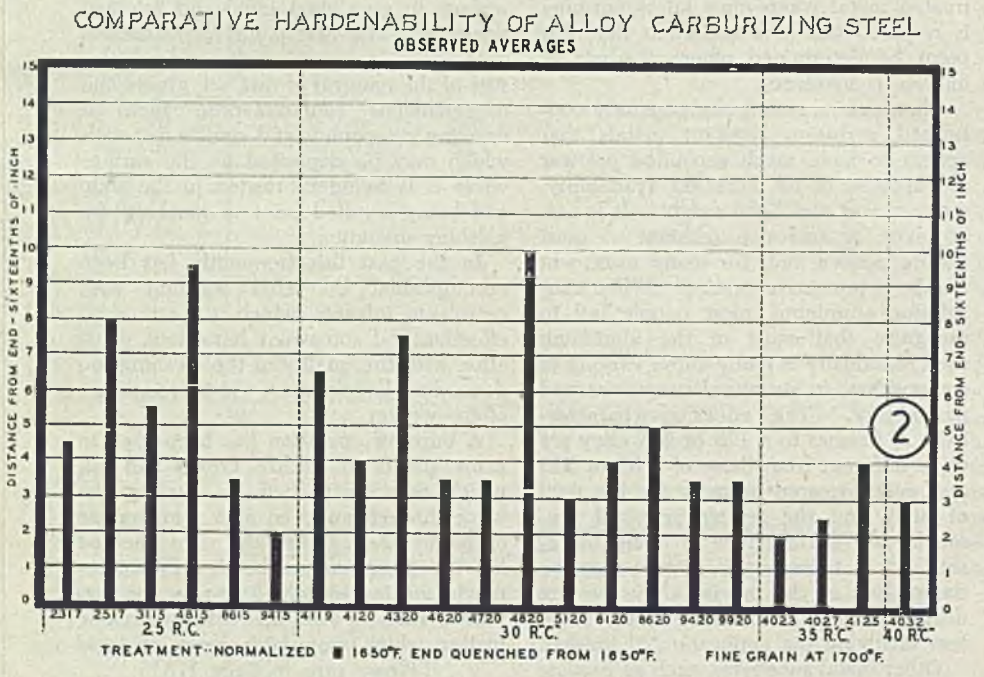


Fig. 4—By setting a schedule of 85 minutes, with a peak temperature of 250 degrees Fahr., finishes on varying weights of steel are more evenly baked

HARDENABILITY of Carburizing Automotive





By A. S. JAMESON
Works Metallurgist
International Harvester Co.
Chicago

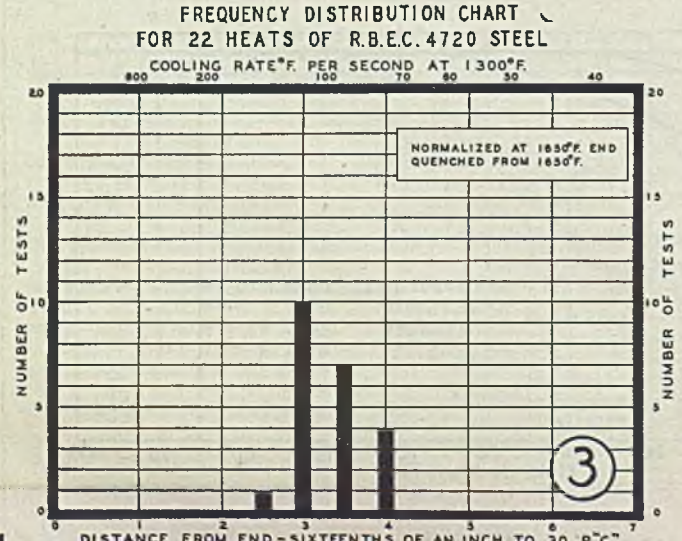
IN the application of NE carburizing steels as replacements for the standard alloy steels, certain difficulties were encountered due to a lack of information on the hardenability behavior of these steels. As a matter of fact, information also was lacking on the hardenability behavior of the standard alloy steels.

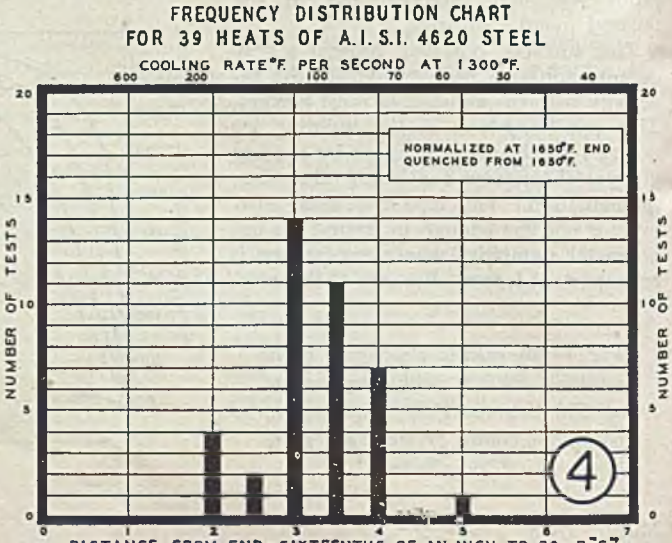
Introduction of the NE steels, and also the development of the Jominy-Boegehold or end quench test, gave considerable impetus to the study of the hardenability of steels.

The end quench test, as described in the current SAE handbook, can be used as a basis for comparing the NE steels with the standard alloy steels, however, it must be realized that there are certain existing limitations which make exact comparison difficult and uncertain in the instance of carburizing steels. There are three ways of determining the hardenability of low carbon steels employing the end quench test.

(1) Tests in the uncarburized condition.
(2) Tests in the carburized and direct quenched condition.
(3) Tests in the carburized direct quenched and reheated condition.

Where users are interested in the core hardness, the testing of the steel in the uncarburized condition perhaps is pre-





BEHAVIOR

Grades of NE and Alloy Steels

Difficulties encountered in testing for hardenability are discussed here and attention is drawn to differences to be expected in behavior of various alloy combinations

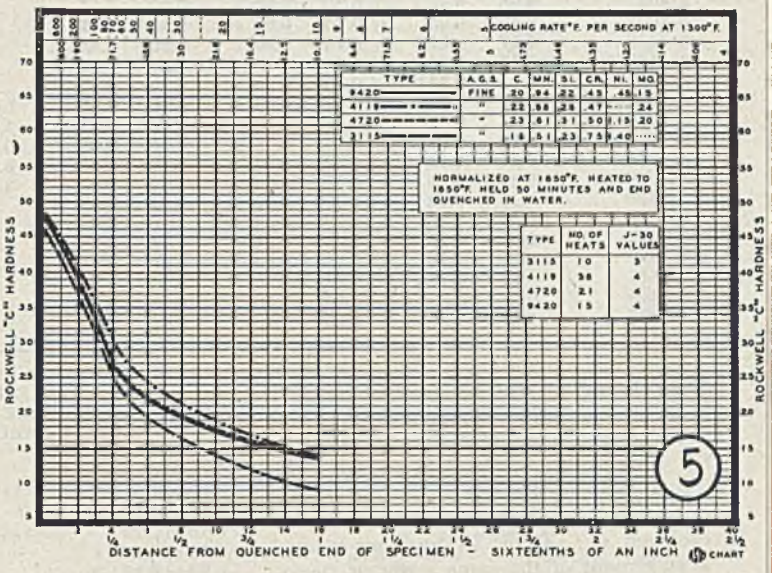
ferable. Where users are heat treating parts by direct quenching from the carburizing cycle and are interested in surface hardenability, the end quench test with a similar treatment would be preferred. However, many heat treaters are employing a treatment for carburized parts consisting of carburizing and reheating and are, therefore, more interested in test specimens similarly treated. A scientific investigator would prefer a test method which was an accurate determination of the comparative properties of the steels under similar structural conditions, regardless of the practice used in heat treating parts made from the steel.

The first way of determining hardenability, that is, by end quenching from the uncarburized condition, seems to be favored at the present time by investigators. Fig. 1 gives a comparison of certain standard and NE steels using observed averages and based on the distance from the end to 25 on the rockwell C scale. The treatment consists of normalizing at 1650 deg. Fahr., followed by reheating to 1650 deg. Fahr., holding for 35 minutes, and end quenching in water. This chart takes into account the effect of the carbon content as well as the alloying elements. It is the recommendation of the joint SAE-AISI Committee on Hardenability that the hardness reference points be changed to conform to the changing carbon contents. See Table 2. Chemical ranges of the steels shown in Fig. 1 are given in Table I.

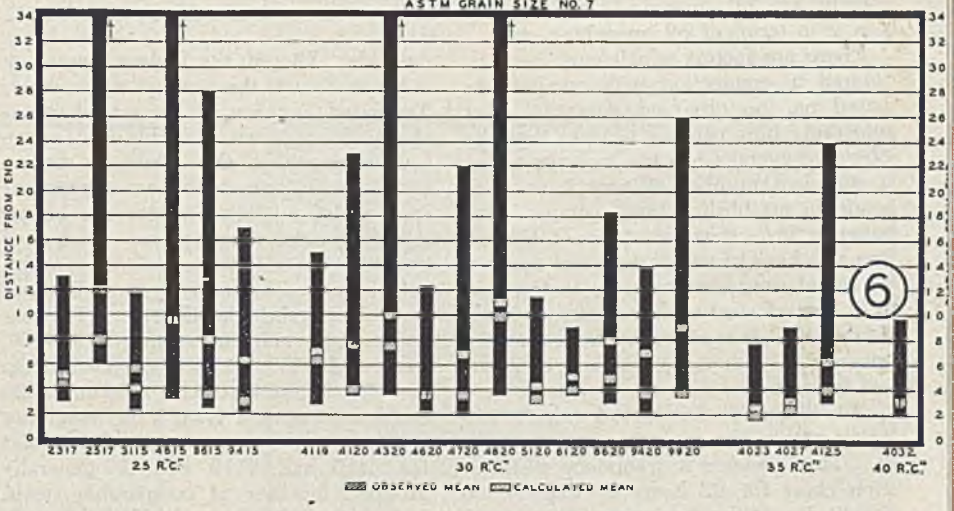
Fig. 2 gives a comparison of the steels, using observed averages based on the reference points shown in Table II. In the case of Fig. 2, comparisons can only be made within groups showing the same hardness reference number. It will be noted from Figs. 1 and 2 that there are four steels whose hardenability cannot be compared with the NE steels. They are 2517, 4320, 4815, and 4820, and this means that they cannot be substituted for by the NE steels shown where the sections to be hardened are large.

The hardenability values shown in

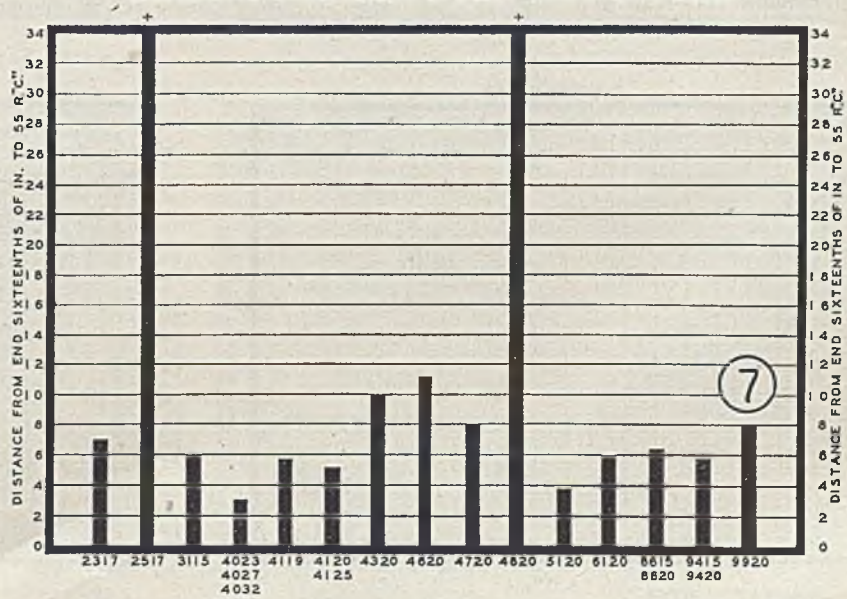
AVERAGE CURVES FOR 3115, 4119, 4720 AND 9420



COMPARATIVE HARDENABILITY OF ALLOY CARBURIZING STEELS



COMPARATIVE HARDENABILITY OF ALLOY CARBURIZING STEELS



CARBURIZED AT 1700°F. FOR 8 HOURS AND QUENCHED IN OIL. REHEATED TO 1480°F. AND END QUENCHED IN WATER.

FINE GRAIN - 1700°F.

TABLE I

CHEMICAL RANGES OF CERTAIN NE AND STANDARD ALLOY STEELS

Steel Symbol	Carbon		Manganese		Silicon		Nickel		Chromium		Molybdenum		Vanadium	
A-2317	0.15	0.20	0.40	0.60	0.20	0.35	3.25	3.75						
E-2517	0.15	0.20	0.45	0.60	0.20	0.35	4.75	5.25						
A-3115	0.13	0.18	0.40	0.60	0.20	0.35	1.10	1.40	0.55	0.75				
A-4023	0.20	0.25	0.70	0.90	0.20	0.35					0.20	0.30		
A-4027	0.25	0.30	0.70	0.90	0.20	0.35					0.20	0.30		
A-4032	0.30	0.35	0.70	0.90	0.20	0.35					0.20	0.30		
A-4119	0.17	0.22	0.70	0.90	0.20	0.35			0.40	0.60	0.20	0.30		
A-4120	0.17	0.22	0.70	0.90	0.20	0.35			0.60	0.80	0.20	0.30		
A-4125	0.23	0.28	0.70	0.90	0.20	0.35			0.40	0.60	0.20	0.30		
A-4320	0.17	0.22	0.45	0.65	0.20	0.35	1.65	2.00	0.40	0.60	0.20	0.30		
E-4620	0.17	0.22	0.45	0.60	0.20	0.35	1.65	2.00			0.20	0.27		
E-4720	0.17	0.22	0.45	0.75	0.20	0.35	0.90	1.20	0.35	0.55	0.15	0.25		
A-4815	0.13	0.18	0.40	0.60	0.20	0.35	3.25	3.75			0.20	0.30		
A-4820	0.18	0.23	0.50	0.70	0.20	0.35	3.25	3.75			0.20	0.30		
A-5120	0.17	0.22	0.70	0.90	0.20	0.35			0.70	0.90				
A-6120	0.17	0.22	0.70	0.90	0.20	0.35			0.70	0.90			0.10	
NE-8615	0.13	0.18	0.70	0.90	0.20	0.35	0.40	0.70	0.40	0.60	0.15	0.25		
NE-8620	0.18	0.23	0.70	0.90	0.20	0.35	0.40	0.70	0.40	0.60	0.15	0.25		
NE-9415	0.13	0.18	0.80	1.10	0.20	0.35	0.30	0.60	0.30	0.50	0.08	0.15		
NE-9420	0.18	0.23	0.80	1.10	0.20	0.35	0.30	0.60	0.30	0.50	0.08	0.15		
NE-9920	0.18	0.23	0.50	0.70	0.20	0.35	1.00	1.30	0.40	0.60	0.20	0.30		

Figs. 1 and 2 can be translated into hardness values for round bars, which perhaps is a more understandable form for general use. These are shown in Table III. In Table III, data is based on hardness reference number of 25 rockwell C. Table IV presents a rearrangement of the same series of steels grouped by hardness reference numbers according to Table II. As these steels usually are oil quenched, the translation is in terms of oil quenching only.

There are factors which must be considered in connection with comparisons based on the observed averages. For one thing how can we be sure that the observed average is a true average unless a sufficient number of tests have been made to establish a true average? Another is this: If we are to use this average as a basis of comparison and apply it to actual use, what happens in the case of a heat of steel with a minimum hardenability? It is stated by some that the minimum is the value which is of greatest interest.

To illustrate the spread which can occur within one analysis range, see Fig. 3. This presents a frequency distribution chart for 22 heats of RBEC-4720 steel. Fig. 4 is a frequency chart for 39 heats of E-4620. It will be seen that the minimums for 4720 and 4620 do not coincide, although the highest frequency is the same and the average is the same. Tabulated in terms of bar size, hardenability is as shown in Table V.

TABLE II

HARDNESS REFERENCE NUMBERS USED TO RECORD HARDENABILITY

Mean of Ordered Carbon Range (Per cent)	Hardness Reference No. R"C"
0.08 to 0.17	25
0.18 to 0.22	30
0.23 to 0.27	35
0.28 to 0.32	40
0.33 to 0.42	45
0.43 to 0.52	50
0.53 to 0.62	55

Assuming that the minimum values are the most important from a practical view point, minimum values can be established only after a large number of tests; in the meantime, however, average values can be used as rough basis of comparison and classification. For example, the average curves for 3115, 4119, 4720, and 9420, are in close relationship (See Fig. 5) and therefore, 4720 and 9420 could be assumed from a hardenability standpoint to be satisfactory substitutes for 3115 and 4119 and be generally grouped together as comparable steels.

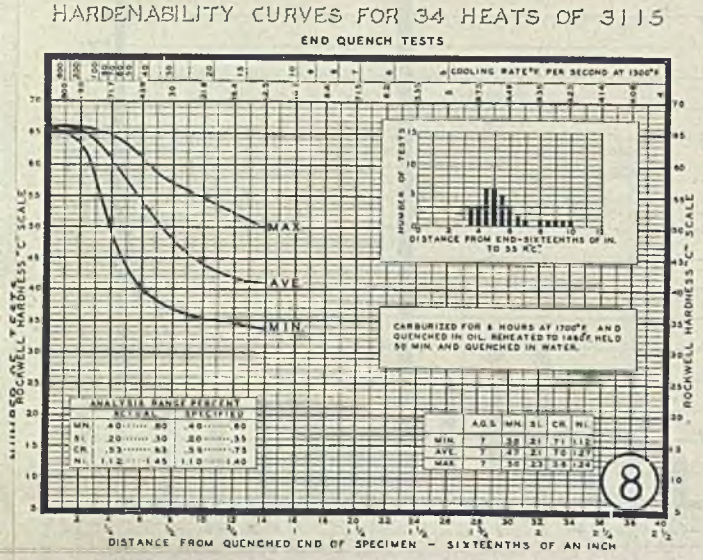
A method has been developed to calculate the hardenability for a given steel. Fig. 6, gives the observed means as shown in Fig. 2, as well as the calculated minimum, mean, and maximum values for these steels obtained by using the chemical composition ranges as a basis for calculation and assuming an austenitic grain size of ASTM No. 7. It will be

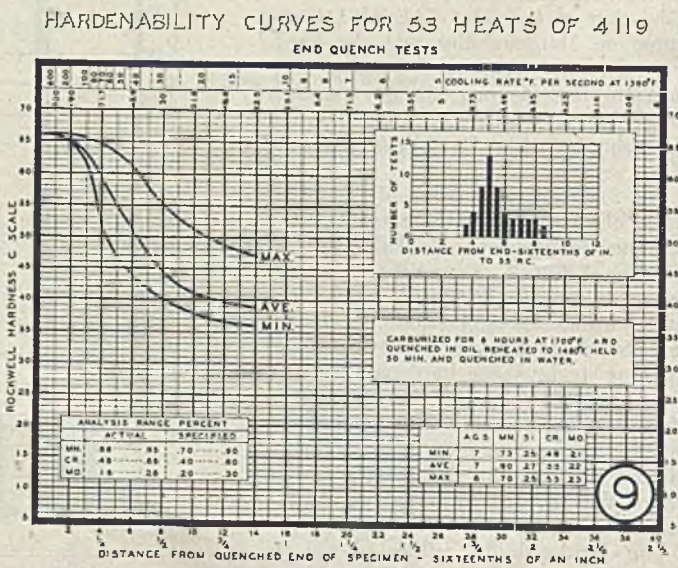
TABLE III

HARDENABILITY VALUES IN FIGS. 1 AND 2 IN TERMS OF BAR SIZE—OIL QUENCHED

(Based on Hardness Reference Number of 25 R"C")

Steel Symbol	Diameter of Rounds at Which Reference Hardness is Obtained —at Various Locations in the Bar— Surface	¾ Radius	½ Radius	Center
2317	1.9	1.2	0.9	0.7
2517	3.0	2.0	1.6	1.4
3115	2.1	1.4	1.1	0.9
4023	1.4	0.8	0.6	0.4
4027	1.8	1.0	0.8	0.6
4032	2.4	1.5	1.2	1.0
4119	2.6	1.6	1.3	1.1
4120	2.1	1.4	1.1	0.9
4125	2.8	1.9	1.5	1.3
4320	3.8	2.8	2.4	2.1
4620	1.8	1.0	0.8	0.6
4720	1.8	1.0	0.8	0.6
4815	3.3	2.3	1.9	1.7
4820		3.2	2.8	2.4
5120	1.8	1.0	0.8	0.6
6120	2.8	1.9	1.5	1.3
8615	1.6	0.9	0.7	0.5
8620	2.4	1.5	1.2	1.0
9415	1.6	0.9	0.7	0.5
9420	2.1	1.3	1.0	0.8
9920	2.1	1.3	1.0	0.8





noted that in the case of 4620, where about 39 heats were involved in the testing, that the calculated mean and the observed mean are the same. It can be said that this way of testing for hardenability, that is, quenching from 1650 degrees Fahr. or 1700 degrees in uncarburized condition, can give fairly accurate relative values for various alloy compositions. Also, that these values can have some relation to the actual hardness of the cores of carburized parts where the heat treatment of these parts calls for direct quenching from the carburizing cycle. Nevertheless, a question might be raised as to whether these comparisons are valid for surface of carburized parts, that is, where the alloys are associated with a higher percentage of carbon.

The second way of making these tests —consisting of carburizing for 8 hours at 1680-1700 degrees Fahr. and direct end quenching in water—has certain advantages where it is used in the control of steel for parts which are heat treated in this manner, but when it is used to compare the steels listed in Table I, it has many advantages. These are as follows:

1. Steels with high hardenability will harden to the full length of the bar, or at least so far along the bar as to make accuracy doubtful.
2. The basis of comparison of harden-

TABLE IV

HARDENABILITY VALUES IN FIGS. 1 AND 2 IN TERMS OF BAR SIZE —OIL QUENCHED

(Grouped by Hardness Reference Numbers According to Table 2)

Steel Symbol	Hardness Reference No. R"C"	Diameter of Rounds at Which Reference Hardness Is Obtained at Various Locations in the Bar — Surface	¾ Radius	½ Radius	Center
2317	25	1.9	1.2	0.9	0.7
2517		3.0	2.0	1.6	1.4
3115		2.1	1.4	1.1	0.9
4815		3.3	2.3	1.9	1.7
8615		1.6	0.9	0.7	0.5
9415		1.6	0.9	0.7	0.5
4119	30	2.5	1.6	1.3	1.1
4120		1.8	1.0	0.8	0.6
4320		2.8	1.9	1.5	1.3
4620		1.6	0.9	0.7	0.5
4720		1.6	0.9	0.7	0.5
4820		3.4	2.4	2.0	1.8
5120		1.4	0.8	0.6	0.4
6120		1.8	1.0	0.8	0.6
8620		2.2	1.3	1.0	0.8
9420		1.6	0.9	0.7	0.5
9920		1.6	0.9	0.7	0.5
4023	35	0.8	..	..	..
4027		1.0	0.6	..	0.3
4125		1.8	1.0	0.8	0.6
4032	40	1.4	0.8	0.6	0.4

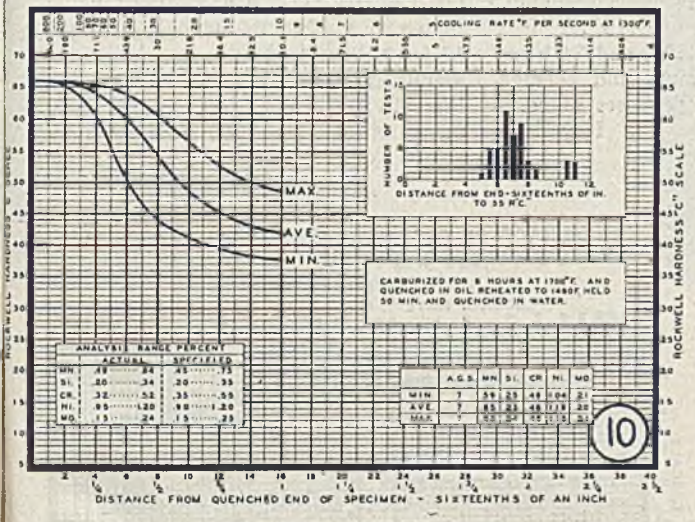
TABLE V

HARDENABILITY OF RBEC-4720 AND E-4620 IN TERMS OF BAR SIZE

4720 — 22 Heats						4620 — 39 Heats					
Hardenability Value —at 30 R"C"—			In terms of bar —diameter (surface)—			Hardenability Value —at 30 R"C"—			In terms of bar —diameter (surface)—		
Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.
2.5	4	3.5	1.1	1.8	1.6	2	5	3.5	0.8	2.1	1.6

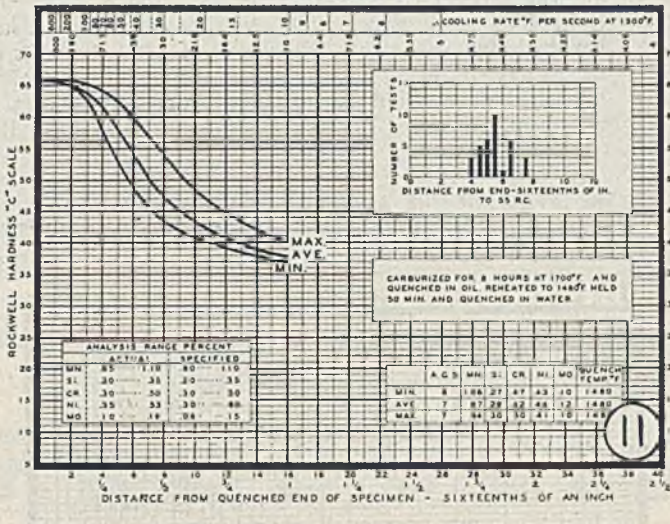
HARDENABILITY CURVES FOR 49 HEATS OF 4720

END QUENCH TESTS

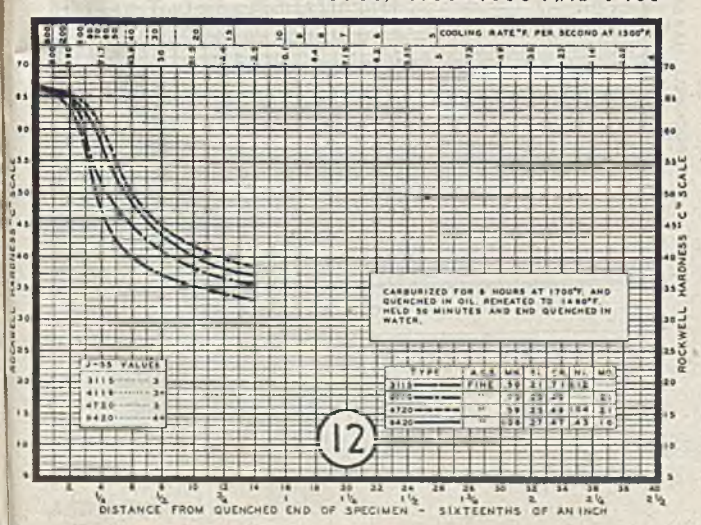


HARDENABILITY CURVES FOR 34 HEATS OF 9420

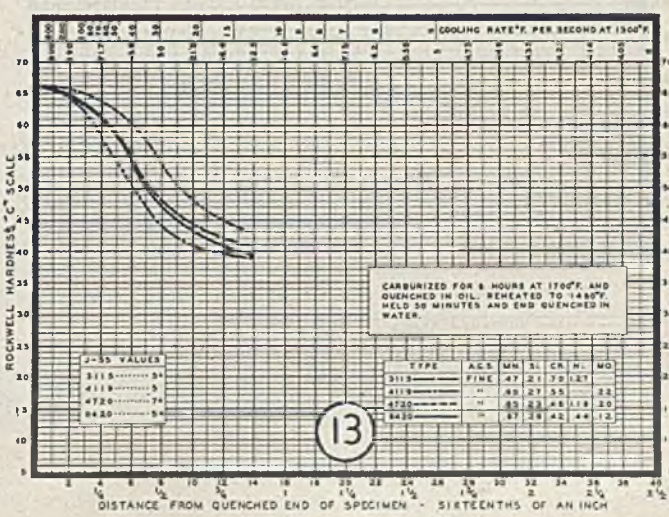
END QUENCH TESTS

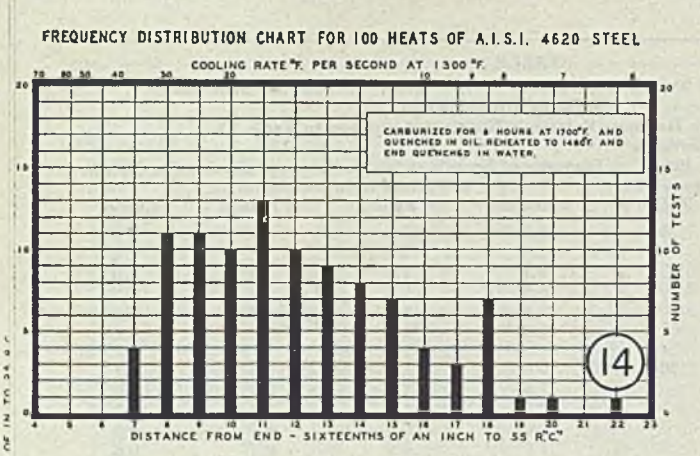


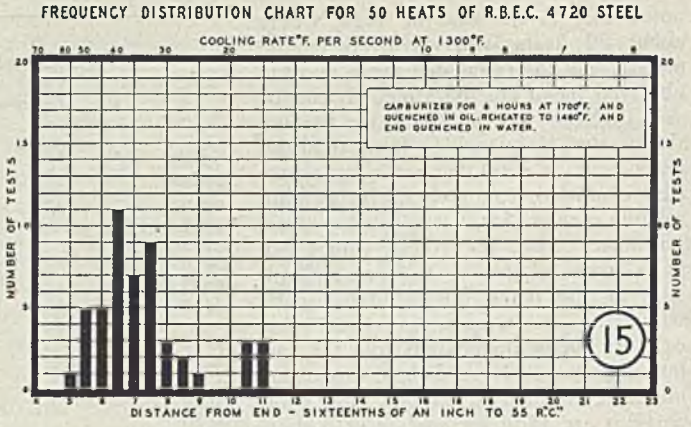
MINIMUM CURVES FOR 3100, 4100, 4700 AND 9400



AVERAGE CURVES FOR 3100, 4100, 4700 AND 9400







ability is not comparable, due to differences in microstructure. Steels with a tendency to form austenite will have high percentages of austenite near the quenched end and therefore, do not give hardness values which can be used for translation into numerical values based on the hardness reference numbers.

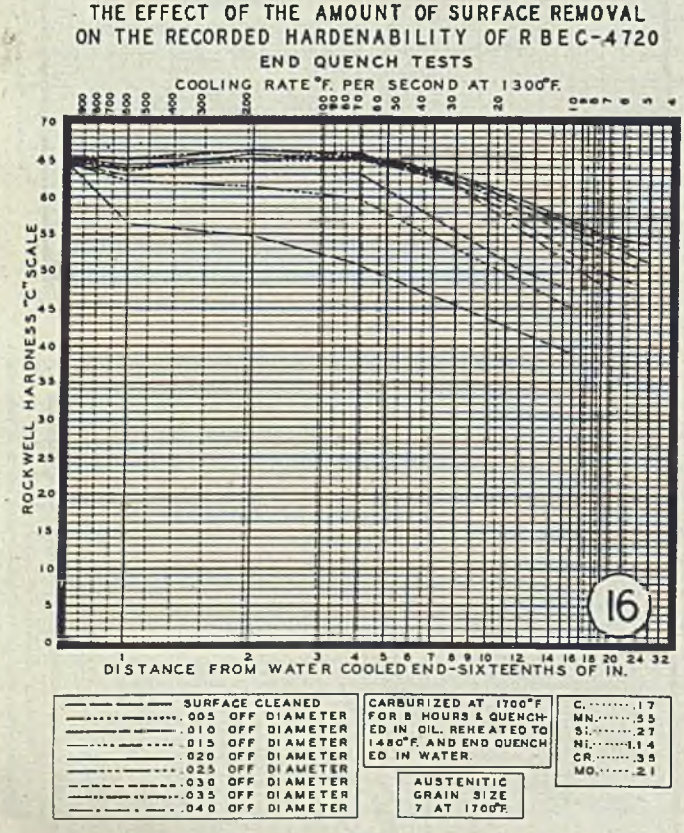
3. Grain coarsening temperature often is close to 1700 degrees Fahr., or at least larger grains appear, and the test, therefore, introduces a variable grain size which does not occur in carburized and reheated specimens to any appreciable extent because of the lower temperature and shorter holding time above critical range. This may account for the wide variation in values obtained from 4620 steel, which will give hardenability values all the way from J55=8 to J55=64, when quenched direct from the carburizing heat.

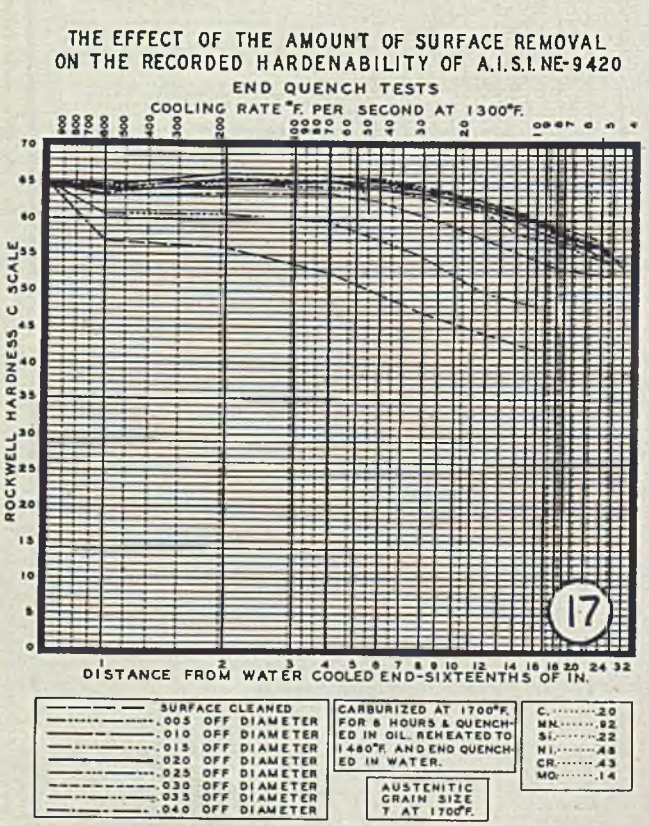
The third way of comparing the hardenability of various alloy steels—consisting of carburizing the end quench specimen for 8 hours at 1700 degrees Fahr. and quenching in oil, followed by reheating to 1480 degrees Fahr. and end quenching in water—has the advantage of producing at least 90 per cent martensitic structure in all the steels tested. Fig. 7 gives comparative hardenability of the various alloy steels shown in Table I, as determined by this way of testing based on a reference hardness of 55 rockwell C. These values are average, and thus again, the question of the validity of averages as a means of comparison is raised both with reference to a number of tests and to relationship of the average to the minimum values.

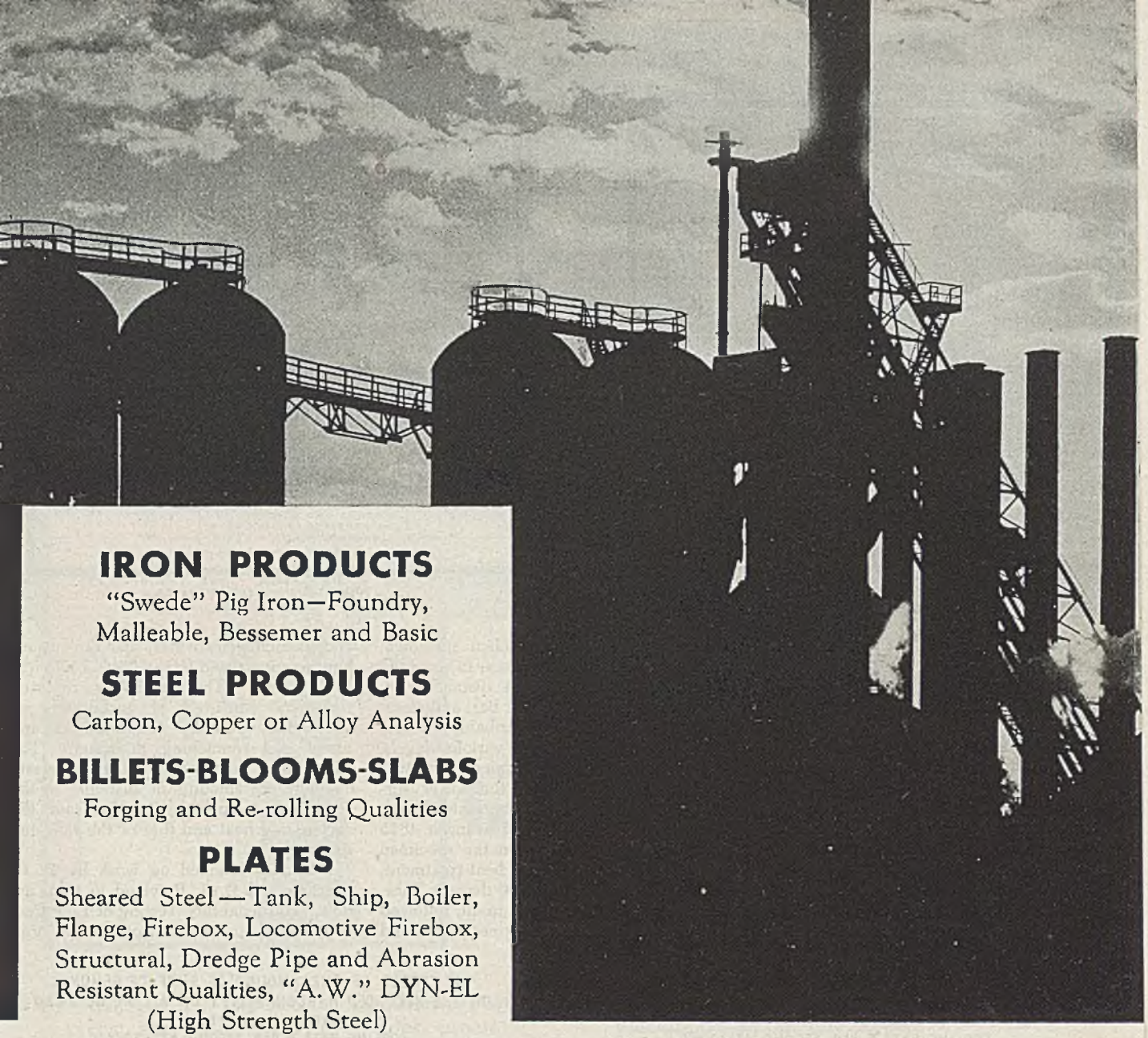
Figs. 8, 9, 10, and 11 are hardenability curves for 34 heats of 3115, 53 heats of 4119, 49 heats of 4720, and 34 heats of 9420 steel. Minimum and average curves are shown for purposes of comparison in Figs. 12 and 13. It will be seen that the relationship of the average to the minimum is the same for these steels. Figs. 14 and 15 are frequency distribution charts for 100 heats of E-4620 and 50 heats of E-4720.

As mentioned previously, there are difficulties in making hardenability tests on carburized specimens, or at least in the duplication of results by different laboratories. One of the main difficulties is the determination of the amount to be removed from the surface of the bar before taking hardness tests. A standard removal of 0.015-inch is used for medium carbon steels, or in contrast to the carburized specimens, steels which have a uniform carbon content throughout the bar.

The effect of the removal of the surface on the recorded hardenability is shown in Fig. 16 for 4720, and in Fig. 17 for NE-9420. Data taken from these graphs is arranged in another form in Figs. 18 and 19. These are for specimens reheated to 1700 degrees Fahr.,







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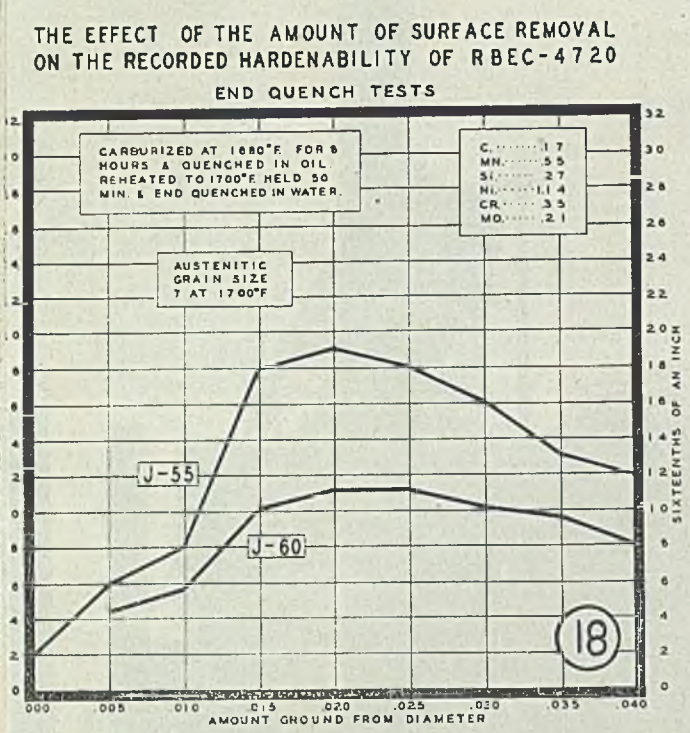
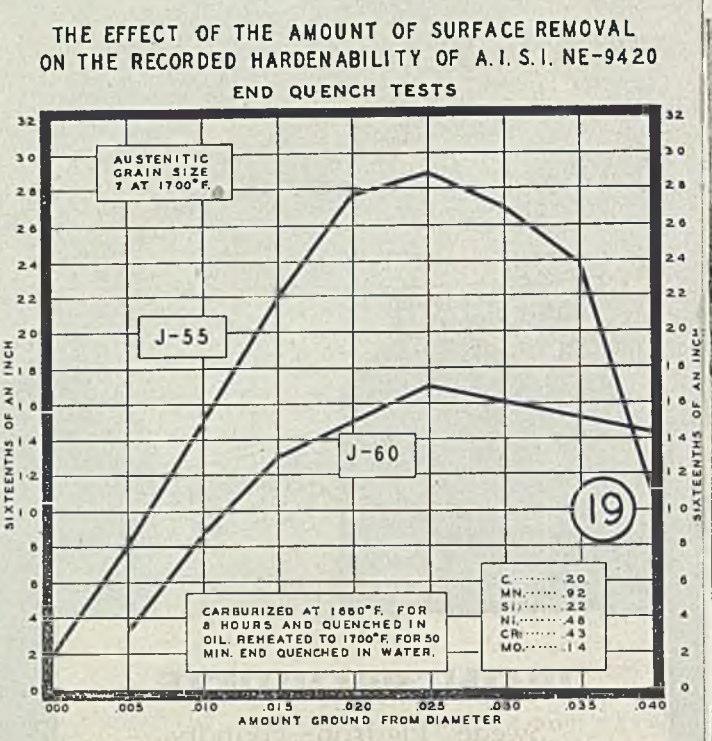


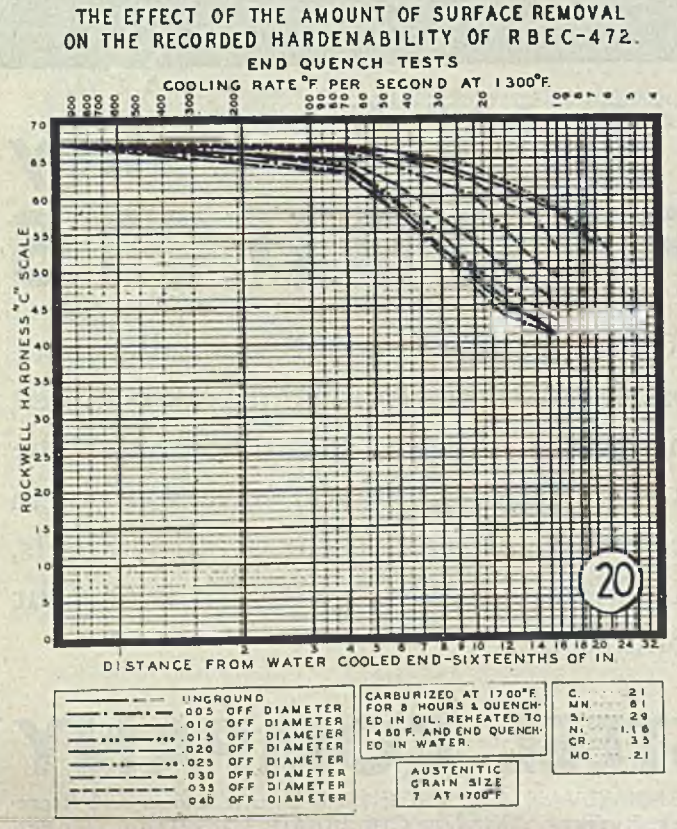


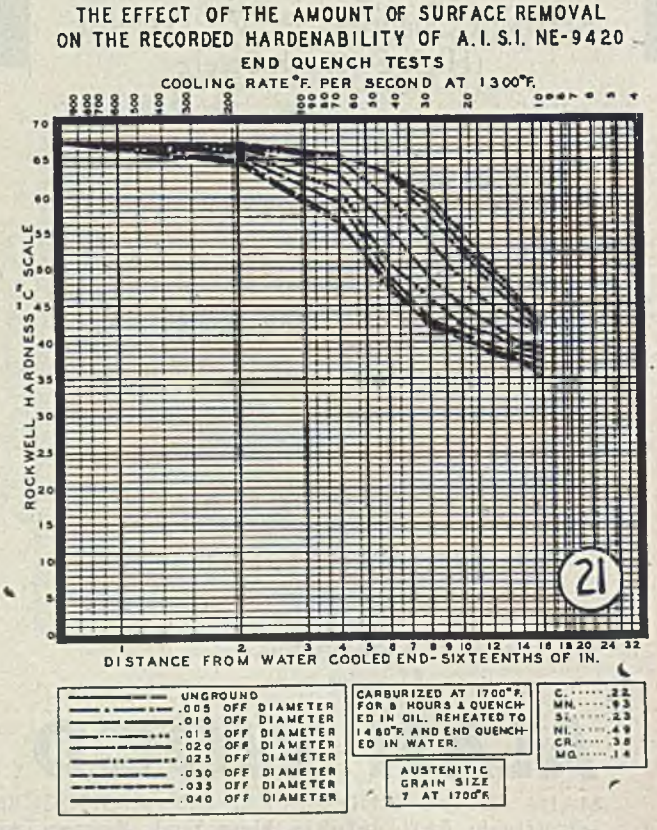
which would show the effect of both carbon content and austenite formation at the surface.

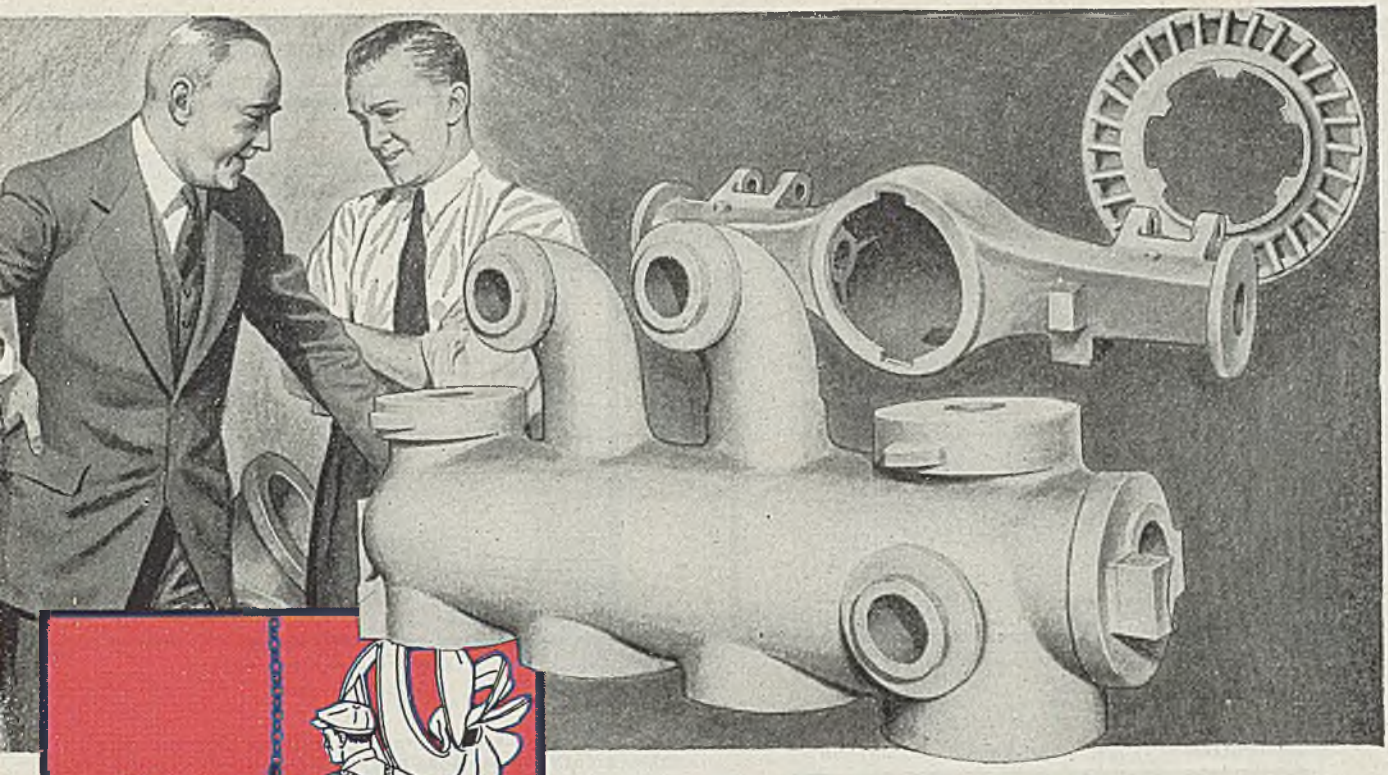
Figs. 20, 21, 22, and 23 show similar data for specimens reheated to 1480 degrees Fahr.

This difficulty is mentioned by W. E. Jominy and A. L. Boegehold in their article entitled "A Hardenability Test for Carburizing Steel" to be found in *Transactions*, American Society for Metals, Vol. 26, Page 574. This article, which was the first description of a hardenability test for carburizing steels which, by the way, dealt with the carburized and direct quenched specimen, notes that there is a variation in recorded hardenability at different distances below the surface of the test bar, and states that the difference is probably due to the carbon content at various levels. Later in this article, a microscopic examination revealed that the softer surface hardness was due to retained austenite. It further showed (using a 4815 steel test piece) that when the specimen was given a different heat-treatment, namely, carburized at 1700 degrees Fahr. for 8 hours, and quenched in oil, followed by reheating to 1425 degrees Fahr. and end quenching in water, that the surface hardness increased from 500 to 700 Vicker's brinell. The previously reported treatment consisted of carburizing at 1700 degrees Fahr. for 8 hours and direct end quenching in water. The microscope then was used to illustrate the different amounts of austenite in the specimen, quenched directly from the carburizing heat and that of the reheated specimen.

It is also touched on work by R. C. Frericks and E. S. Rowland in their article, "Hardenability Testing of Low Carbon Steels", in *Transactions*, ASM, Vol.







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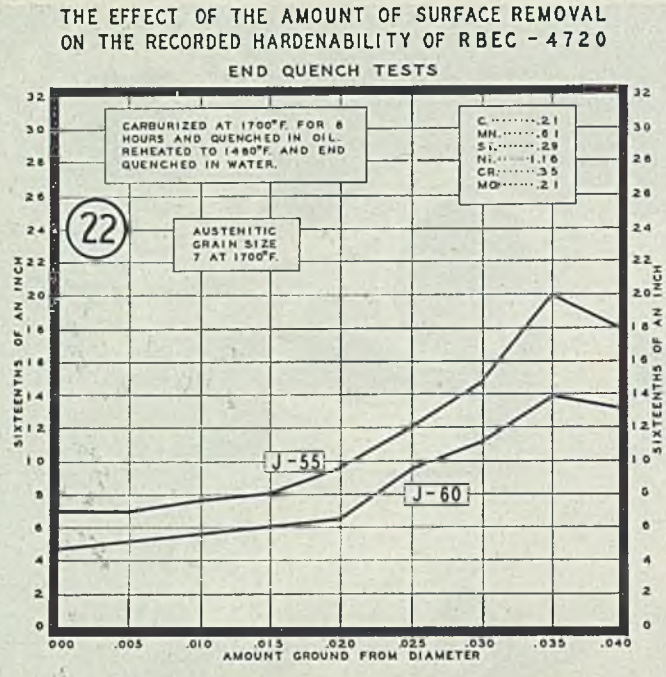
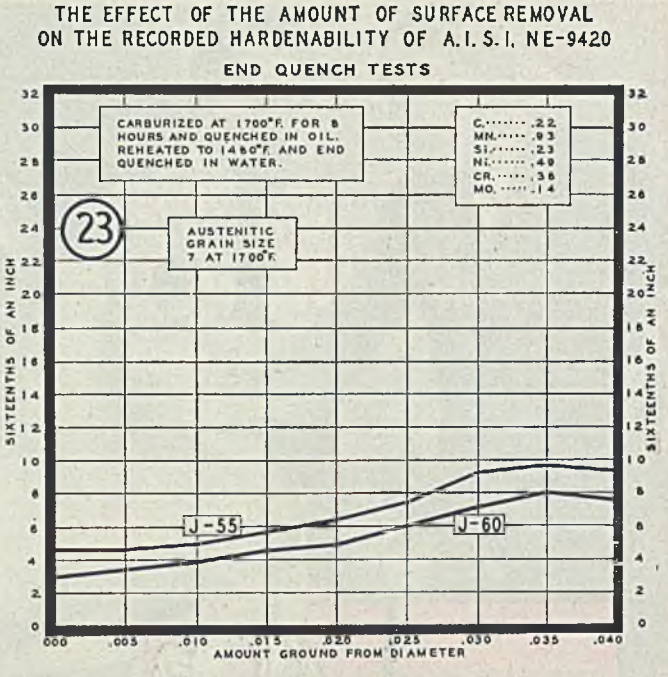
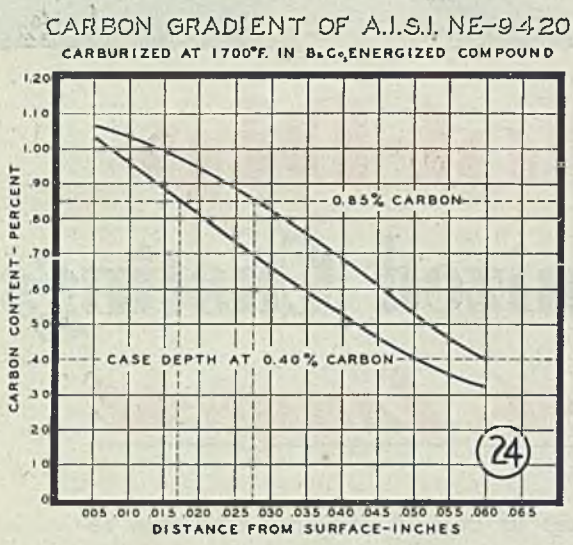
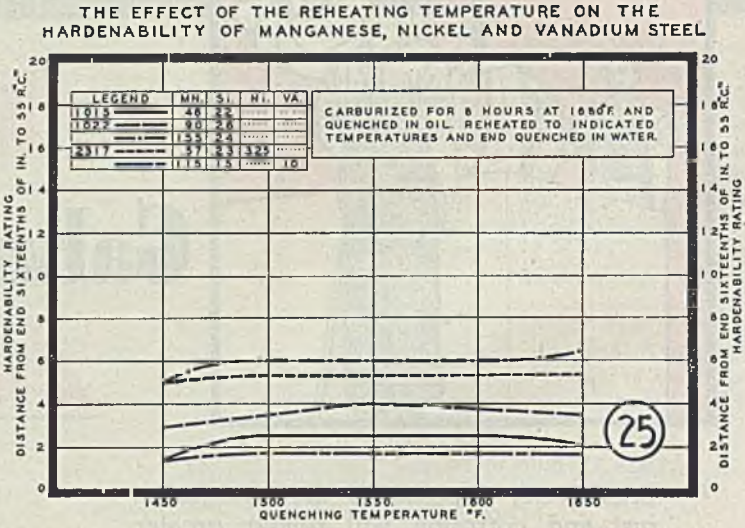








30, Page 225. The authors here noted a difference in the recorded hardenability at different distances below the surface. They state that it would seem to be indicated that the effect of varying carbon content in the high range is sufficiently great to disturb the evaluation.

In accumulating the data shown in this article, a surface removal of 0.008-inch was used for the carburized specimens and, in order to have this coincide with a definite carbon content, the specimens were carburized in a closely controlled compound. The time and temperature of the carburizing cycle controlled the case depth. The importance of the case depth in relation to the amount removed from the surface before taking hardness readings is illustrated in Fig. 20. Suppose we assume that the highest recorded hardenability is obtained at a carbon content of 0.85 per cent, and the amount removed from the specimen before taking hardness readings corresponds to 0.85 per cent carbon layer for a case depth of 0.050-inch, the case depth is increased to 0.060-inch; the amount removed to reach the 0.85 per cent carbon layer will have to be increased, which in the case of Fig. 20 would be from about 0.017 to 0.027.

There is one other point to be considered in the use of the carburized and reheated test piece, and that is that different alloy compositions give different hardenability values depending on the reheating temperature used. It appears that there might be a question as to the proper reheating temperature to use for each alloy composition.

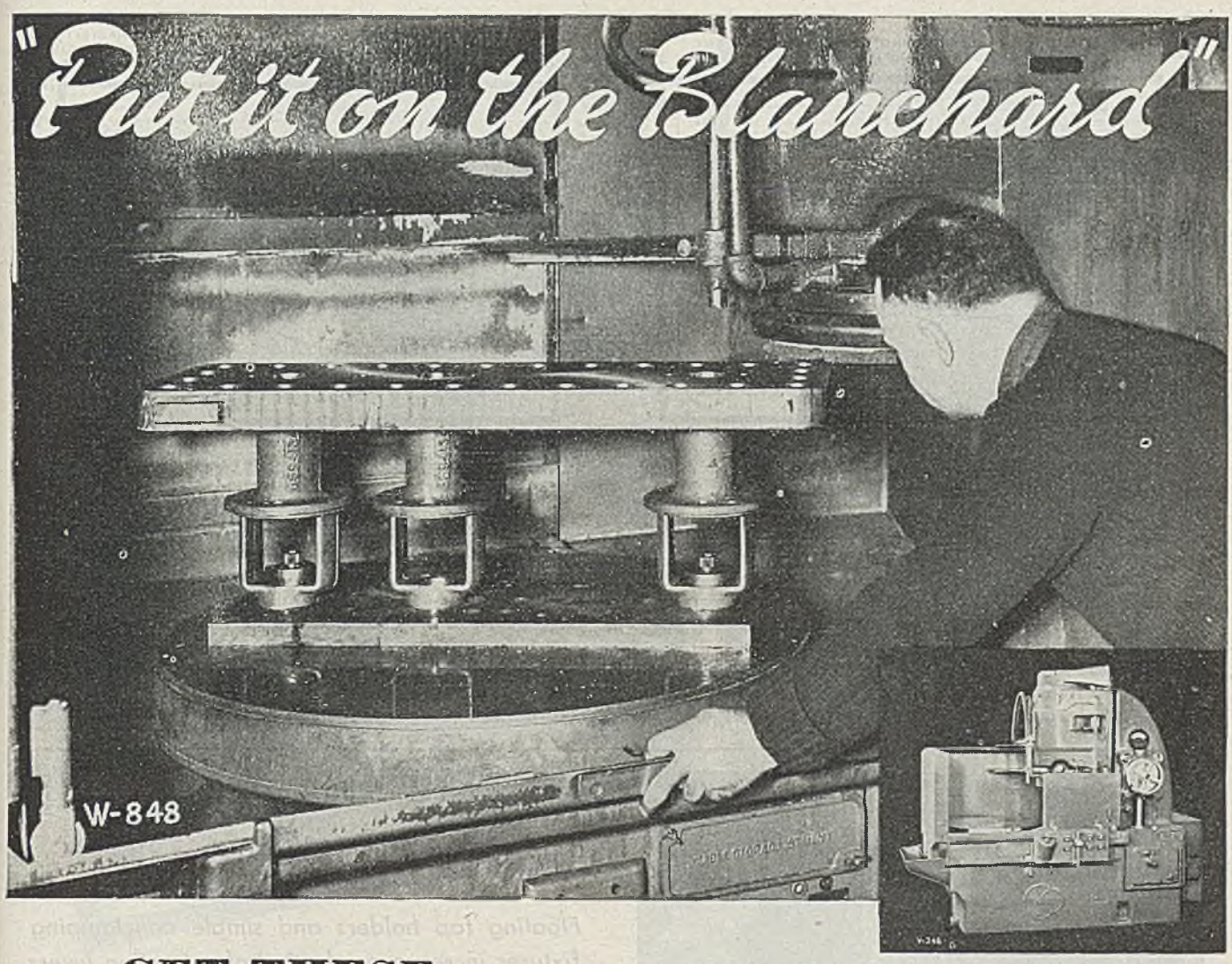
There are three distinct types of reaction to an increase in the temperature employed to end quench carburized specimens: (1) No appreciable increase in the hardenability rating, (2) an increase followed by a decrease in the rating, and (3) a marked increase in the hardenability rating.

Group 1 contains the steels which use either manganese, nickel or vanadium as an alloying element. See Fig. 25. Manganese is present in all steels, and although trade nomenclature does not recognize manganese as an alloying element, unless it is present in amounts over 1.60 per cent, it nevertheless is an alloying element when present in amounts in excess of 0.30 per cent. So, therefore, a plain carbon steel containing 0.90 per cent could be considered an alloy steel, for the manganese is definitely added for the purpose of increasing the hardenability of the steel.

Group 2 contains steels which have molybdenum as an alloying element and some manganese. See Fig. 26. Where the manganese is not over 1.25 per cent and the molybdenum not over 0.30 per cent, there is no increase in hardenability; but with still higher amounts of these elements, the hardenability increases.

Group 3 contains nickel-chromium; chromium; nickel-chromium-molybdenum; chromium-vanadium; and nickel-molybdenum alloy combinations. See Fig. 27. Nickel-molybdenum steel cannot be said to conform entirely to Group 3, as when a temperature of 1650 degrees Fahr. is employed, there is a decrease in the hardenability.

This change in the hardenability rat-



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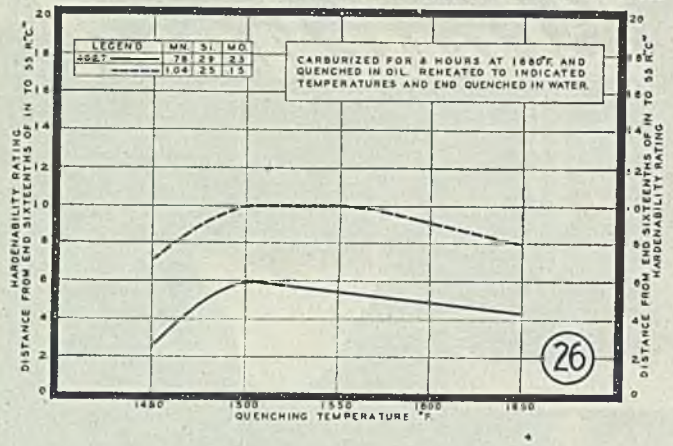
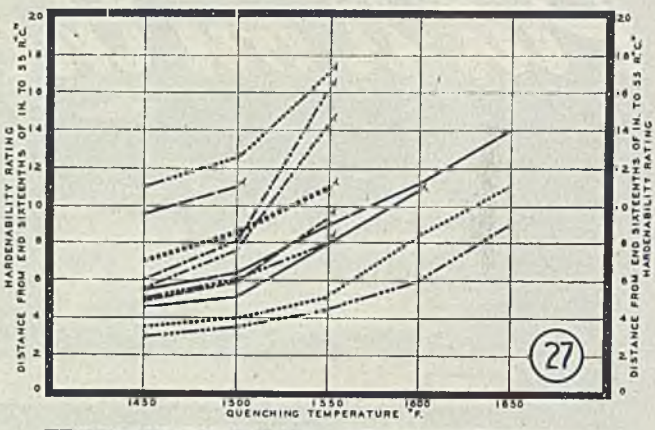
THE EFFECT OF THE REHEATING TEMPERATURE ON THE HARDENABILITY OF MOLYBDENUM AND MOLYBDENUM MANGANESE STEEL



THE EFFECT OF THE REHEATING TEMPERATURE ON THE HARDENABILITY OF NICKEL CHROMIUM, CHROMIUM, NICKEL CHROMIUM MOLYBDENUM, CHROMIUM MOLYBDENUM AND NICKEL MOLYBDENUM STEELS

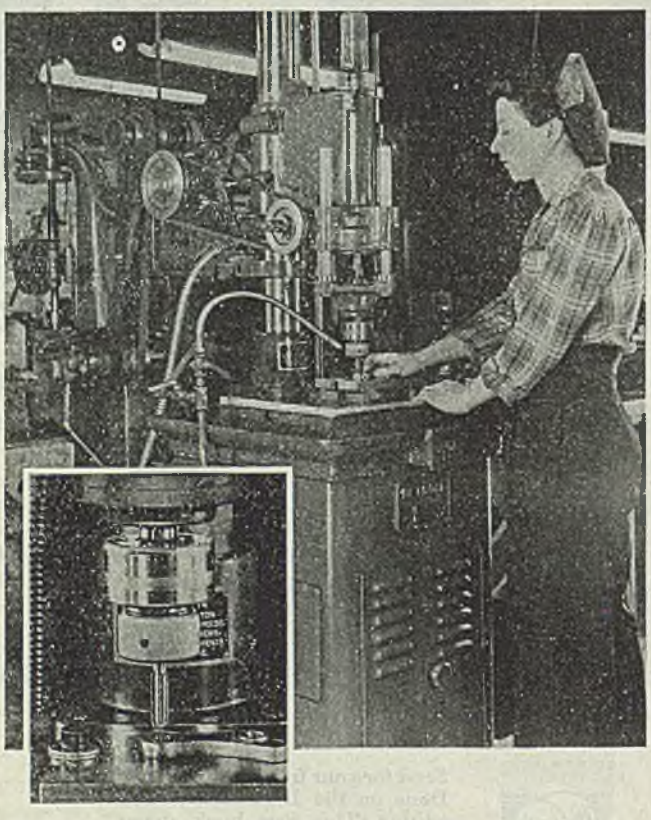


LEGEND	MN	SI	NI	CR	MO	VA
5120 ———	.84	.24	11	.83		
4118 ———	.70	.28		.50	.20	
4120 ———	.73	.24		.84	.21	
4320 ———	.60	.25	1.82	.44	.22	
4820 ———	.50	.31	3.52		.24	
4720 ———	.55	.28	1.05	.41	.22	
5120 ———	.78	.28		.74		
6120 ———	.84	.28		.78		.18
8620 ———	.81	.28	.63	.54	.17	
8630 ———	.92	.22	.58	.63	.14	
8720 ———	.82	.28	1.02	.50	.24	

CARBURIZED FOR 8 HOURS AT 1680°F. & QUENCHED IN OIL. REHEATED TO THE INDICATED TEMPERATURES AND END QUENCHED IN WATER.

ing depending on the reheating temperature or rather knowledge of this behavior, is of considerable practical importance. For example, in changing over from E-4620 to E-4720 as a substitute steel for roller bearings, the same hardening practice was used, namely, a final hardening temperature of 1480 degrees Fahr. It was found that the larger race rings made from E-4720 showed soft areas. The hardening temperature was raised to 1525 degrees Fahr. and the trouble disappeared. By comparing Figs. 14 and 15, it will be noted that the hardenability of 4620 in the carburized condition is greater than that of 4720, at a quenching temperature of 1480 degrees Fahr. But because of the behavior of

(*Please turn to Page* 192)



New "Wrinkles" for TAPPING MACHINES

Floating tap holders and simple nonclamping fixtures increase production of retraction levers for machine guns by 180 per cent

LEAD-SCREW tapping machines with floating tap holders and simple nonclamping fixtures have enabled Flint Manufacturer's Service Co., Flint, Mich., to increase production of retraction levers for 50-caliber machine guns by 180 per cent, decrease rejects, and lengthen life of taps some 25 per cent, using unskilled women operators.

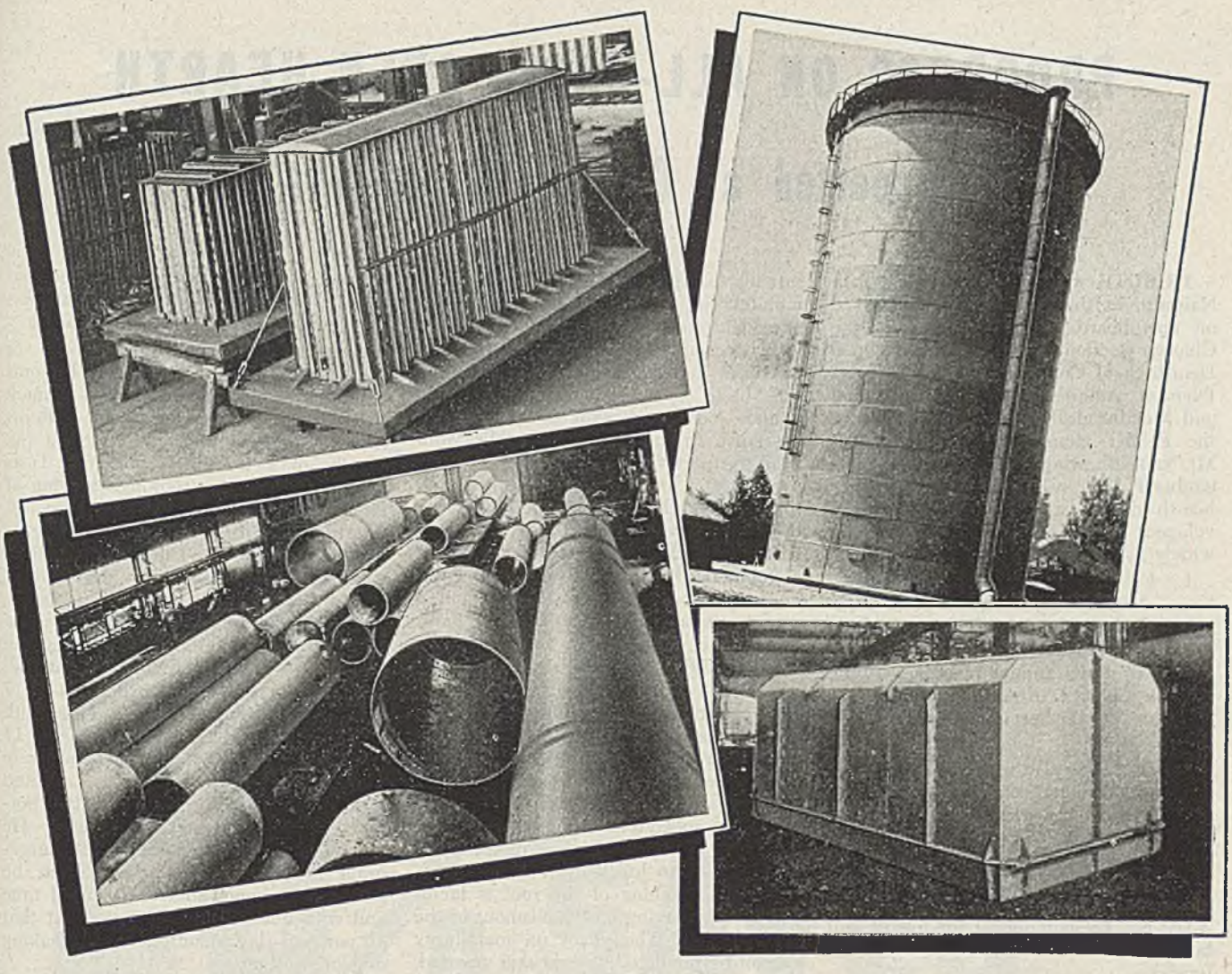
The particular job involved was the tapping of a 7/16-20 NS thread ⅜-inch deep to a Class 3 fit in the retraction lever, which was forged from tough SAE 1050 steel. Each part has one tapped and one reamed hole. The lead-screw tapping machine used is the light-duty LTM-16 model produced by Detroit Tap & Tool Co. and shown in the accompanying illustration.

With tapping speed of 400 r.p.m., a production of 450 pieces per machine per hour was consistently obtained, tripling previous production. This speed is equivalent to an overall average, floor to floor, of 8 seconds per piece. It is due, in part, to the fact that high precision control of the tap eliminated all necessity for holding the work piece on the return stroke.

Locating pins on the simple platen fixture make it easier to position the work, and it is unnecessary for the operator to clamp down each piece. Positioning is further simplified and loading and unloading materially speeded by the 0.010-inch float in the fixture. Centering troubles also are practically eliminated by the action of the floating tap holder which compensates for tolerances in the positioner by following the tapped hole without end play through the complete cycle of tap, return, and stop.

In addition to producing smoother, better-appearing threads, use of this machine eliminates rejects due to lead errors. Its high degree of accuracy is credited to a unique lead-screw drive in which the power takeoff is between the lead-screw and the spindle, permitting the lead-screw to function as a lead guide only. Thus, the lead-screw is not subjected to the force which drives the tap.

Operation of this type of machine is simple enough for unskilled women operators to be used, releasing highly skilled operators previously needed for tapping to other work on more intricate operations.



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PROGRESS ON ALL-BASIC OPEN HEARTH

Reported at Chicago Conference

TRIBUTE was paid to the late Sam Naismith at the local spring conference on open-hearth steel sponsored by the Chicago section of the National Open Hearth Steel Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers and held at the Palmer House, Chicago, April 27. Mr. Naismith, whose death occurred September 1, 1944, was an authority on open-hearth design and practice having developed the sloping backwall now so widely used by the open-hearth industry.

L. F. Reinartz, chairman, executive board, National Open Hearth Steel Committee, in opening the conference which drew an attendance of 240, announced that next year's annual meeting will be held in Chicago in April, pending confirmation of the executive board at a later date.

Mr. Reinartz also announced that the Pittsburgh section of the Open Hearth Committee has established an award consisting of a $50 War Bond for the best original contribution of not less than 1000 words on the theory and practice of open-hearth steelmaking published by A.I.M.E. Presentation of the award will be made at the annual Pittsburgh conference.

This year's McKune Award, consisting of a check for $200, a certificate from the Open Hearth Committee and all expenses paid to the national conference, went to A. M. Croner, practice foreman, Inland Steel Co., Indiana Harbor, Ind., for his paper on "Control of Melt Carbon". The award is to be made at the meeting of Pittsburgh section May 18.

Mr. Croner emphasized that there has been a lack of qualitative operating material and that for the past 10 years the control of melt carbon has been the most important factor in steelmaking. He also pointed out that silicon analysis is considered to be the most important phase in the control of melt carbon. While the hot metal mixer has provided a more uniform temperature, he explained, any high-sulphur iron put through the mixer does not necessarily produce a lower sulphur mixer iron. It is his belief that casts of iron poured in the mixer stratify or remain in layers.

A digest of the various papers presented at the one-day meeting of the Chicago group follows:

Basic Refractories. On a 180-ton open hearth, at the Steel Co. of Canada, all-basic with the exception of the roof, a total production of 91,900 net tons of steel was obtained or 5000 tons more than the best average of any other 180-ton furnace in the shop. Time of heats was 11 hours and 43 minutes on the basic furnace, compared with 12 hours and 2 minutes for silica furnaces. Few furnace delays occurred and no repair work was necessary on the basic ends. Refractories consumed per ton of steel on the basic furnace amounted to 1½ pounds, compared with 15 pounds for the silica furnace. The sidewalls wore near the port roofs and required repairing. Later, a basic roof was installed and, to date, 630 heats have been made in the furnace with 180 heats on the main roof. The furnace is controlled so that a temperature of 2500 degrees Fahr. never is exceeded at the fantail and a roof temperature of 3200 degrees Fahr. during the melt down. Steel is being made on 3,300,000 B.t.u.'s per ton. The furnaces average 16.20 tons per hour from tap to tap, or 2 tons better than any silica furnace in the shop.

Another operator, in discussing basic refractories, directed attention to the advantages of the basic open hearth. They include a speedup of production, longer life (650 to 1500 heats are required for a basic roof to break even with a silica roof), hot patching of the roof is facilitated, and a saving on the cleanout of the slag pocket. The effect on metallurgy cannot be predicted, the speaker asserted, by operating the furnace at higher temperatures which basic brick affords. Some of the disadvantages of the basic furnace mentioned by the speaker were that the cost is from five to ten times more than the silica furnace and that the weight of the basic brick is 1.8 times greater than silica brick, requiring heavier steel work.

Action Similar to Bellows

In discussing the failure of basic furnaces, the speaker warned that chemical attack may be expected though there is no cause for worry concerning the strength of the basic brick at high temperatures. He pointed out that the basic roof goes up and down like bellows with each temperature change. Opinion also was advanced that the peeling effect comes from a liquid layer on the inside surface of the basic brick. Splashes, lime dust, etc., are not responsible for deposits in the checkers. It was brought out that the deposits are mostly iron oxide, the minor constituents being slag and iron. The speaker in closing recommended that basic roofs be kept dry so that no peeling layer will form, and hot, preferably between 2000 and 2400 degrees Fahr., so that iron oxide will not condense on the surface.

Bottom Refratories. Summary of a questionnaire on present construction and preferred future construction of furnace bottoms showed that rammed bottoms are satisfactory, well burned-in surface is recommended by most operators, and that inverted basic brick has made an impression on the open-hearth industry.

Examination of lump metals and of drill cores from new and old bottoms both of the burned-in and cold-rammed types, show that the rammed bottoms falls considerably short of attaining the density of a burned-in bottom. Tests have shown that too thorough beating of rammed bottoms, on the other hand, result in penetrating shrinkage cracks, as well as cracks due to thermal contraction when the bottom reverts to the temperature gradient under normal operation.

Four methods of installing an open-hearth bottom were presented by an Indiana operator as follows: Sintered, rammed, rammed subhearth of 6 or 7 inches, and rammed chrome base with sized magnesite to a depth of 10 to 11 inches. He mentioned that the fully rammed bottom at his shop has resulted in longer bank and repair time than bottoms having a sintered surface. He favored sized magnesite over the large-grain material inasmuch as it can be sintered in a much shorter period of time and with less slag. He pointed out that 10 per cent slag is sufficient from making a good bottom.

An open-hearth consultant warned that in discussing open-hearth bottoms, the minimum thickness of the bottom at the center of the furnace should be considered carefully, inasmuch as thermal characteristics change with dimensions.

Some interesting data on density of open-hearth bottoms were presented by R. B. Snow, research laboratory, United States Steel Corp., Kearny, N. J. In testing a section from the initial layer rammed on the brick of one furnace he found the bulk density was 2.24 (140 pounds per cubic foot) and 2.42 (151 pounds per cubic foot) from another. In the first case the material had been taken from storage; in the latter case new material was used.

One factor that deserves special mention, he stated, is the distribution of bonding materials and fines in the mix. In the laboratory, segregation of these fractions during tempering with water and mixing can be easily prevented. On the open-hearth floor, however, it has been customary to do this tempering and mixing in a batch cement mixer; this has a tendency to form dense nodules of the fines and bonding chemicals, thus impoverishing the mix as a whole, because the nodules are not broken up and evenly redistributed during the subsequent ramming.

The pressure and impact of the ram-

(*Please turn to Page* 194)

25% SAVED

IN HOT-NUT FURNACES by B&W INSULATING FIREBRICK

A prominent steel company reports fuel consumption cut 25% after the installation of B&W K30 Insulating Firebrick in its hot-nut furnaces.

The average life of B&W I.F.B., used throughout the mill, is over five years. Thus the cost of the brick, on a service-life basis, is decidedly low.

Savings such as these are possible because, at the maximum service-temperatures for which they are recommended, B&W I.F.B. are lightest in weight, lowest in heat conductivity, possess high hot-load strength and show negligible permanent volume change.

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R-200

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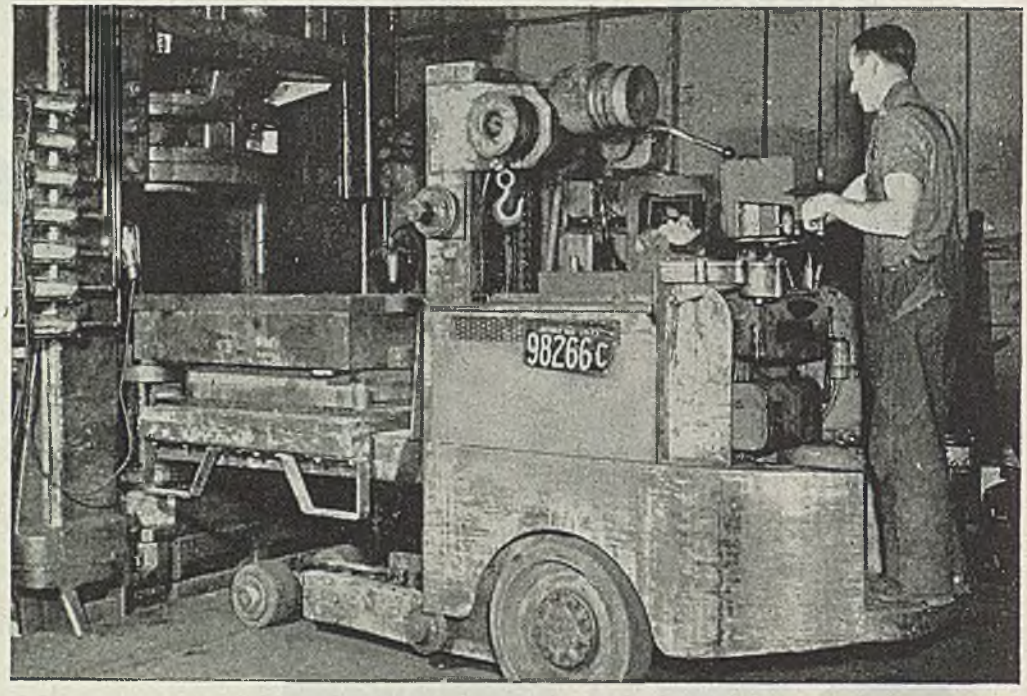

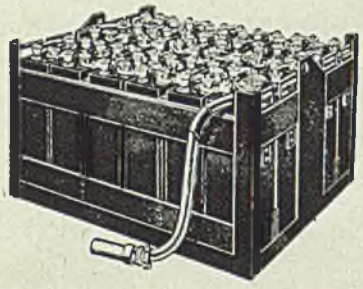

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for Most Trouble-free Power

Time-saving material-handling operations being performed by battery industrial trucks—working 24 hours a day—are enabling all kinds of mills and factories to meet production schedules that seemed "impossible" when set up. Keeping work flowing continuously to and from machines and assembly lines on time, is a stop-and-go job in which battery industrial trucks excel because of their superior maneuverability, high availability and dependable operation.

With batteries exchanged two or three times a day, the truck is kept continuously supplied with power. While one battery is being charged, another operates the truck. Except for the few minutes needed to change batteries, the truck need not stop for servicing the power unit. Its electric-motor drives have a minimum of wearing parts and are inherently simple and trouble-free. The truck starts instantly; accelerates smoothly; operates quietly; gives off no fumes; consumes no power during stops. Not only does it make efficient use of power but the current used for battery charging is the lowest-cost power available.

Altogether the battery industrial truck is one of the most dependable and most economical methods of handling materials—especially when powered by Edison Alkaline Batteries. With steel cell construction, a solution that is a natural preservative of steel, and a foolproof principle of operation, they are the most durable, longest lived, and most trouble-free of all types of batteries. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.*

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In Industrial Trucks, Alkaline Batteries Give You These Important Advantages

- They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- They are **simple and easy to maintain.**
- They can be **charged rapidly;** gassing cannot dislodge the active materials.
- They are **foolproof electrically;** are not injured by short circuiting, reverse charging or similar accidents.
- They can **stand idle indefinitely** without injury. Merely discharge, short-circuit, and store in a clean, dry place.

CONVEYORIZED *Aircraft Assembly*

Horseshoe-shaped chain conveyor 1320 feet long, equipped with all necessary supporting trucks, ladders and dollies, lends speed, safety and centralized control to assembly operations on B-26 Marauder bombers. Time from station-to-station now about 3 minutes

By NORMAN STEWART
Army Division Superintendent
Glenn L. Martin Co.
Baltimore

DETERMINING the right mechanical setup was only part of the job in establishing the final assembly conveyor system for B-26 Marauder bombers at Glenn L. Martin Co., Baltimore. Once the type of conveyor and actual layout had been decided upon, the next problem was to balance operations so that work assigned to each position could be completed in the same amount of elapsed time, for timing is the essence in conveyorized assembly of the kind adopted by the Martin company.

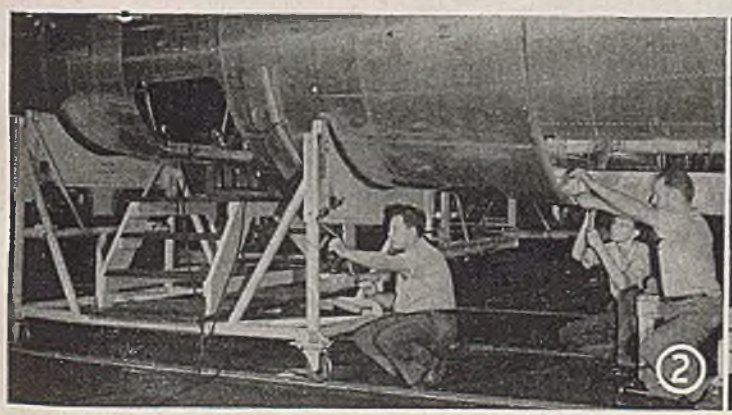
These two problems were combined, and in a large part overcome, before the conveyor now functioning so efficiently went into operation. This was achieved through the simple expedient of laying the track and setting up the various stations immediately, and operating the new system on a manual basis while awaiting delivery of the conveyor chain. Company made the most of this opportunity for training employes.

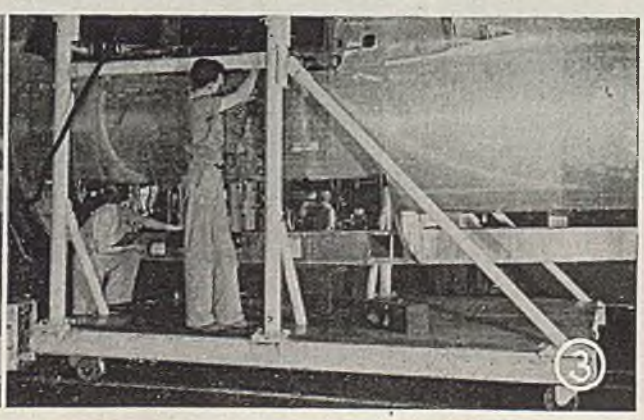
Basically, the final assembly conveyor consists of two parts, a 6-position splicing line and the 11-position, horseshoe-shaped installation line—the shape of the latter being decreed in advance by general outline of the assembly floor, a giant horse-

Fig. 1—Work on nose installation is facilitated by special ladder

Fig. 2—Fuselage sections are spliced together on an intermittent removing line. Note differences in types of dollies in Figs. 2 and 3

Fig. 3—First part of two-section final assembly conveyor used for splicing fuselage





GREATEST ADVANCE IN CRANE DESIGN IN 20 YEARS!

NEW CAB PROVIDES FULL VISION— SIT-DOWN CONTROL—AIR CONDITIONING

Again Cleveland Crane scores another *first* in crane design—the greatest step forward in crane construction since the advent of the all-welded steel crane also pioneered by Cleveland Crane 20 years ago—a new cab that is radically different in every respect.

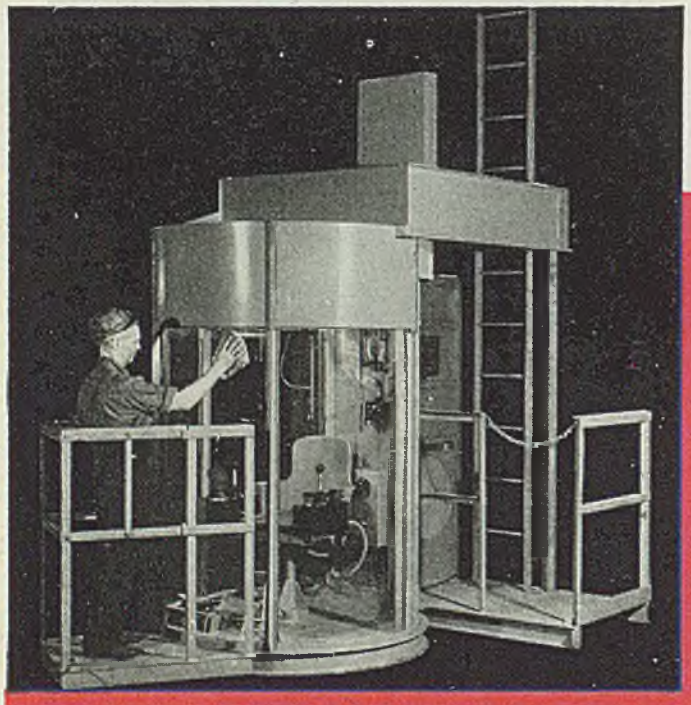
Modern, streamlined in appearance, the cylindrical-shaped cab provides full vision for the operator, comfortable sit-down control and air-conditioning.

Shatter-proof plastic enclosure panels extend to the floor permitting maximum vision in every direction over the area covered by the crane. Corners or blind-vision spots are eliminated.

Crane operation with this cab is a simple easy sit-down job. Hoist and trolley master switches are attached to the chair arms for manual operation; bridge switch and hydraulic brake are secured to the floor for foot operation. Each of the operator's limbs has one definite control job—no double duty.

An air-cooled, air-conditioning unit especially developed for this cab provides fresh clean air at any normal temperature desired and gives protection against objectionable gasses, dusts and fumes.

This new cab is a self-contained unit that may be furnished with any new crane or easily applied to existing cranes of any make employing magnetic control.



WINDOWS EASILY CLEANED

A novel traveling platform serves both as vestibule to the cab and means for easy access to the entire exterior window surface for cleaning purposes. Safety locks on both platform and cab door prevent operation of either except when platform is in proper position.

Features Plus

1. Maximum vision in all directions. No corners. No blind spots.
2. Operator sits in comfortable adjustable seat.
3. Easy control arrangement. Each of operator's hands and feet have definite job—but no double duty.
4. Fresh, clean air, cooled to temperature desired. (Air conditioning unit for cab illustrated suitable for temperatures up to 140°).
5. Full protection against gasses, dusts and fumes.
6. Windows easily cleaned by means of traveling platform.
7. Compact self-contained unit complete with controls, brake and air-conditioning equipment.
8. Easily applied to new or existing cranes of any make employing magnetic control.

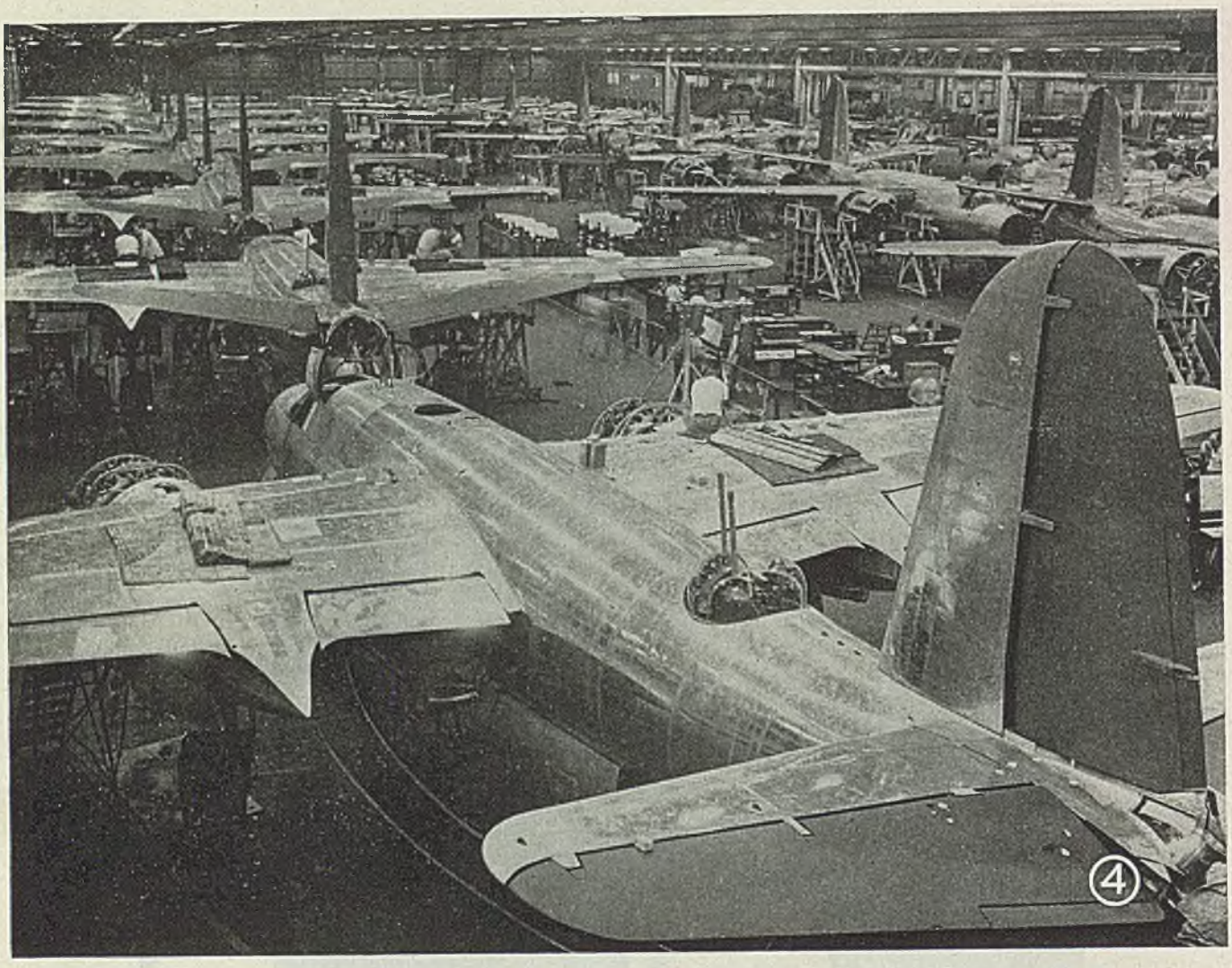


Fig. 4—Looking down the line on last 8 positions on the giant horseshoe

shoe—with the sides of the horseshoe parallel to the splicing line. Backbone of the conveyor is a continuous chain 1320 feet long, made up of 1100 solid and 1100 split links, and total weight of 7½ tons. It is driven by a 15-horsepower electric motor and runs in a channel recessed in the floor and is guided around curves by bronze-bearing steel rollers. The line (Fig. 4) can be stopped at any time from the main switchboard, located on a raised platform between the open ends of the horseshoe and commanding a full view of the entire operation.

As the three sections comprising the fuselage come from the body division, they are placed on a special splicing fixture, shown in Fig. 3, which is at the first position of the splicing line. Splicing fixtures are mounted on grooved wheels which ride on V-shaped tracks and are moved by hand. Fixtures traveling on rails, such as the ones shown in Figs. 2 and 3, support the fuselage during splicing operations.

During the period of manual operation while waiting for the chain, it was possible not only to acquaint the employes with their new duties but to determine accurately the length of time necessary to perform each operation and to make readjustments and balance still further the work assigned to various stations. Thus, when the conveyor installation finally was completed, a high degree of efficiency was attained almost immediately. Under the manual setup, the first eight airplanes nearest to completion were moved by a tractor with a 2-man crew. The remaining airplanes were moved by hand, seven men to a plane. The entire operation required 6 minutes, as compared with only 2 minutes for the mechanized conveyor.

Apportioning the various operations under the present setup follows a progressive plan. Typical operations for each position include:

1. Splicing nose and tail to center section.
2. Locking down engine controls.
3. Installing aileron cables.
4. Installing rudder cables.
5. Electrical check-out.
6. Hooking up and adjusting cables.
7. Splicing wing and installing engines and landing gear.

8-9 Rigging surface controls and bomb bay doors.

10-11-12. Hydraulic operations.

13. Final electrical check-out.
14. Installing soundproofing.
15. Installing engine cowling.
16. Installing nose turret.
17. Installing radio equipment.

Where work is to be advanced to a new position on the production line, a warning buzzer sounds. Workmen remove scaffolding and tools from around each large bomber. The all-clear signal then is sounded. The general foreman, whose headquarters are on an elevated platform at the open end of the horseshoe, next presses a button and the whole line, whose weight in bombers is nearly 225 tons, moves forward one position. Scaffolding is rolled back into place and assembly work continues, the workers at each position concentrating on their specialty. Because of the chain-type conveyor system which was developed specially for this production line, the entire operation, from one station to the next, is completed in barely 3 minutes. Limited floor space is utilized to the fullest extent.

When the spliced fuselage reaches position No. 6 on the splicing line, it is picked up with slings by an overhead crane and is moved to the first position on the mechanized horseshoe conveyor (actually station No. 7). Here wings are spliced on and landing gear and engines are installed. The installation of landing gear at this point is one of the keys to the entire setup, for the airplane rides on its own landing gear throughout the remaining operations, attached to the conveyor chain by a nosewheel dolly. This permits use of an extremly narrow gage track, greatly simplifying the problem of negotiating the horseshoe bend.

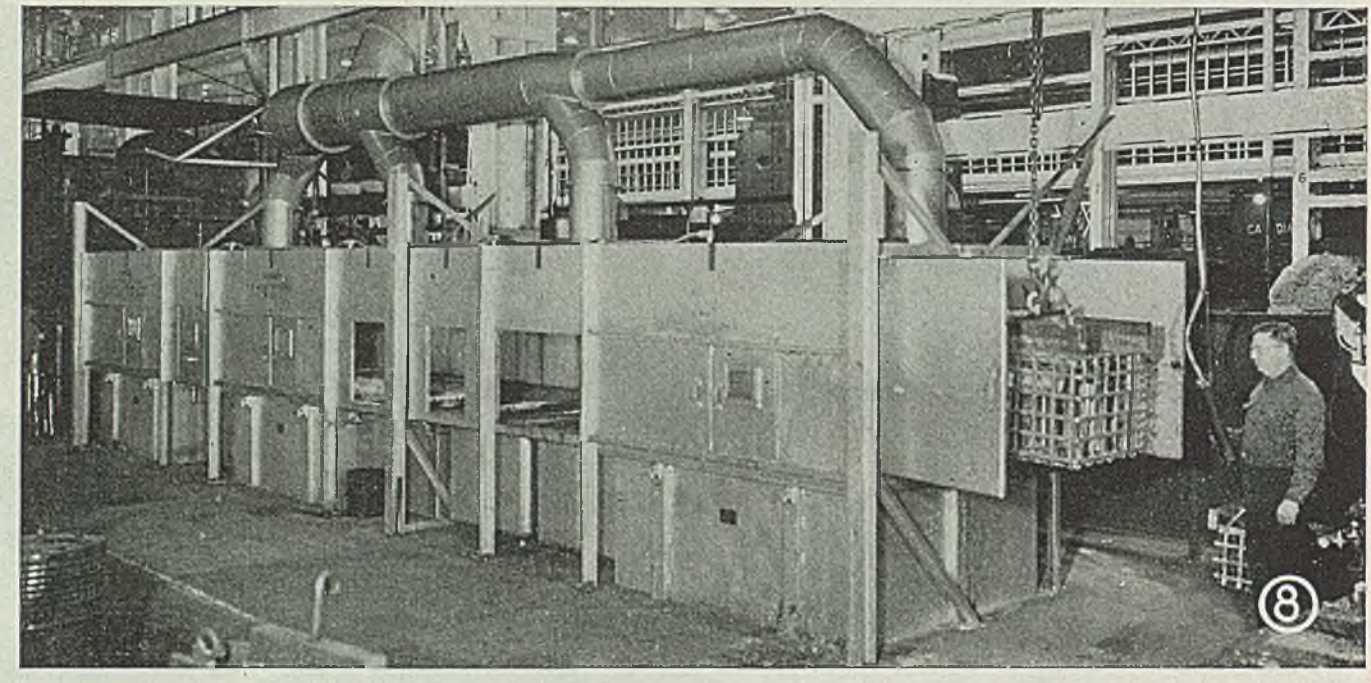


Fig. 8—At right, bearings are being removed from electrically heated tinning bath at end of the Kolene cleaning line at East Pittsburgh Works of Westinghouse Electric Corp.

New Cleaning Process

(*Continued from Page* 106)

porcelain enameled without any difficulty whatever, says Mr. Shoemaker.

What this can mean to the porcelain enameling industry can easily be visualized in the greatly simplified cleaning practice that can be employed when using the new process, the cost of equipment and operation being only a mere fraction of conventional cleaning expenses.

Too, the characteristics of the cleaning process produce a surface condition that greatly facilitates enameling because surface impurities in the metal itself are removed. Believe it or not, it is reported that boiler plate has been cleaned and enameled perfectly.

Enamels Boiler Plate: Indicating the importance of new porcelain enamel fields that such work may open up is the case of a furnace door which deteriorated rapidly because of scaling brought about by its high operating temperature. Cleaned the new way and porcelain enameled, this same door has now stood up for a time equivalent to the life of several unprotected doors. By proper selection of frits and by controlling other factors, it is possible to produce porcelain enamel coats which will withstand reheating up to 2000 degrees Fahr. or more.

Deep Drawn Parts: Because the new process permits successful application of porcelain enamel to almost any type of steel, it may greatly reduce cost of enameling stock by permitting use of lower grades and less expensive sheet. Too, it may expand the application of porcelain enamel to deep drawn parts, formerly difficult to enamel successfully because of the poor enameling characteristics of the deep drawing stock that was required.

Alnico Magnets: This development is reported to be the only cleaning method that will permit the tinning of high-permeability magnets for hearing aids, radio, etc., parts cast or made from sintered powdered metals in the Alnico classification. These alloys contain 20-30 per cent nickel, 10-12 per cent aluminum, 3-5 per cent cobalt, remainder iron.

Since these materials are extremely hard and difficult to machine, tinning and soldering or brazing may be useful in mounting the magnets for use.

Glass Molds: Typical of the unusual applications being found is on molds used in the glass industry. After operating only 2-6 hours, a thin undesirable scale forms on the molds. Heretofore this had to be removed by hand. This meant that molds must be replaced every 2-6 hours, resulting in much lost production time and excessive maintenance costs.

By removing the scale and silica rapidly and easily in the new bath, greatly reduced maintenance costs are anticipated.

Food Chopper: As an indication of the economies being experienced where the new cleaning process has been adopted, there is the case of a food chopper whose cast iron parts were formerly hot tinned after tumbling for 16 hours in a barrel to clean the surfaces. Without any tumbling, the part is now being hot tin dipped.

Removes Core Sand: Many castings have cores that are only partially accessible for removal by mechanical methods. While it is not practicable to remove complete cores by the Kolene process, it can be exceptionally useful in supplementing conventional mechanical core removal methods, for it permits removal of every last vestige of sand in the surface of the casting.

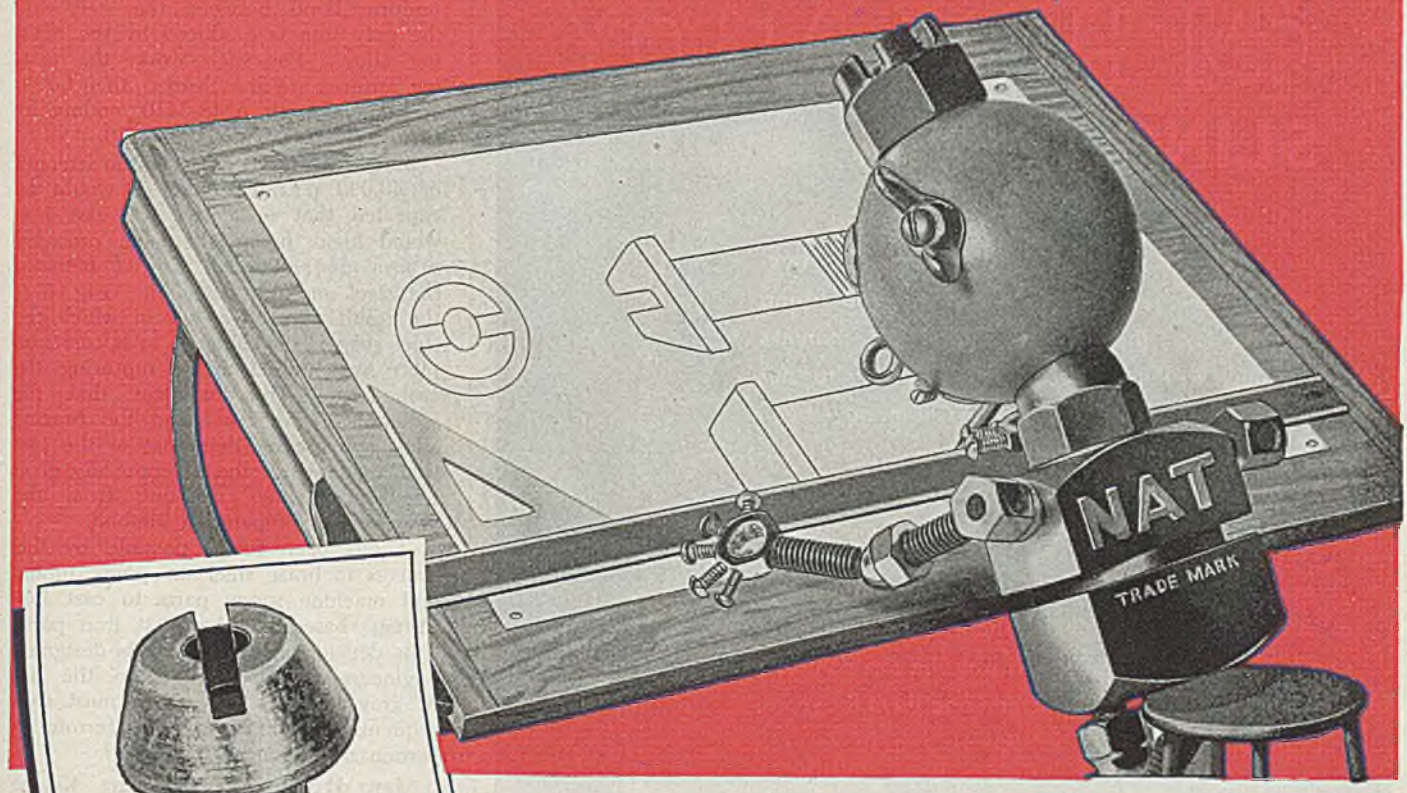
In fact, its use to thus supplement mechanical methods is reported to have made possible core and casting designs that would not be possible were conventional core removal methods to be relied upon exclusively. Many castings have cored cavities which later are used for passage of liquids. If any sand were allowed to remain in the cast metal surface, the hazard of its possible loosening to foul up small nozzles or cause other difficulties may not be tolerated, thus limiting application of castings for such service.

As long as the cored casting offers free passage for the electrically activated molten salts, all residual sand and sand inclusions will be removed from the surface of the casting. The cleaning solution will not penetrate cored passages obstructed by a combination of sand and metal, for the metal will not be removed. Pure sand will. Use of conforming electrodes to activate the salt may further extend the application of the process to cleaning out cores accessible by no other method.

Bonding To Cast Iron: Another important application is in copper brazing and silver soldering direct to cast iron parts. Commercial silver soldering or brazing of cast iron has heretofore been considered impractical. There was no good way to remove the scale, graphite and sand inclusions on the cast surface—elements which prevented formation of a good uniform bond.

But by the new process, it is not only possible to remove all dirt, oil, grease and oxides but also graphite, combined carbon and sand inclusions, thus eliminating all the elements which might prevent making the proper bond. As a re-

THEY NEEDED A BOLT THAT DIDN'T EXIST..



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The right fastener for the job!

Here's another typical example of National's Technical Service—a special fastener designed for the particular application when standard fasteners don't meet the need:

In a certain rubber molding operation a bolt was required that could be pulled up tight and used for many applications. Extra large bearing surface was needed, as well as exceptional strength and high "torquing" capacity.

We designed the bolt of alloy steel, with a specially formed slot which permits use of a reinforced driver. This prevents slipping or shearing of the driver point. The large diameter at the base of the head affords ample bearing surface, while the tapered sides reduce the amount of metal in the head, making it possible to upset the bolt, an important cost factor.

You may need just such a service as this to improve your fastenings. Often we can save production time and cost by upsetting a part instead of milling from bar. Let us have your inquiry.

Send for a copy of this case history booklet describing briefly, with diagrams, typical instances of National's Technical Service. Ask for the "Savings" booklet.

National
HEADED AND THREADED
PRODUCTS

THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

sult, it is already in commercial use for preparing cast iron surfaces, both machined and as cast, for silver brazing.

Fig. 5 shows the penetration of babbitt alloy or silver into the apertures from which graphitic carbon and sand inclusions have been removed. A strong uniform bond between the steel and the gray iron is produced by the brazing alloy. For such work, the casting surfaces are first cleaned, then fluxed and tinned with AMS-3410, ending by silver soldering with AMS-4770.

Since AMS-4770 has a tensile strength of 40,000 p.s.i. or more, it would be expected that in a test the cast iron would break before the joint, *provided a firm uniform bond existed between the steel and the cast iron.* Fig. 6 is the result of such a test in which the steel strip silver soldered to a cast iron piece was pulled away, rupturing the cast iron. This indicates that the strength of the bond and the brazing alloy was greater than that of the cast iron, evidence of the exceptionally good bonding qualities resulting from the new surface preparation method.

It has been found possible by this process to braze steel stampings, tubing and machine screw parts to cast iron fittings, bases or other cast iron parts. This development thus affords designing engineers greater latitude in the use of gray iron castings which must subsequently be joined to other ferrous or certain nonferrous metals.

How It Operates: In the Kolene process, work to be cleaned is immersed in a molten salt bath operated at 850-950 degrees Fahr. Since the bath is electrically activated, large parts to be cleaned are hung from a copper bar connected to one side of a 6 to 12-volt source of direct current which may be a rectifier, motor-generator set or batteries. Small parts are placed in a metal basket or racks, also suspended from the bar over the tank.

The pot containing the molten salts is usually made from welded steel and forms the other electrode of the circuit. It is heated by gas, oil or electricity, usually under automatic temperature control.

Current required varies from 8 to 50 amperes per square foot of work to be cleaned. Connections to the direct-current power source are through a double-pole double-throw switch which permits reversing the polarity of the work at will.

Oxidation Members: When the work is anodic (connected to positive side), an electro-chemical reaction in the molten salts forms oxidation members in the bath near the work surfaces. These soluble oxidation members in turn react with the work to remove (by oxidation) graphite, carbon, silicon, sulphur, phosphorus, manganese, oils, greases and organic materials.

Products of the oxidation reactions go out of the solution in the form of gases, thus do not tend to build up in the bath to cut down the efficiency of the action and ultimately saturate the

DOW CORNING

SILICONES

DOW CORNING, first in silicones, is fully equipped with new plant and facilities for the production and distribution of an expanding line of silicone products

American industry has been quick to utilize the new Dow Corning Silicones—to see the potentialities inherent in their higher order of heat stability, chemical inertness, water resistance, and dielectric properties. Dow Corning is now supplying, directly or through selected distributors, the following silicone products:

DC FLUIDS Water-white, odorless, inert Silicone Liquids . . . notable for their low rate of viscosity change over a wide temperature range, low vapor pressure, water repellency, and good dielectric properties.

DC 4 Ignition Sealing Compound . . . an easily applied silicone waterproofing compound having excellent dielectric properties, corona resistance, and the consistency of petroleum jelly. It neither hardens nor melts at temperatures ranging from −40° F. to 400° F.

DC 7 Special Low Temperature Compound . . . an oxidation resistant lubricant and sealing compound developed for use at temperatures as low as −70° F.

DC 31 A lubricating Silicone Grease for special applications in the temperature range of −70° F. to 190° F.

DC 41 A lubricating Silicone Grease for special applications where operating temperatures range from 0° F. to 400° F.

DC 993 Insulating Varnish . . . recommended because of its extreme heat stability for impregnating, coating and bonding, and waterproofing inorganic insulating materials such as asbestos, mica, and Fiberglas cloth, tape, and sleeving. Other special purpose silicone resins and compounds are available.

DC STOPCOCK GREASE A chemically resistant Silicone Grease for lubricating stopcocks and other ground glass joints.

DC PLUG COCK GREASE A Silicone Grease that affords easy operation of lubricated plug valves over wide temperature ranges in most difficult services.

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solution. This is one of the important advantages of this process.

Reduction Members: When the work is made negative or cathodic, soluble reducing members are formed near the work surfaces. These members remove mill scale as well as forging, casting, and heat treating scale . . . also rust, surface oxides and sand at the metal surface.

Combination Cycles: The work is always given a treatment which includes a combination of oxidation and reduction cycles, the exact timing and sequence of the cycles depending entirely upon the material being processed and the condition desired at the surface. By proper selection of these working cycles, it is possible to produce the amazingly successful cleaning action described in the forepart of this article.

For example, to produce a pure ferrite surface on a typical small cast iron piece the cycle is 5 minutes on reduction, 3 minutes oxidation, followed by 3 minutes reduction. The work remains in the bath during the entire treatment, the action being changed from oxidizing to reducing and vice versa merely by throwing the polarity reversing switch.

Pure Ferrite Surface: The mention of ferrite above brings up an important feature of this process. Because the oxidation cycle removes carbon and graphite by the combined chemical and electrolytic action of the bath, Mr. Shoemaker reports it can penetrate into the grain boundaries at the surface to some degree, removing any trace of these elements and producing a pure ferrite layer at the surface of the steel or cast iron.

This is the feature so important in connection with cleaning work for subsequent porcelain enameling, for it makes it possible to remove every trace of carbon or graphite, oxides or other elements that would prevent proper enameling.

Dirty cast iron parts that have been cleaned can be put in acid and will not "bubble." This indicates an important characteristic of surfaces cleaned by this new method, for it shows that there is no electrolytic action between unlike materials present on the metal surface. The pure ferrite surface produced can have no galvanic or "battery" action, thus there is no intercellular corrosion. Likewise, avoiding electro-chemical action at the surface is an important factor in preventing corrosion and is believed responsible for the greatly extended life of the cleaned parts and their plated and dipped coatings.

Simplicity: The fact that a single bath handles both oxidizing and reducing cycles makes for extreme simplicity in layout and allows handling the work in a small floor area. However, where production volume warrants, some plants have installed two separate pots, using one entirely for oxidation and the other for reduction. This type of arrangement allows maximum output where considerable quantities of work are involved.

Cooper-Bessemer's layout is like this.

Limitations: It should be pointed out that the process is not suitable for cleaning aluminum, magnesium, stainless steel, Inconel or any other high nickel alloy. Stainless steel develops an undesirable stain but low nickel alloys can be handled satisfactorily.

Hydrogen Pickup: It has been found that hydrogen pickup is frequently encountered in pickling operations. No pickup whatever is involved in the new bath. Too, pickling may actually dissolve some of the base metal, thereby exposing additional insoluble impurities such as carbon. The reverse occurs in the new process. Thus from many angles, this development appears to be an important step forward.

Glass Tank Resists Corrosive Solutions

An all-glass tank made by a new heat treating process is the answer to the need for industrial tanks where corrosive solutions present a maintenance problem, according to Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh. With the exception of hydrofluoric acid and hot caustic, this glass is said to be unharmed by acids which destroy every other type of material used in tanks. These glass tanks, now in use in many plants and pharmaceutical houses and in steel mills, stand an instantaneous temperature shock of 400 degrees Fahr. and continuous working temperatures of 500 to 600 degrees Fahr. Pickling and plating solutions are seldom over 250 degrees Fahr. The company's Herculite glass shows much resistance to impact. A piece 12 inches square by ¾-inch thick, supported only at the edges, is said to withstand without cracking the shock of having a 5-inch duck-pin ball dropped on it from a height of 26 feet.

Two types of glass tanks are being produced. One is made of either opaque or transparent glass ⅝ to 1¼ inches thick, depending on service requirements. Side walls are grooved to take gaskets of impregnated glass cloth at the joints, and tanks are held together by noncorrosive metal tie rods. Bottom has an inner or secondary lining of glass. Maximum inside size is 8 feet long by 5 feet 10 inches wide by 5 feet deep.

The other type of tank has a ½-inch glass lining inside a steel shell and is used where larger tanks are required. Glass is held away from the outer shell by spacers designed to put pressure on joints. Space between glass and outer shell contains a continuous acid resistant membrane applied by a special process. Theoretical maximum size is limited by the size in which glass plates can be made, usually 9 feet by 6 feet by 5 feet.

Pyrex drains are provided for severe corrosive conditions. Tanks also have glass hoods for removing fumes and heating units known as candle heaters. All metal parts of heating units are inclosed in glass. According to the company, special tanks can be fabricated for almost any use.

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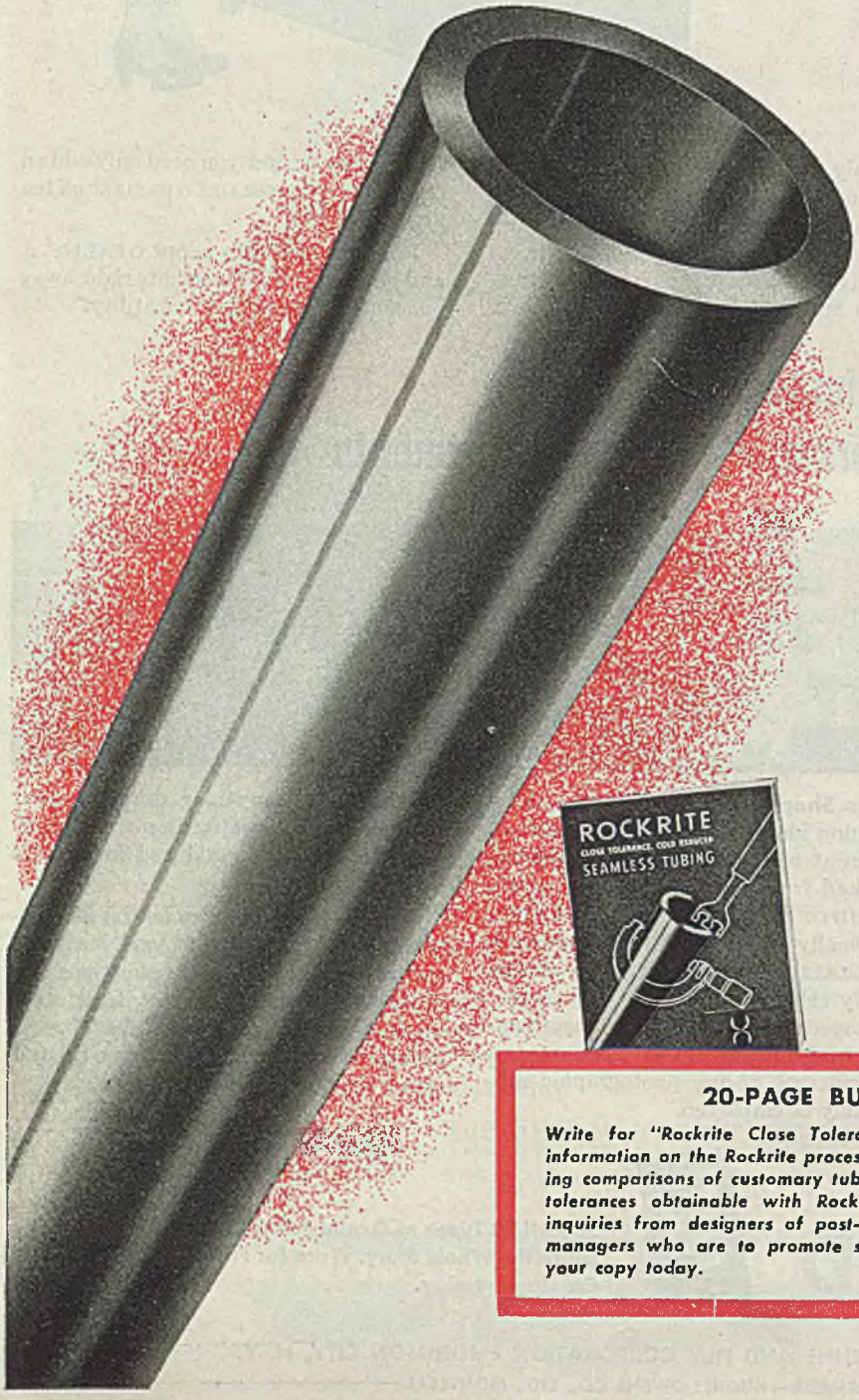


20-PAGE BULLETIN

Write for "Rockrite Close Tolerance Tubing", giving full information on the Rockrite process; tables and charts showing comparisons of customary tube tolerances with the new tolerances obtainable with Rockrite. We especially invite inquiries from designers of post-war equipment and sales managers who are to promote such equipment. Write for your copy today.

rolled tubing

Accuracy, Adaptability

For the designing engineer Rockrite Rolled Tubing opens up possibilities similar to those uncovered by the die-casting of small parts. For bearing races, ferrules, sleeves, bushings, spacers and similar cylindrical or ring-shaped parts, Rockrite Rolled Tubing offers him what is, in effect, a new material. A material of wide variety—obtainable in many metals, including bi-metal combinations. A material producing parts of greater accuracy, closer tolerances with less processing required.

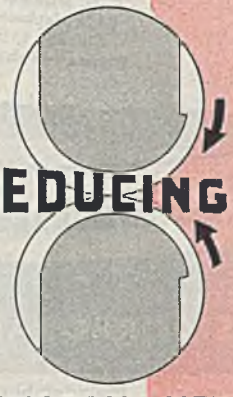
Manufacturing Economies

For the production executive, Rockrite Rolled Tubing means greater economies, an improved product. Better parts made faster and at a lower cost than with ordinary tubing or bar stock. High cutting speeds and one-operation forming-tool finishing of outside surfaces are often possible, sometimes no machining whatever is necessary.

Precision Quality

For the purchaser of finished equipment, the knowledge that it contains parts made of Rockrite Rolled Tubing is assurance of up-to-date design, precision quality, and better value.

Rockrite Rolled Tubing is made by a process totally different from familiar cold-drawing methods of sizing seamless tubing. By the Rockrite method the tube walls are *compressed and rolled* to correct size, insuring greater concentricity, less ovality. And far closer tolerances—half or less than half those of conventional cold-sized tubing.



TUBE REDUCING CORPORATION

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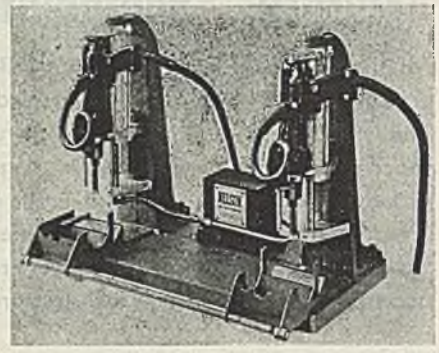
INDUSTRIAL EQUIPMENT

Stud Welder Unit

To meet mass production requirements, a new automatic multiple stud welder production unit has been developed by Nelson Specialty Welding Equipment Corp., 440 Peralta avenue, San Leandro, Calif. Using this unit two or more studs may be welded in one operation. The work is rapidly performed and studs are held to very close tolerances.

Each of the welding guns is mounted



on a pneumatic air cylinder. Each cylinder is fixed to a movable arbor which can be adjusted to any spacing necessary for the work. Work is held in a mandrel, chuck, or special locating device, the setup being determined by the particular production problem at hand. Welding current is obtained from a 400-ampere generator, and is regulated by a timing control unit which automatically controls the length of arc flow.

The unit is operated with a single control switch. Work is inserted, stud is fitted into the chuck of each stud welding gun and the control switch pressed. The first gun then descends making a weld. Upon completion of this weld the next gun descends and welds. Guns then ascend automatically and work is removed.

Electric Speed Indicator

An electric speed indicator has been developed by Reliance Electric & Engineering Co., 1088 Ivanhoe, Cleveland, which makes it possible to determine and to set proper operating speeds. It gives accurate readings of speeds from 100 to 5000 revolutions per minute. The indicator consists of two units. The pick-up unit, a miniature 6 pole alternator with a permanent magnet rotor, is mounted on the shaft whose speed is to be measured. The indicator, meters the pick-up output on a 3¾-inch scale which covers 95 degrees of arc. The resistance of the indicator has been made sufficiently high, so that the size or length of the leads connecting the units will have no effect on accuracy and

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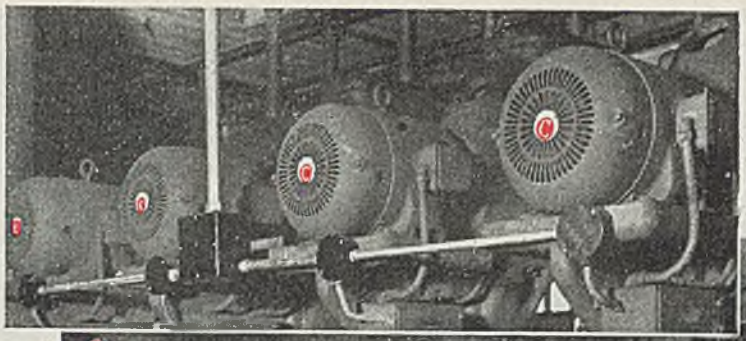

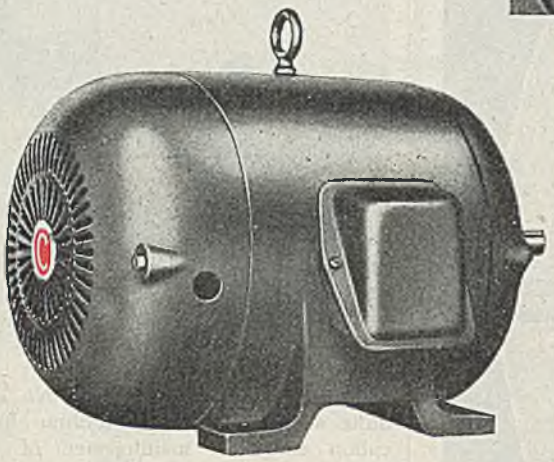

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The large, enclosed fan forces a controlled blast of cooling air through the large, smooth air passages, around the bearings, and between the outside cooling fins of the inner motor frame.

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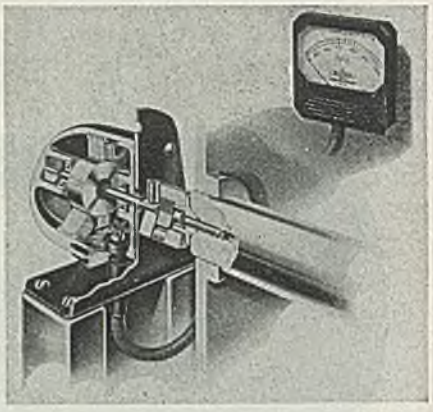
the indicator may be located at any distance from the pick-up unit. The indicator is not affected by other magnetic material, and there is no loss of accuracy due to length of service.

Instantaneous and continuous speed indication is independent of the direction of rotation of the shaft. Pick-up windings are stationary, and there are no

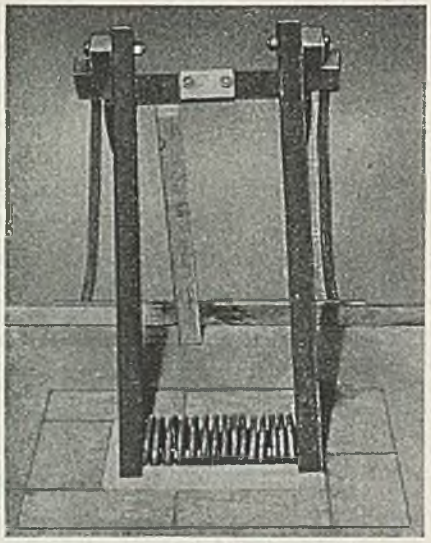


commutators or slip ranges. No conduits are required, and lifetime lubrication simplifies maintenance of this indicator.

Indicators are provided for full scale deflection corresponding to 1500, 2000, 2500, 3000 and 5000 revolutions per minute, and special scales are available to read in other units, such as feet per minute and process cycles of varying times.

Furnace Coil

A new electric salt bath furnace coil is introduced by Upton Electric Furnace Division, 7450 Melville at Green, Detroit 17. The starting coil consists of a nichrome heating coil element connected



to the output leads of the furnace transformer by two mild steel bars and flexible buses, and operates in conjunction with the transformer. It can be used either before or after salt in the furnace is allowed to freeze up.

When the furnace is to be shut down, the coil is dropped into the salt bath so

So Now Brownie Is Happy With A.C.

I HEARD a stricken moan and looked over at Brownie, my boss. He's our Purchasing Agent and so has a right to look unhappy—decent supplies being as scarce nowadays as prospective husbands. But I never did see him look this sunk before.

"Miss Jones," he groaned, meaning me, "I got troubles. For years our Welding Department has done a swell job with D.C. equipment and Murex electrodes. You know: FHP for downhand work, Fillex for fast fillet welding, Genex for tacking and fitup, Type M or Type 90 for high tensile steels, and so on. Now the department's installing some A.C. units, and I have to try to locate and stock a whole new group of electrodes. I feel like sticking my head in an eight-ton drop hammer and Ending It All."

"You'll do better," I said, "to stick your head in the Welding Department and ask for Joe, the foreman. And I'm going with you, to see you two don't come to blows about this."

But Joe, who's the excitable kind himself, just sort of tut-tutted poor Brownie's worries.

"Mr. Brown," Joe said, grinning, "every pound of Murex we have in stock works on both D.C. *and* A.C., including the Stainless. In fact, one of our A.C. units is already running, and going along swell on Murex."

Brownie practically collapsed on the nearest chair, he was that relieved. I felt the same way, knowing what troubles Joe's knowledge of Murex had saved me.

"And while you're here," Joe smiled, "you might take a request. Stock me some Murex Type A for vertical and overhead work on A.C., and some of their Alternex, which also does an extra-swell job on A. C. Meanwhile, forget your worries. Except for their type E6012 and E7012, practically all regular Murex electrodes work as well on alternating current as on direct."

P.S. Miss Jones back again. I found out later how Joe happened to know things about Murex my own boss didn't know. He has one of those big Murex wall charts, dividing their thirty-odd electrodes by use on mild steels, low alloys, stainless, and hard-surfacing. It also shows at a glance the AWS-ASTM grade, polarity, current, etc., of each electrode. I wrote for one for Brownie, and I think no Purchasing Agent in a plant that does welding should be without one. You just drop a line to:

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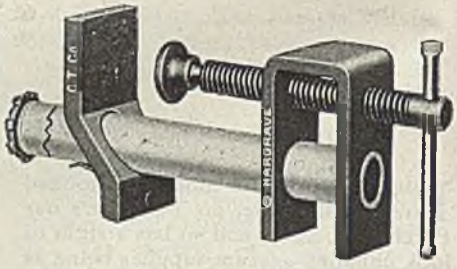
it reaches the bottom of the pot. Power can then be cut and the furnace allowed to freeze up. Leads are connected to transformer and power turned on when it is desired to start the furnace again. With both starting coil and normal heat from electrodes, the salt is melted down in a short time and the starting coil removed and furnace is ready for use.

When salt has been allowed to freeze up solid without the starting coil having been placed in the bath, the salt at the top of the pot is chipped away to provide a nest for the coil and the starting coil is placed in the nest. Loose salt is poured into the depression and around the coils until the latter are about half covered. The leads of the coil are connected with transformer and power turned on. Melting of salt from this point is entirely automatic. As salt at top melts, the coil gradually works downward, melting the frozen salt as it descends until all salt in the pot is completely molten.

Clamp Fixture

A new steel clamp fixture is announced by Cincinnati Tool Co., 4108 Montgomery road, Cincinnati 12. The frame, slide and screw of this fixture are of steel. The slide, made of heat-treated steel will not slip on pipe under



pressure, yet it is released when pressure is removed. Clamping surface is 1½ x 1½ inches. This fixture is recommended for wood glueing and metal welding. It fits ½-inch pipe in any length so that clamp of any size opening can be made.

Roughness Selector

A set of standard surface-roughness specimens, each representing one clearly identified degree of surface roughness ranging from the smoothness of a bearing surface to the roughness of a flame cut, is announced by Special Products Division, General Electric Co., Schenectady, N. Y. The specimens are designed to permit the engineer or draftsman to select and specify by symbol the special degree of surface roughness allowed for a particular machine part. They are also desirable for use in the shop to enable the mechanic to determine exact surface roughness allowed by drawings.

The set consists of 10 metal specimens each approximately 2 x 2½ x 1/8 inches in size. Several of the specimens are divided into two and in some cases four, surfaces, all of which, while equally rough, are produced by different

OWI Photo by Palmer in an Allegheny Ludlum plant

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WHO'S to say what job is more vital than another, when the chips are down? Those Allegheny Metal tubes aren't gun barrels, but they carry charges quite as potent in the overall picture. Much stainless tubing has gone into the manufacture of high-octane gas, synthetic rubber, magnesium, food and dairy products, etc.—and in more minute sizes, it is indispensable in aircraft fuel and instrument lines, drug and medical work and similar uses.

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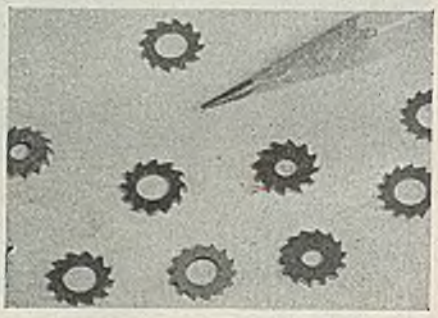
machining methods. In all, the 10 specimens simulate 25 surfaces, each surface representing the roughest one acceptable for that particular symbol regardless of the method of producing the

finish or material of which part under inspection is made.. Specimens are furnished in a cloth-lined wooden case.

Commutator Saws

Development of a line of solid tungsten carbide commutator saws is announced by Super Tool Co., Detroit.



These saws, ranging in sizes from ¼ to 1 inch in diameter can be supplied in thicknesses from 0.015-inch up and in hole sizes to meet specifications.

Tapping Machine

A multiple tapping machine is designed and built by Snyder Tool & Engineering Co., 3400 East Lafayette, Detroit 7. The part is loaded and manually clamped in a fixture which is on a hydraulic sliding table. In the first working position there is a vertical tapping unit and an angular tapping unit, each equipped with multiple heads and tapping spindles with individual lead screws. To facilitate loading, the vertical head and unit are hydraulically lifted upward and out of the way.

In the second working position, there is a vertical multiple head for tapping and a single spindle angular tapping unit. All spindles have individual lead screws. The machine is semiautomatic, with the part loaded and clamped, the vertical head is moved into position hydraulically and both vertical and angular heads tap a series of holes.

The vertical head then returns to rear position and the part automatically moves to second working position, at which point the vertical and horizontal heads

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Preventing corrosion includes far more than mere application of a preventive compound—even if the preventive is specified for the job. No matter if it is most carefully applied, it cannot do valiant guard duty against infiltration of rust unless the metal surface is clean.

Houghton's Rust Prevention Service begins at the beginning. It covers the three major points listed above. It includes also protection of parts passing through production before they are finally packaged.

This service, begun three wars ago, has kept ahead of current demands made increasingly stringent by this global war. May we sit in on your plant's discussion of corrosion problems? We believe we can help.

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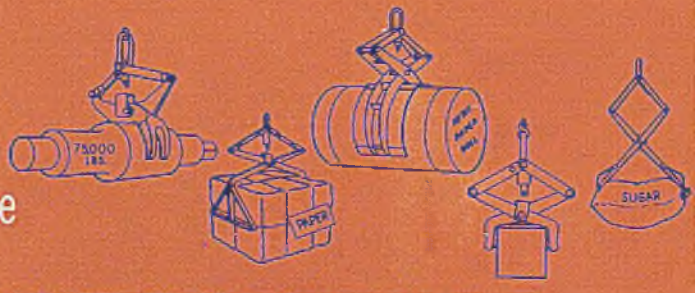

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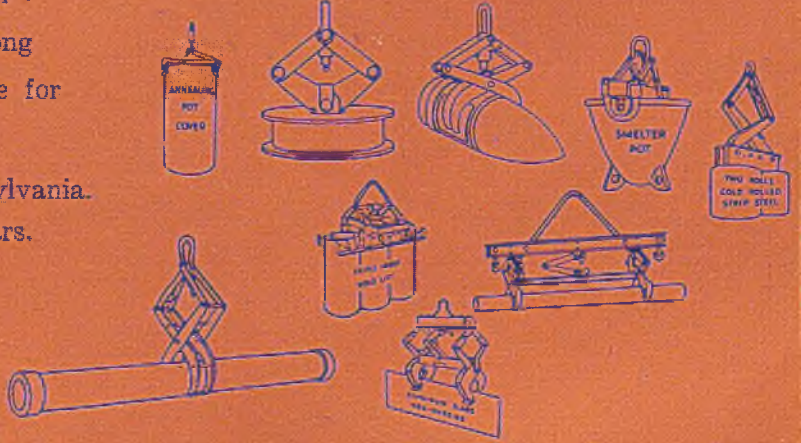

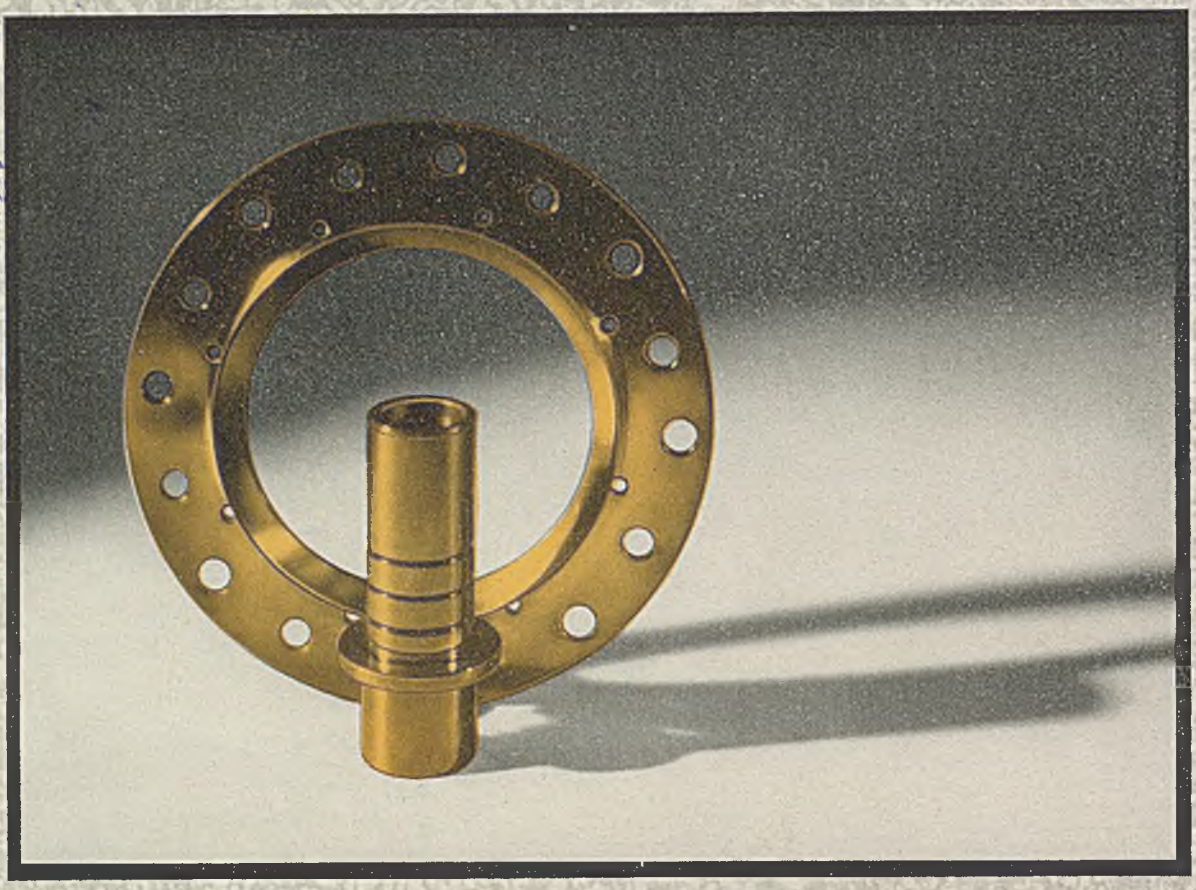

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Accurate Springs

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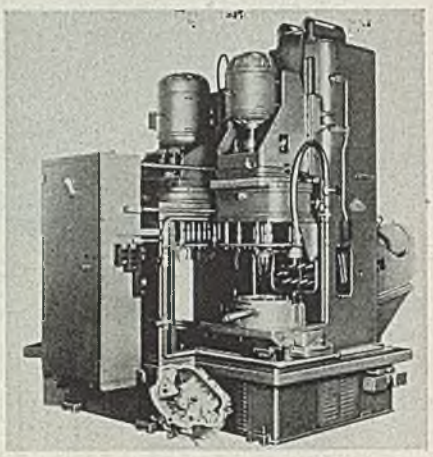
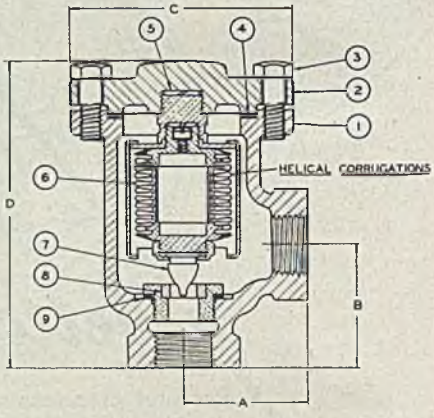
go through in the tapping cycle. When the taps have retracted, the fixture and slide automatically return to the loading station and the part is finished. All



lead screw tapping spindles are equipped with safety spindle ends and floating tap holders. The safety device on the spindles goes into action when the hole is shallow or too small or if the tap is dull or tap hole has not been drilled.

Thermostatic Steam Traps

Sarco Co. Inc., 475 Fifth avenue, New York 17, announces a new line of thermostatic steam traps made possible by the manufacture of bellows from heavy wall bronze tubing, drawn and helically corrugated. These traps are



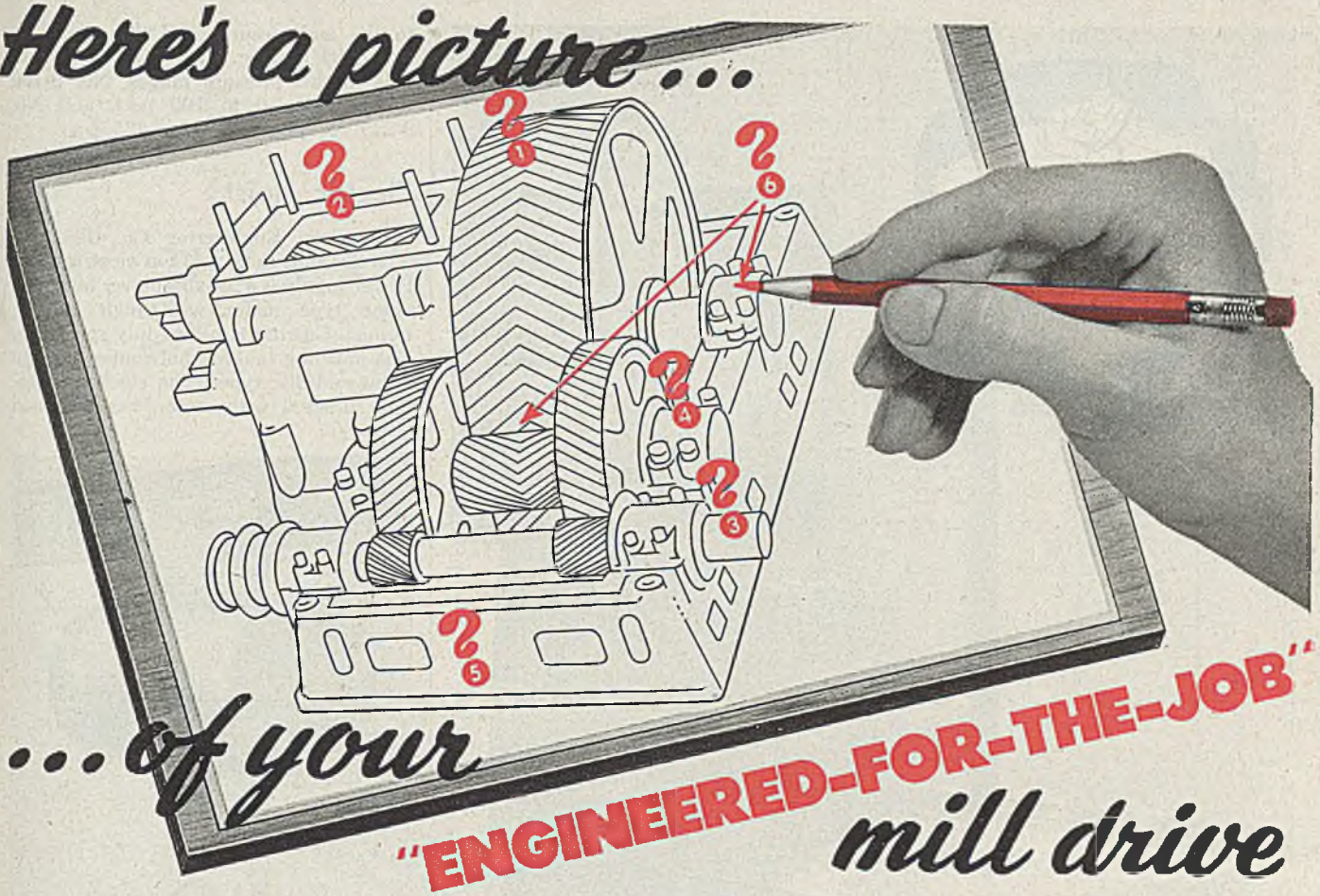
for pressures up to 225 p.s.i., using single, large diameter bellows, and for inlet sizes ½ to 2 inches inclusive. Capacities are double those of the company's No. 9 series.

Due to the lifting power of the thermostatic element, these traps have much larger valve orifices than can be provided on float or bucket types. This means several times the air venting capacity and therefore, very rapid heating up from a cold start.

Numerals in the accompanying illustration of the construction indicate (1) body, cast iron; (2) cap, cast iron; (3) cap screws, steel; (4) cap gasket, asbestos; (5) lockwasher, steel; (6) element assembly; (7) head, stainless steel; (8) seat, stainless steel; (9) seat gasket, asbestos.

The heavy wall bellows is screwed in-

Here's a picture...



...of your "ENGINEERED-FOR-THE-JOB" mill drive

The design specifications of the six vital parts of your rolling mill drive are questions on which Farrel engineers can give you sound advice when they know the job the drive will have to do.

FARREL ROLLING MILL MACHINERY

- Rolls
- Rolling Mills
- Rod Mill Tables and Manipulating Equipment
- Universal Mill Spindles
- Rod Coilers
- Gears
- Mill Pinions
- Pinion Stands
- Gear Drives of any Capacity
- Flexible Couplings
- Roll Grinding Machines
- Roll Calipers
- Lead Presses for Pipe or Rod

Since every Farrel gear unit is engineered to fit the job, the design is influenced by many factors of the proposed application. Power and speed . . . type and gauge of metal to be rolled . . . process (hot or cold) . . . nature of load (continuous or intermittent) . . . type of drive motor . . . all are taken into account before the size, material and type of construction are specified for the following parts:

1. **GEARS** — Usually continuous tooth herringbone—the *Gear with a Backbone*—accurately generated by the Farrel-Sykes process. Single helical or a combination of single and double helical gears are also furnished.

2. **MILL PINIONS** — These, too, are usually continuous tooth herringbone but single helical pinions can also be supplied.

3. **SHAFTS** — Of ample size to provide the rigidity necessary to prevent deflections and keep the gears in exact alignment. They are precision ground to close tolerances and accurately mounted in their bearings.

4. **BEARINGS** — Any approved make of anti-friction bearings or babbitt-lined, steel-backed, sleeve bearings can be furnished.

5. **HOUSINGS** — Cast steel, cast Meehanite, welded steel, or a combination of cast and welded construction. Bases are of heavy section for maximum strength and rigidity. Double-walled or single-walled, depending on load conditions.

6. **LUBRICATION** — Spray lubrication of the gear teeth and flood lubrication of the bearings by built-in pump or by separately mounted, electrically driven pump equipped with filter. Some drives have dip and splash system.

After analyzing the job to be done, Farrel engineers design each gear unit to give smooth, quiet operation and trouble-free service under all conditions of rolling mill operation. They will be glad to discuss gear drive problems with you at any time—without obligation.

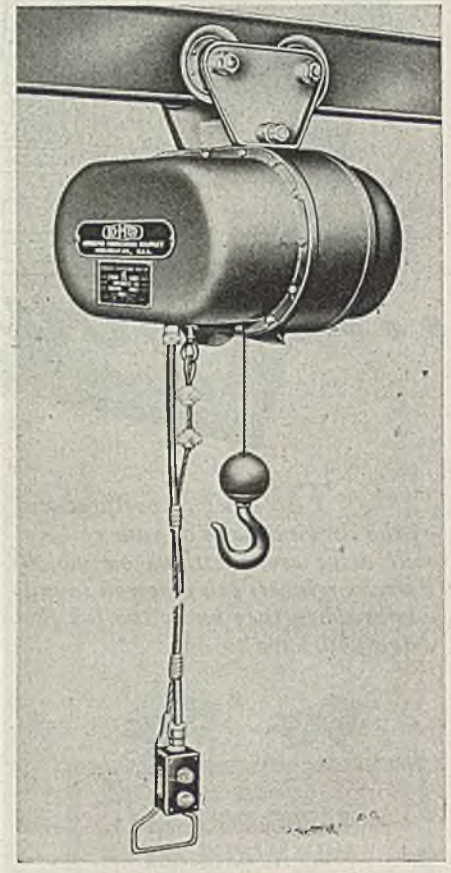
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Branch Offices: New York, Buffalo, Pittsburgh, Akron, Los Angeles

Farrel-Birmingham

to the end closures and the joints are sealed by brazing. The traps are available in two pressure ranges, No. 9-100 for pressures 0 to 100 p.s.i. and No. 9-225 for pressures 0 to 225 p.s.i.

Electric Hoist

American Engineering Co., Philadelphia 25, announces a ¼-ton electric hoist. Power supply is a ¾-horsepower hoist and crane type motor with high starting torque. Gearing is heavy-duty spur type. The lowering brake is automatic, Weston screw-and-disc type. The electric brake, built integral with motor, has full load



torque capacity. The push button control pendant and control cord are reinforced by a steel pull cable. Chassis is heavy-gage pressed steel.

The trolley is shockproof and designed to withstand the initial shock of electric hoisting and lowering. The body is dustproof and finished in a bright tangerine color.

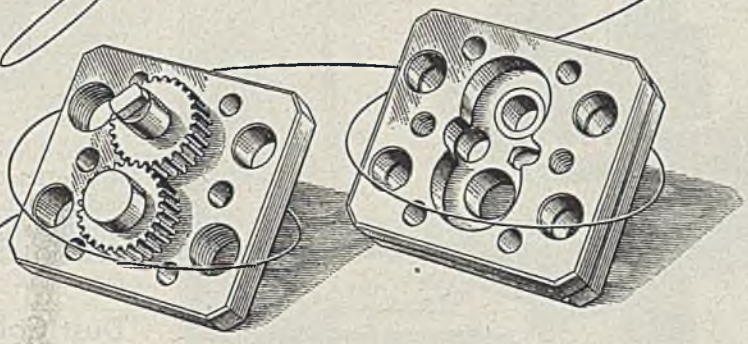
Safety Nut

A dual-purpose safety nut operating on the principle of the engagement of a snap ring in one of a number of longitudinal serrations in the bolt thread, is announced by Simlok Fastener Division, Simmons Machine Tool Corp., Albany, N. Y. With seven serrations on the bolt thread, there are 14 locking positions per revolution of nut. It can be used on any length thread.

Used as a stop nut, the serrations in the bolt thread are not necessary. When the nut is tightened and the locking

THE MASS-PRECISION STORY BEHIND

Nylon



Imagine a precision mechanism maintaining its "split-tenths" accuracy while spending its entire life submerged in molten fluid hot enough to soften armor plate in a few minutes.

Du Pont engineers posed this unusual manufacturing problem when they brought the designs of their first nylon pump to Nichols.

From the start, the required alloy stubbornly defied accepted machining and finishing methods, yet surface scratches had to average less than two-millionths of an inch. Lapping to ± .000025" and gears thicknessed to .00005" were specified, and the pump was to produce output pressures ten times that needed to make rayon.

Nichols overcame the combined obstacles of heat, pressure and machining to make the first nylon pump. Today these are exclusively manufactured here on a *strictly interchangeable parts and assembly basis* and are used wherever nylon is made.

Such accuracy in over forty years of *mass-precision* manufacturing is traditional at W. H. Nichols & Sons. Specialized facilities and advanced techniques in finish-grinding, lapping, hole location and sizing have developed other products that have been called "the most accurate assembly of commercial parts ever produced."

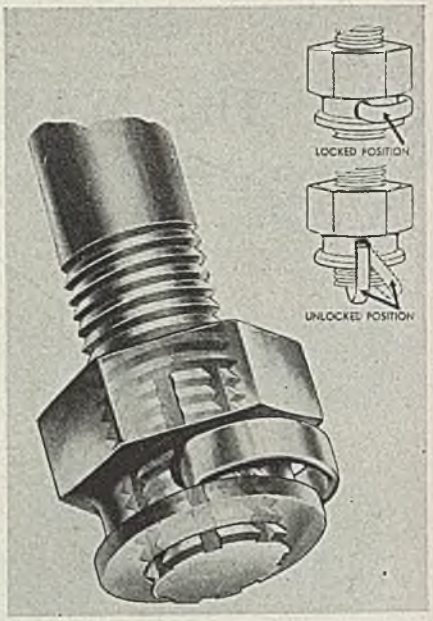
Have you a product design whose development has reached a manufacturing impasse? Then it's a job to discuss with "Accurate" Nichols.

W. H. NICHOLS & SONS, 48 WOERD AVENUE, WALTHAM 54, MASS.

"Accurate" Nichols

PRECISION ENGINEERING AND MANUFACTURING FACILITIES FOR MASS PRODUCTION.....

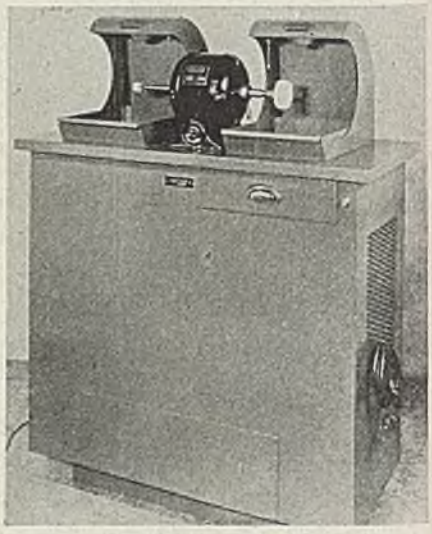
ring snapped in locked position, the spring pressure provides a stopping action. The nut withstands abnormal heat, moisture and oil conditions. It requires no additional torque or wrench-pull and



can be turned down by hand until work is contacted. Any standard open-end socket wrench will fit perfectly over the nut. It requires no special bolts. The locking ring is a permanent part of the nut.

Dust Collector

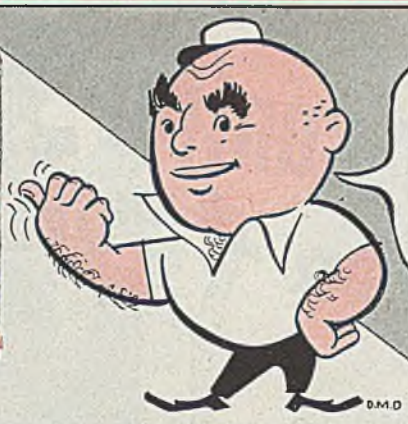
Designated as Lab-Bench, a new self-contained combination dust collector and bench designed for collecting both wet and dry dust, dirt, lint, pumice, etc., in dental and similar laboratory work is introduced by Aget-Detroit Co., 602



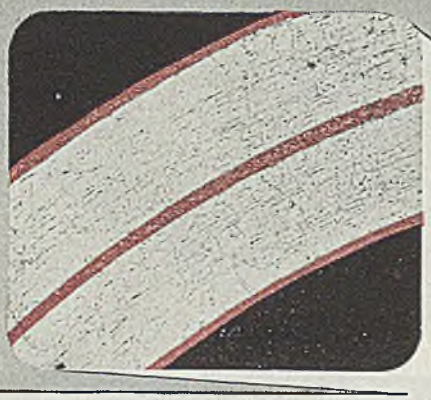
First National building, Ann Arbor, Mich. The unit requires no installation other than plugging in the cord to an electric outlet.

Due to the design, which permits all of the material to be separated out of the air stream before the latter enters the fan, any type of material can be handled without wear to the fan blades

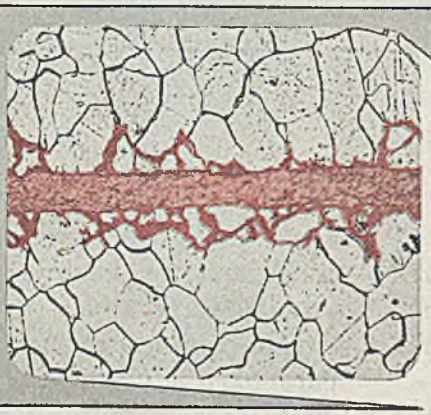
BUNDYWELD SPOTLIGHTED



SMOOTH JOINT . . . Note in this photomicrograph how the beveled edges of the strip produce a tube uniformly smooth on the outside and with no inside bead.



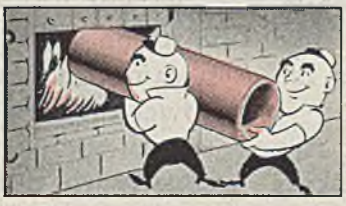
SOLID DOUBLE WALL . . . And note here how Bundyweld is made from a single steel strip laterally rolled twice for strength.



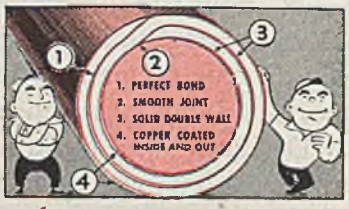
PERFECT BOND . . . This greatly enlarged view shows how the copper coating alloys with the steel throughout 360° of wall contact.

1 Bundyweld Tubing is made by a process entirely different from that used in making other tubing. A single strip of copper-coated S.A.E. 1010 steel is continuously rolled twice laterally...

2 . . into tubular form. Walls of uniform thickness and concentricity are assured by the use of close tolerance cold rolled strip. This double rolled strip passes through a furnace where the . . .



3 . . copper coating fuses and alloys with the double steel walls. After brazing and cooling, it becomes a *solid* double wall steel tube, copper brazed throughout 360° of wall contact . . .



4 . . copper coated inside and out, free from scale, and closely held to dimensions. Hard or annealed in standard sizes up to 5/8" O.D. Special sizes cold drawn. Also furnished in Monel.

BUNDY TUBING

ENGINEERED TO YOUR EXPECTATIONS

For help in planning, write Bundy Tubing Co., Detroit 13

BUNDY TUBING DISTRIBUTORS AND REPRESENTATIVES:

Pacific Metals Company, Ltd.
3100 19th Street
San Francisco 10, California

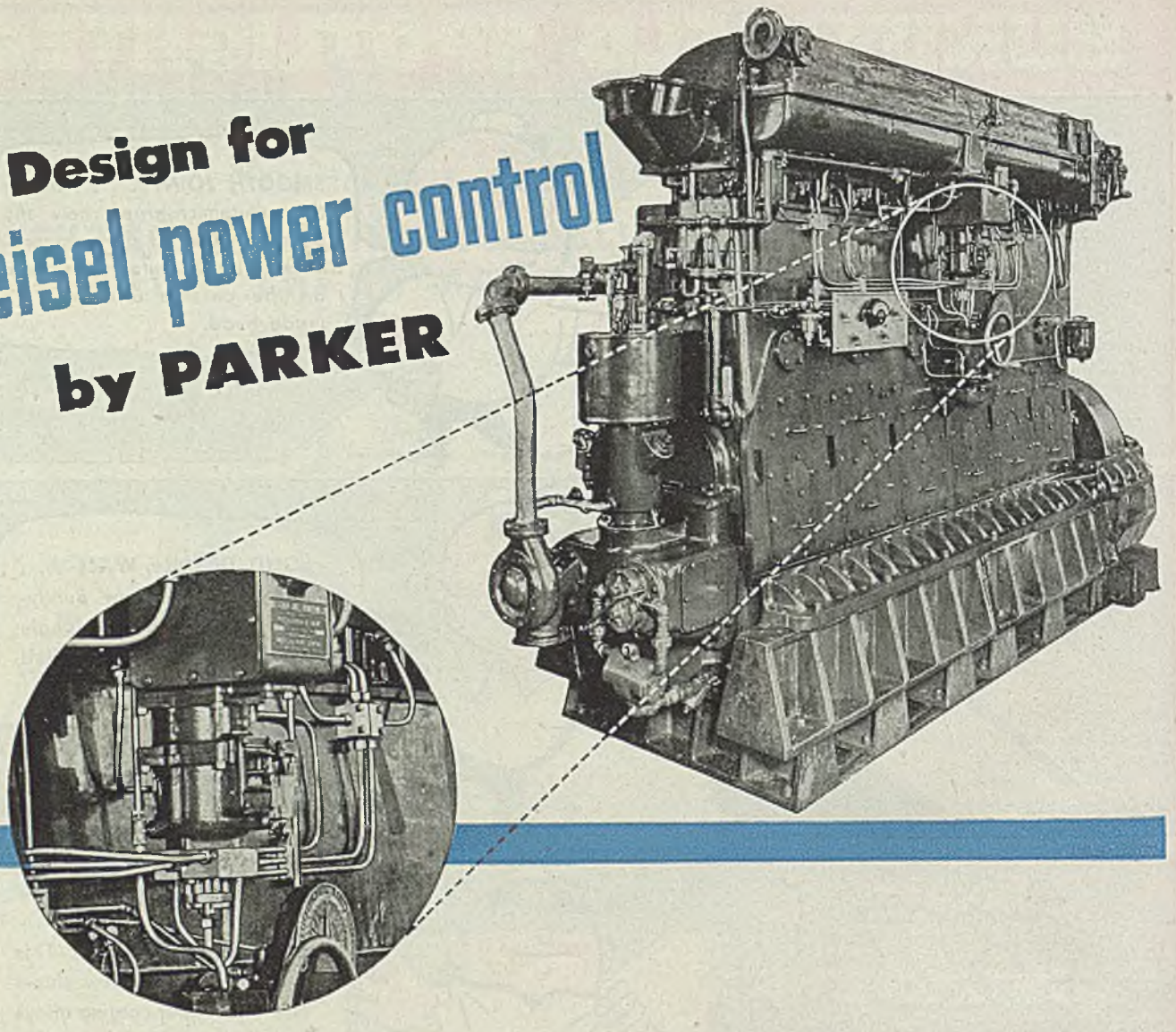
Standard Tube Sales Corp.
1 Admiral Avenue
Maspeth, New York City, N. Y.

Lapham-Hickey Company
3333 W. 47th Place
Chicago 32, Illinois

Rutan & Company
112 South 16th Street
Philadelphia 2, Pennsylvania

Eagle Metals Company
3628 East Marginal Way
Seattle 4, Washington

Design for deisel power control by PARKER



The "nervous" system and the circulation system of a Diesel power plant depend on tubing, with suitable fittings and valves.

Without the tubing installation, the engine can't run. And that's true of many other important kinds of machines.

Designing and building tubing installations, and making their valves and fittings, has been a Parker job for more than twenty years. We call it Fluid Power Engineering.

Parker is ready to supply you with hundreds of types of valves and fittings—all precision-built to precise specifications. Or with completely fabricated tubing jobs, ready to install.

And our Fluid Power Engineers are ready to work with you on plans and designs, with plenty of knowledge and broad experience to draw from.

Parker-Engineered tubing systems provide you with streamlined flow, to conserve power and lessen pressure drop—with compactness and neatness—with ease of access for service and maintenance—and with complete protection against leakage, even under conditions of high pressure, vibration and abuse.

This complete service, or any part of it, is yours to command, for improving present products or in planning for the future.

For more information, or for the service of a Parker Fluid Power Engineer, write to The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, O.

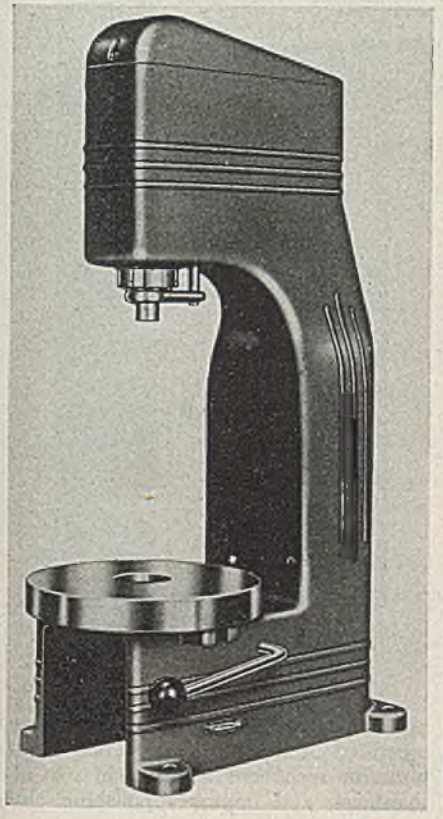
THE
PARKER
APPLIANCE COMPANY
CLEVELAND • LOS ANGELES
FLUID POWER ENGINEERING

or without damaging the blades of the fan. The large storage space for the collected dust and dirt is of sufficient size so that emptying it once every 6 months should be sufficient.

Each of the two hoods is equipped with a removable sludge pan and a baffle, as well as individual light sockets with pull chain control. A toggle switch on the front of the unit is for the control of the motor fan. A ¼-horsepower continuous duty 3450 revolutions per minute motor is direct-connected with the fan to supply a quiet suction of air, yet sufficiently powerful to remove all dusts. Standard motor is for operation on 110 volt, 60 cycle, 1 phase, alternating current, but it can be supplied with motors for operation on most other power characteristics.

Hydraulic Press

All working parts of the new air hydraulic press offered by Air-Hydraulics Division, Beyer Machine Co., Jackson, Mich., are contained in housing. There



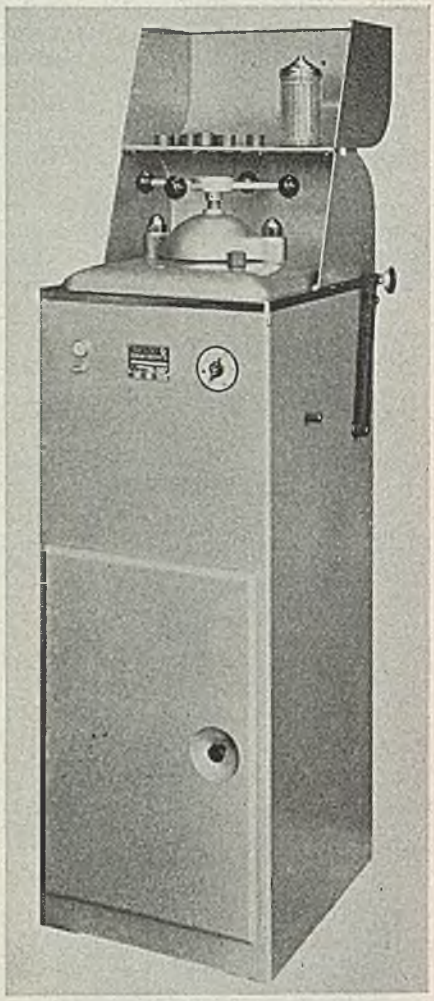
are no cams, levers, pins or gears in the pressure mechanism. The unit is powered by normal compressed air supply line which is multiplied by two hydraulic cylinders at a ratio of 50 to 1.

The unit is small enough for the lightest press job and powerful enough for many operations being done on presses five times its weight. It has positive control of pressure by adjustment of air regulating valve. Predetermined pressure is delivered regardless of varying thickness of work piece. It may be used for stamping steel, copper, wood, plastics, etc. Controlled pressure and the fact that varying thickness does not affect the depth of the imprint makes it

ideal for this type of work. It can also be used for riveting single or multiple arrangements of solid tubular and split rivets; inserting metal parts, drill bushings, terminals, press assembly operations; forming and punching.

Mounting Press

Utilizing air which is automatically set by a constant pressure reducing valve, the semiautomatic air operated specimen mounting press announced by Precision Scientific Co., 1750 North Springfield



avenue, Chicago 47, eliminates the hand operated hydraulic jack. This assures uniform specimens identical in size and hardness, and improves polishing characteristics.

Flanging Press

A new 500-ton flanging press of the gap type is announced by Watson-Stillman Co., Roselle, N. J. The press has a frame of welded steel construction to enable it to handle heavy plate work. It has a dual delivery pump, high and low pressure, driven by a 20 horsepower motor and has a capacity of 103 gallons per minute at low pressure and 14.7 at high pressure. It has an operating pressure up to 2900 p.s.i.

The vertical or main ram has a capacity of 500 tons; stroke, 12 inches; depth of throat, 28 inches; size of mov-

A NEW SERVICE by VINCO

MEMO..... from the desk of the Exec. Vice President

Att. Advertising Dept.

PRECISION PARTS ON A PRODUCTION BASIS

This is an important subject - mass production of precision parts is a serious problem in many plants - Stress fact that we produce precision parts on schedule in quantity, to exact specifications - Should interest Mechanical Industries greatly - Photo is ample proof that "Millionths of an inch for sale by VINCO" is a working slogan worth investigating.

MILLIONTHS OF AN INCH FOR SALE BY VINCO

REG. U. S. PAT. OFF.

VINCO CORPORATION, 8863 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN; SALES OFFICES, NEW YORK, CHICAGO, CLEVELAND

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development.

ing platen, 36 x 36 inches; size of bed, 66 x 55 inches. The horizontal ram has a capacity of 250 tons; stroke, 7 inches; size of clamping platen, 24 x 24 inches.

Dust Collector

A new unit type dust collector is announced by Ideal Commutator Dresser Co., 5076 Park avenue, Sycamore, Ill. Five hundred cubic feet per minute is developed through the two inlets by a 3/4-horsepower, 3450 revolutions per minute motor, driving a 7½-inch diameter by 2-inch wide squirrel cage blower wheel.

Dust laden air is drawn through the inlet pipes into twin cyclone separators where it is whirled around at high

speeds. The dust particles being heavier than air move more slowly and drop down into the dust drawer. The lighter air passes on through a viscous coated filter where very fine dust is removed. Clean air is discharged back into the room. The two 3-inch diameter inlets can serve either one or two machines.

The filter consists of 20 layers of viscous coated filter paper. To restore the filter's efficiency after it becomes dirty, it is necessary to peal off the first two layers. This can be done five times without affecting its cleaning ability. Under average conditions a filter lasts approximately a year or more.

Mobile Crane

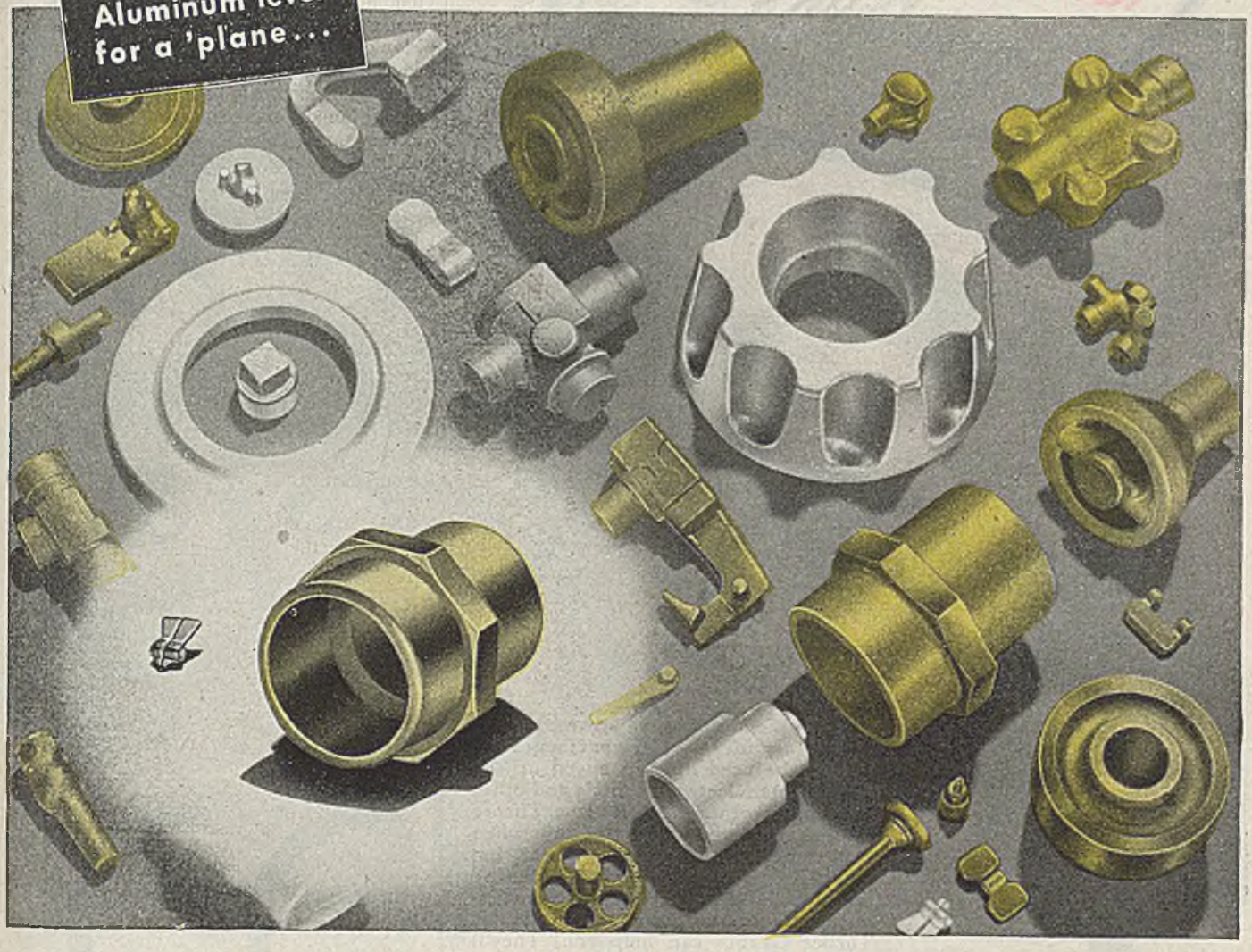
The full-vision cab of the new crane offered by Unit Crane & Shovel Corp., Milwaukee 14, affords the operator an unobstructed view in all directions at all times. The design of this cab has been accomplished without sacrificing weight, capacity, or head room.

The self-propelled, one-man operated crane is powered by a single engine, either gasoline or diesel and is equipped with an all-purpose, jib-extension boom for multiple yard operations. The rated lifting capacity of the crane is 5 to 7 tons from the 30 foot straight lattice boom and the 8 foot jib extension will handle 4000 pounds. The jib is designed for close-in operations. With this dual purpose boom each cargo hook works independently, one hook available for light, close-up work and the other for heavy lifts.

Brass coupling for a hose... Aluminum lever for a 'plane...

SCOVILL FORGINGS

for strength, uniformity, economy



Couplings for fuel oil and gasoline hoses must absorb a lot of wrench abuse. So Scovill *forges* them of brass to give them the kind of toughness only forging provides. And by ingeniously forging them without webs on the inside, Scovill saves weight on the couplings and reduces scrap.

Tiny levers for an aircraft application must be dense and uniform so that the ten thousandth piece will be as safe and dependable as the first. So Scovill *forges* them of aluminum... two levers in the same die...and saws the forging in half for more economical production.

When Scovill's ingenious designing, expert die-making, knowledge of metal behavior, diversity of metal-working facilities and years of experience are focused on a problem in metal parts, they invariably arrive at the *one* best answer. That's why records of Scovill production for more than 3000 firms show that Scovill usually produces metal parts better at the same price or equally good at lower cost.

Remember—Scovill works in all metals with such processes as forging, drawing, stamping, casting, pressing and finishing ...and therefore can honestly recommend the one best process for solving your problems in metal parts production. For proof of Scovill's ability, fill in the coupon below and get the free booklet *"Masters of Metal"*.

Scovill
MANUFACTURING COMPANY
WATERBURY 91, CONN.

Please send me a free copy of *"Masters of Metal"* booklet describing your facilities. I am interested in the metal forgings applications checked.

☐ Valves, Torch Heads, Regulators, for compressed gas cylinders, Welding and Blow Torches, etc. ☐ Household Appliance Parts ☐ Plumbing Goods (valves, etc.) ☐ Industrial Instrument Parts ☐ Aircraft Parts ☐ Communications Equipment Parts ☐ General Electrical Product Parts ☐ Fire Extinguishers ☐ Cameras ☐ Oil Burners ☐ Band Instruments

Other applications.....

SCOVILL MANUFACTURING COMPANY

Forgings Division
20 Mill Street, Waterbury 91, Connecticut

Name .....

Company .....

Address .....

Faster and Better Milling

(*Continued from Page* 107)

friction"[4] from which the following excerpts are taken:

"Being engaged, lately, in superintending the boring of cannon, in the workshops of the military arsenal in Munich, I was struck with the very considerable degree of heat which a brass gun acquired, in a short time, in being bored; and with the still more intense heat (much greater than that of boiling water, as I found by experi-

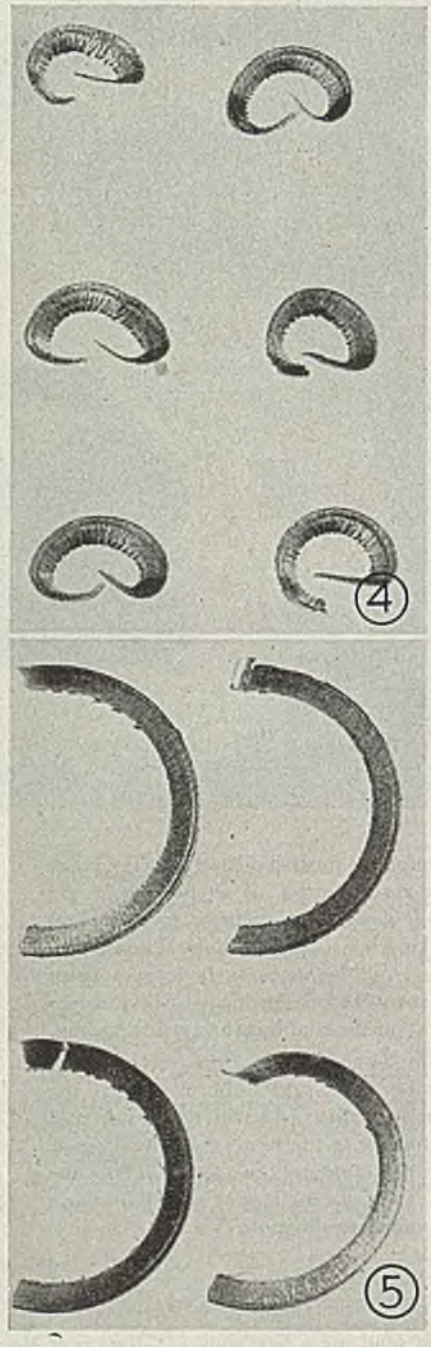


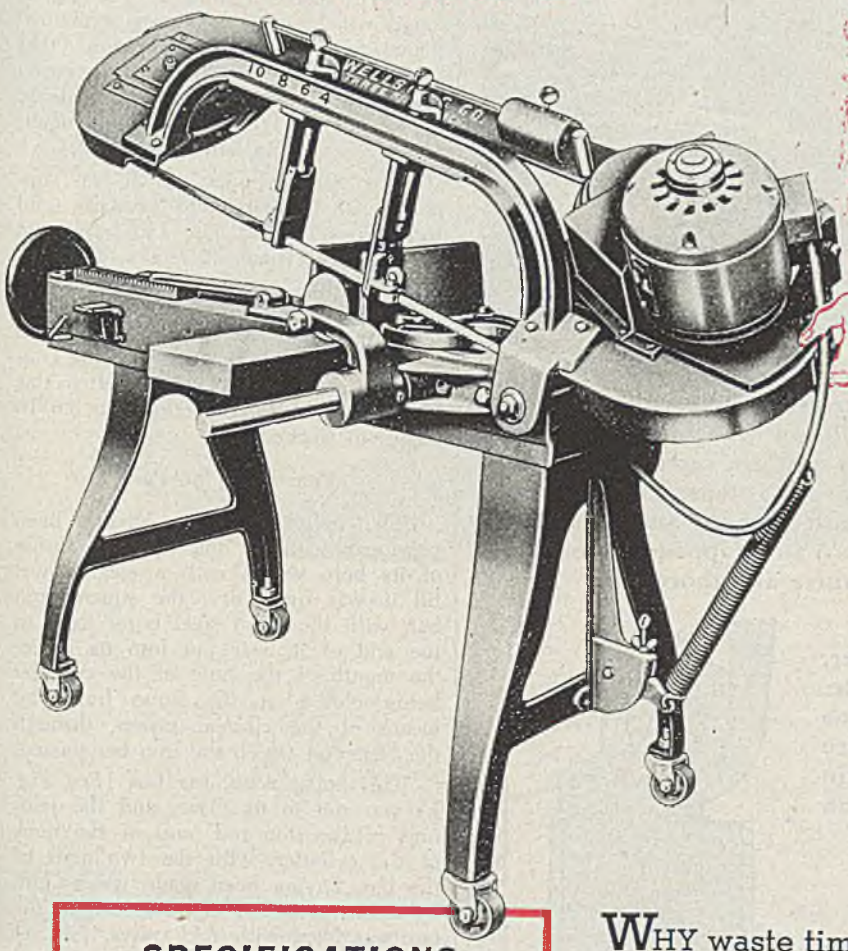
Fig. 4—Blue steel chips produced by cutter of conventional design at a cutting speed of 465 fpm

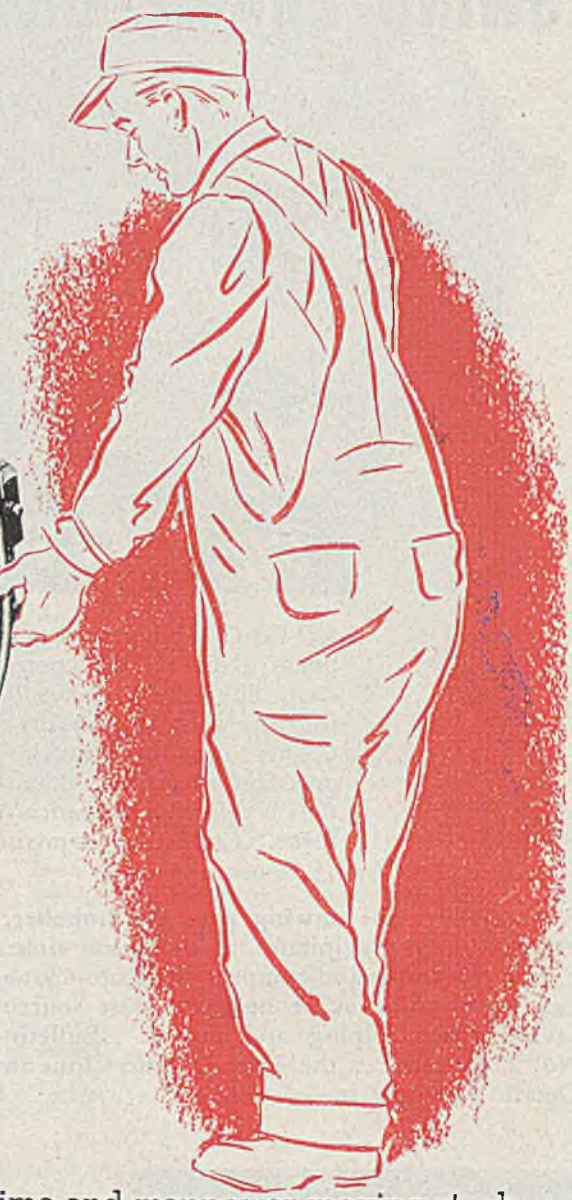
Fig. 5—Straw-colored steel chips produced under the same conditions as those in Fig. 4 but with a cutter of improved design

. . . if it's easier

to move the saw to the work

get a *Portable* WELLS No. 8





SPECIFICATIONS
WELLS No. 8

CAPACITY: Rectangular . . 8"x16"
(Special Guides) . . . . 5"x24"
ROUNDS: . . . . . 8" diameter
MOTOR: . . . ½ H. P., A. C. or D. C.
SPEEDS: . . . . Selective 60, 90, 130 feet per minute.
WEIGHT: . Approximately 750 pounds

WHY waste time and manpower moving stock to a fixed saw—it's easier to roll a portable Wells right where you want the cutting done. The Wells cuts quickly, most any shape or size metal you can get into it . . . with a minimum of labor. Easy to use, economical, this handy Wells No. 8 frees larger units for production work, pays for itself in time and labor savings. Write for details.

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

ment) of the metallic chips separated from it by the borer.

"Taking a cannon, (a brass six-pounder) cast solid, and rough as it came from the foundry, and fixing it horizontally in the machine used for boring, and at the same time finishing the outside of the cannon by turning, I caused its extremity to be cut off; and, by turning down the metal in that part, a solid cylinder was formed, 7¼ inches in diameter, and 9 8/10 inches long; which, when finished, remained joined to the rest of the metal (that which, properly speaking, constituted the cannon) by a small cylindrical neck, only 2 1/5 inches in diameter, and 3 8/10 inches long.

"This short cylinder, which was supported in its horizontal position, and turned round its axis, by means of the neck by which it remained united to the cannon, was now bored with the horizontal borer used in boring cannon; but its bore, which was 3 7/10 inches in diameter, instead of being continued through its bottom was left to this hollow cylinder, which bottom was 2 6/10 inches in thickness.

Preparation of Parts

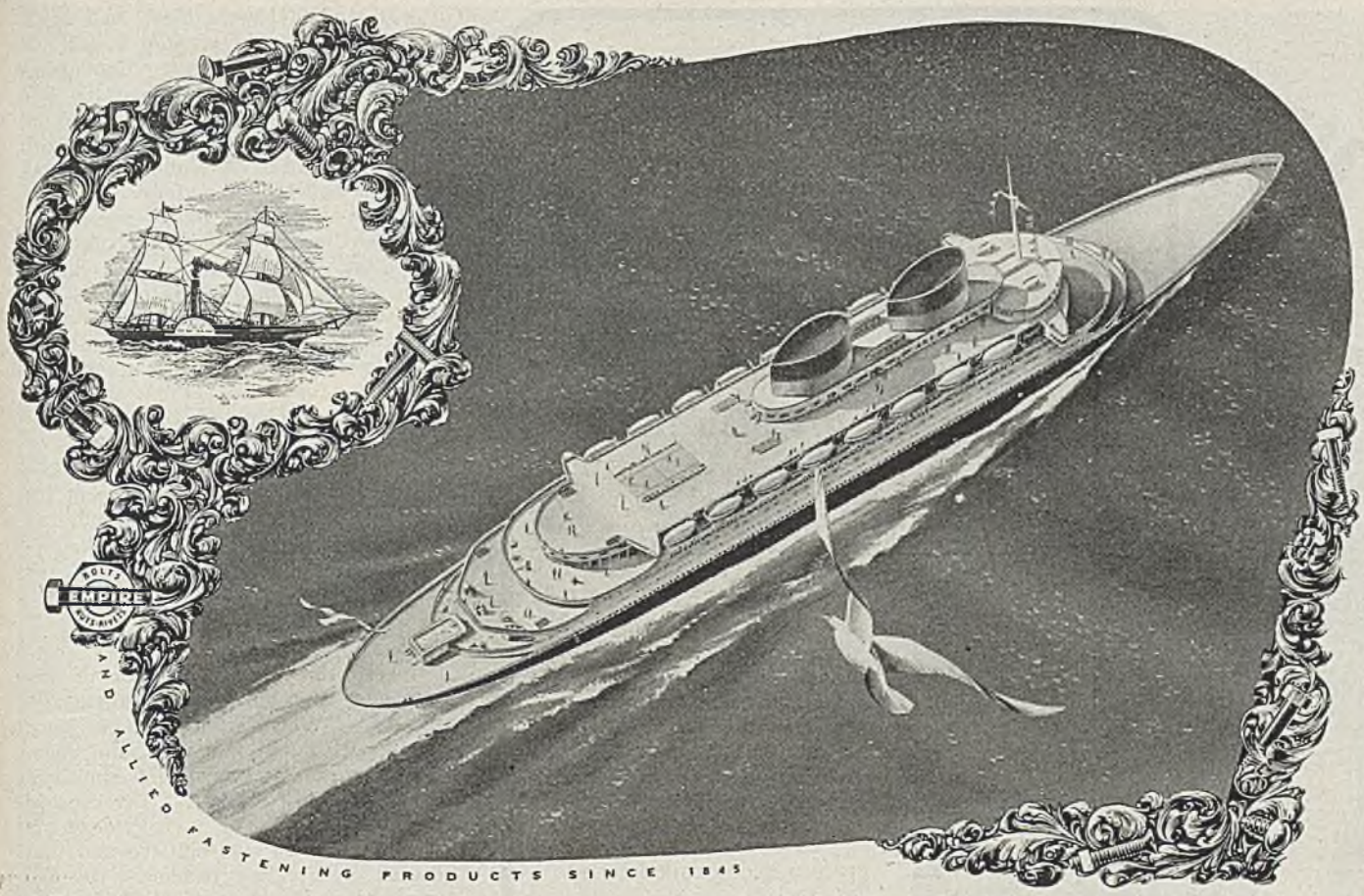
"The hollow cylinder having been previously cleaned out, and the inside of its bore wiped with a clean towel till it was quite dry, the square iron bar, with the blunt steel borer fixed to the end of it, was put into its place; the mouth of the bore of the cylinder being closed at the same time, by means of the circular piston, through the center of which the iron bar passed.

"This being done, the box (See Fig. 1) was put in its place, and the joinings of the iron rod, and of the neck of the cylinder, with the two ends of the box, having been made water-tight, by means of collars of oiled leather, the box was filled with cold water, (viz. at the temperature of 60 degrees Fahr.) and the machine was put in motion.

"The cylinder, revolving at the rate of about 32 times in a minute, had been in motion but a short time, when I perceived, by putting my hand into the water, and touching the outside of the cylinder, that heat was generated, and it was not long before the water which surrounded the cylinder began to be sensibly warm.

"At the end of the 1 hour I found, by plunging a thermometer into the water in the box, (the quantity of which fluid amounted to 18.77 pounds avoirdupois, or 2 1/4 wine gallons) that its temperature had been raised no less than 47 degrees; being now 107 degrees of Fahrenheit's scale.

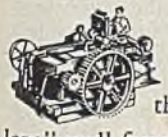
"When 30 minutes more had elapsed, or 1 hour and 30 minutes after the machinery had been put in motion, the heat of the water in the box was 142 degrees Fahr. At the end of 2 hours, reckoning from the beginning of the experiment, the temperature of the water was found to be raised to 178 degrees Fahr. At 2 hours 20 minutes



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

NO. 5 *Marine*

A *White Spread* OF CANVAS . . .
A PATH OF CHURNING FOAM



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it was at 200 degrees Fahr.; and at 2 hours 30 minutes it *actually boiled!*"

This was an important observation, especially in those days when the accepted theory was that heat was a kind of fluid. Rumford was one of the first to challenge the philosopher who held this belief. He performed and recorded a number of other experiments in which he proved that friction generates heat. Fig. 1, which was drawn from an illustration in his book, shows how he arranged the necked end of the cannon barrel so that tool and work were immersed in water during the boring operation. From these observations he computed the power consumption.

Despite Rumford's proofs, the philosophers of his day did not accept his findings which were later confirmed in general when Joule, in 1840, performed his famous experiments on the mechanical equivalent of heat.

Thermodynamic Law Determined

Joule used various methods of determining the first law of thermodynamics: "When work is transformed into heat, or heat into work, the quantity of work is mechanically equivalent to the quantity of heat." His classical experiment employed a calorimeter in which the water was agitated and thus heated by rotating paddles. He also used beveled cast iron wheels pressed against one another under water and observed the increase in temperature caused by the resultant friction[2].

In 1860, the French engineer Hirn[3] performed a number of experiments on the mechanical equivalent of heat by boring and deforming metal. His skill as an experimenter should be noted because the values he established were very close to those determined by Joule, which are modern standards. In 1882 the American Society of Mechanical Engineers elected Hirn an honorary member.

Although many investigations have been carried out in the metal cutting field concerning power consumption and efficiency of tools, surprisingly little use has been made of calorimetric measurements[4].

When an investigation of high-speed milling was initiated by the Kearney & Trecker Corp., the calorimetric method was chosen for the establishment of basic data after a survey of available test equipment had been made.

The apparatus used is shown in Fig. 2 and is simple, inexpensive, and reliable[5]. The power required by the tool is determined from the heat in the chips. Distilled water is employed as the medium for measuring the quantity of heat generated by a combination of friction and deformation in the chips during the cutting operation. Power measurements with this equipment do not represent the full value but only that portion which has been converted into heat in the chips.

However, additional experiments brought out that the percentage of

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total power going into the chips remained constant for all the different cutter angles which were investigated. This type of test excludes errors due to motor and gear variations. The most valuable characteristic of this method is the consistency with which test results can be duplicated within close limits at any time. It is possible to study the effects of workpiece materials, feeds, speeds, and tool angles, on the power requirements of the tool and the temperature of the chips by noting the temperature change of the water into which the chips fall.

Net horsepower expended on the chips is the mechanical equivalent of the heat increase in the calorimeter per unit time.

Therefore

$$\text{Net hp} = \frac{(\Delta T)\ (\text{Water equivalent})}{(\text{Cutting time, min.})\ (42.44\ \text{Btu/min})}$$

where

ΔT = Calorimeter temperature rise °F.

1 hp = 42.44 Btu/min

In these particular tests the cut was 1 inch long, the cutting time, therefore, could be expressed as the reciprocal of the feed rate F in inches per minute or 1/F. The water equivalent for the calorimeter, steel chips, and water was 0.2452 pound. Then

$$\text{Net hp} = \frac{(\Delta T)\ (0.2452)}{(1/F)\cdot(42.44)}$$

From the product of the temperature rise of the calorimeter and the weight of water plus the water equivalent of the calorimeter, the quantity of heat given off by the chips was determined. Before the chips fell into the water this quantity of heat existed in these chips alone. It was therefore possible to compute the maximum average chip temperature by the process of thermal balance commonly used in calorimetric tests.

$$(\Delta Tc)\ (\text{chip wt})\ (\text{sp ht}) = (\Delta T)\ (\text{Water equivalent of calorimeter, chips and water})$$

where ΔTc = average temperature rise of chips, °F

ΔT = temperature rise in calorimeter, °F

The change of specific heat of the steel with increasing temperatures was not taken into account in the above formula. With the specific heat values of gamma iron, a corrected average chip temperature value was computed for cutting tests in which the testbar material was SAE-1055.

With this equipment several thousand tests were run and the resulting information permitted a mathematical analysis of the face milling process at both low and high cutting speeds.

Since it was recognized that the horsepower consumption was affected chiefly by the radial rake angle, the test cutters were made identical except for this angle which was varied from 30 degrees negative to 30 degrees positive[6]. It was found that the power required at the cutting edge is higher

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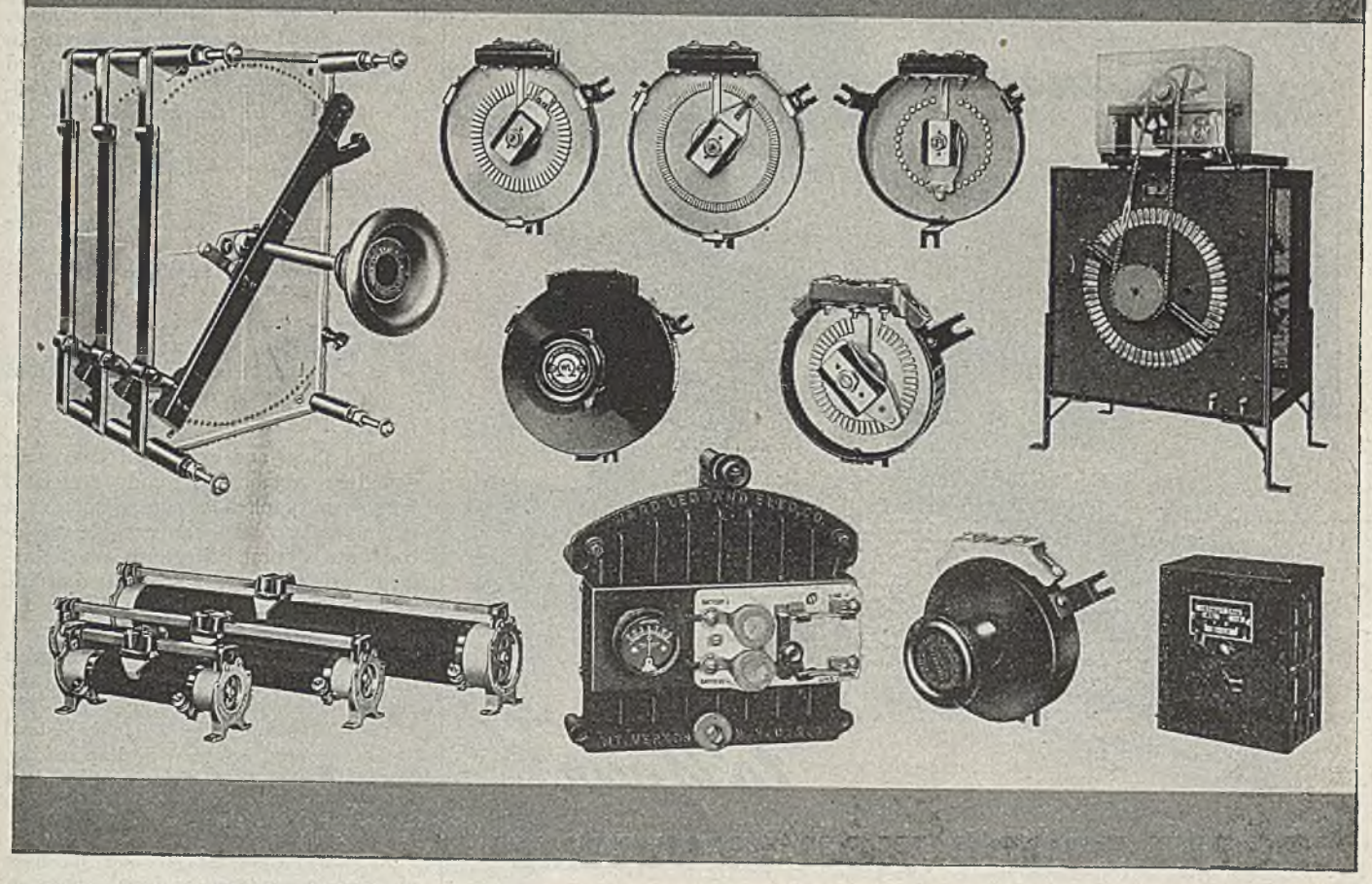

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for the negative radial rake cutter than for the cutter with positive radial rake angles. This held true for conventional as well as high cutting speeds. But cutters with negative radial rake angles would stand up longer at the higher speeds than positive radial rake cutters under identical conditions. Fig. 3 shows the relation between net horsepower and feed per tooth at cutting speeds of 285 and 785 feet per minute.

For a given rake angle, the increase in net horsepower with an increase in feed has a relationship which is always definite and can be determined from the logarithmic graph as

$$hp = Cn\ Nf^a$$

in which

C = constant depending upon the radial rake angle
n = number of revolutions per minute of cutter
N = number of teeth in cutter
f = feed in inches per tooth
a = exponent determined as 0.85 from values plotted on log paper

Once these and additional data were definitely established and correlated they were applied to the design of a milling cutter. It was possible to incorporate desirable features and eliminate those which were detrimental. This resulted in a better and more effective tool for high speed milling.

There are two major requirements for a cutter which will give satisfactory cutting action and tool life:

1 — A cutting edge which will stand up and not wear or chip readily.
2 — A tool shape which will reduce the deformation in the chips and workpiece.

As the cutting speed and hardness of the workpiece material increase, these two requirements assume greater importance. The first requisite can be satisfied with negative radial rake angles and carbides on the cutting tips; the second is achieved by simultaneously providing a positive radial rake angle for improving chip flow.

In Fig. 4 are shown chips which are much compressed and deformed produced by a cutter of conventional design. In Fig. 5 are chips taken with a cutter the design of which was based on research data. These latter chips have been removed with less power because the cutter design eliminated a large percentage of the deformation and attendant heat in the chip. Thus it has been demonstrated that a thermodynamic principle can be employed to improve what is commonly known as shop practice.

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[2]"On the Mechanical Equivalent of Heat," by J. P. Joule, Philosophical transactions of the Royal Society of London, 1850, pp. 61-82.

[3]"Theorie mechanique de la chaleur," by

"Takes me a Lot Less Work to get More Work Done...

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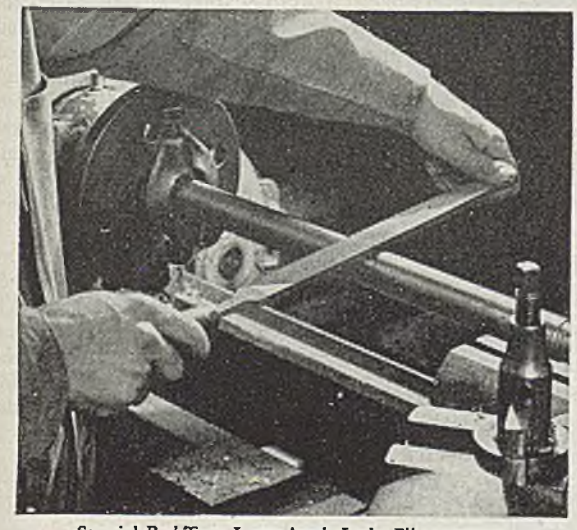

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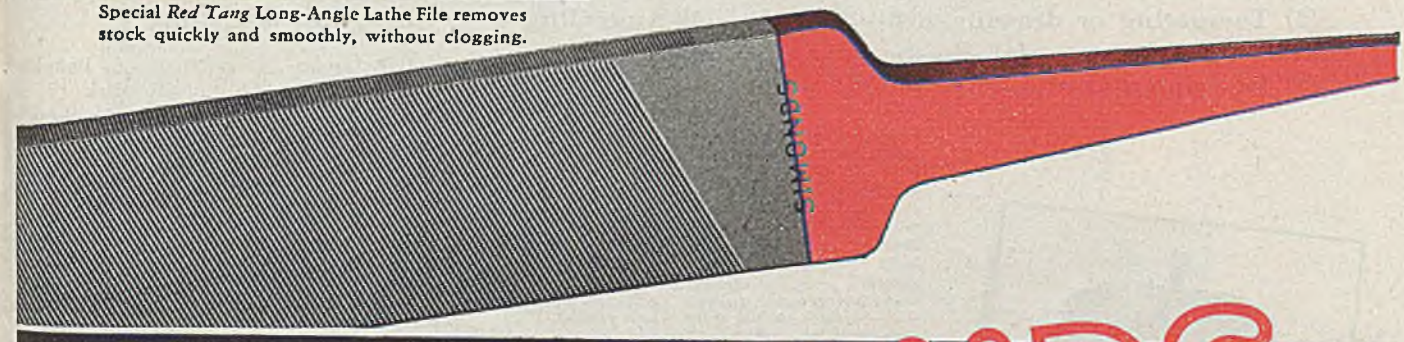

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G. A. Hirn, third edition, Gauthier-Villar, Paris, Vol. 1, 1875, pp. 91-118.

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Magnesium Subject of Educational Program

A sound film depicting the production and fabrication of magnesium, with particular emphasis on foundry operations, and an educational exhibit of various types of magnesium products, has been made available to scientific groups and industries by Hills-McCanna Co., 3025 North Western, Chicago.

Among features of the display are sand castings of airplane engine parts, landing wheels, portable and manually handled tools, household appliances, and die and permanent mold castings. Also included in the exhibit are products from magnesium sheet, rod, tube, and extrusions and forgings. There are talks by company officials, and as souvenirs, the company distributes magnesium disks and a booklet entitled "A Tour of a Modern Magnesium Foundry".

Hills-McCanna, along with Dow Chemical Co. and Revere Copper & Brass Corp., has been conducting a number of such programs in conjunction with engineering, purchasing and technical societies. A duplicate of the film may be obtained by any company wishing to have private showing.

Plastic Valve Is Corrosion Resistant

Polystyrene, a product of Bakelite Corp., 30 East 42nd, New York 17, is used for a simplified molded ball-cock valve with only two moving parts as compared to twelve in the original metal counterpart. Four ounces of this material are used where forty ounces of metal were formerly necessary, a saving in weight of 90 per cent. Parts for two complete units are injection-molded every 35 seconds. This lowers production costs, as each part of the metal valve was cast, machined, drilled, tapped, and threaded by hand before assembly. This plastic valve, molded by Plastics & Rubber Products Co., is said to be resistant to corrosion and scale.

—o—

Protective sleeves made of fabric coated with vinyl resin have been added to the line of industrial clothing of B. F. Goodrich Co., Akron, O. Sleeves are of lightweight, pliable material, black outside and olive drab inside, with length of 16 to 17 inches. They offer protection against oils, most acids and alkalies.

Organic Finishes

(*Continued from Page* 109)

points for blistering under the paint film.

Vapor degreasing is used quite widely throughout various industries and is most effective as a multi-stage operation in which the work is subjected to the trichlorethylene vapor and is then passed through a liquid spray of the same material. This sequence of operations results in a fairly clean job, free of all grease and oil, and all mechanically adhering soil, if the sprays are properly adjusted.

Alkali cleaning and emulsion cleaning are other common methods of effectively removing grease, oil and water soluble matter from metal surfaces. These usually employ water solutions of compounds of sodium salts and other materials such as wetting or emulsifying agents frequently sold under various proprietary trade names. This type of cleaning is most effective when used in a three stage washer with two water rinses and is operated at an elevated temperature usually about 160 to 180 degrees Fahr.

Acid Cleaning Agents

Cleaning of the metal by one of the methods outlined previously may be sufficient preparation for certain types of work. However, in other cases where more is expected of the finishing system, it is necessary to further uniform and prepare the surface in order to obtain the maximum in terms of adhesion retention and moisture resistance. One method of doing this is treatment of the steel with an "acid-cleaning" agent, such as the familiar Metalprep or Deoxidine. There are many other acid cleaning agents of this type, most of which consist of phosphoric acid, together with some alcohol and usually a small percentage of an active wetting agent. These compounds may be of the wipe-off or wash-off type and are effective in removing a light oxide as well as etching the metal slightly and leaving a very thin phosphate film on the steel. Their use has been quite well established in the industry.

To go one step further, we come to the use of a phosphate coating by which we mean Bonderite or its equivalent. The Bonderite process involves the treatment of the steel with a solution of the zinc dihydrogen phosphate which results in the formation of a mixed zinc and iron phosphate coating on the steel surface. This coating is not very corrosion resistant by itself, but when used under a properly applied finish it adds greatly to the prevention of corrosion and blistering failure by virtue of its uniformity and lack of water sensitivity. In addition, its texture provides better tooth than is obtained on a smooth steel with the result that adhesion characteristics are improved. Several new phosphate coating metal treatments have appeared on the market. Examples of these are Deoxidine No. 210 and Oakite Crys-coat No. 86, which should be considered and evaluated. Our own tests have not pro-

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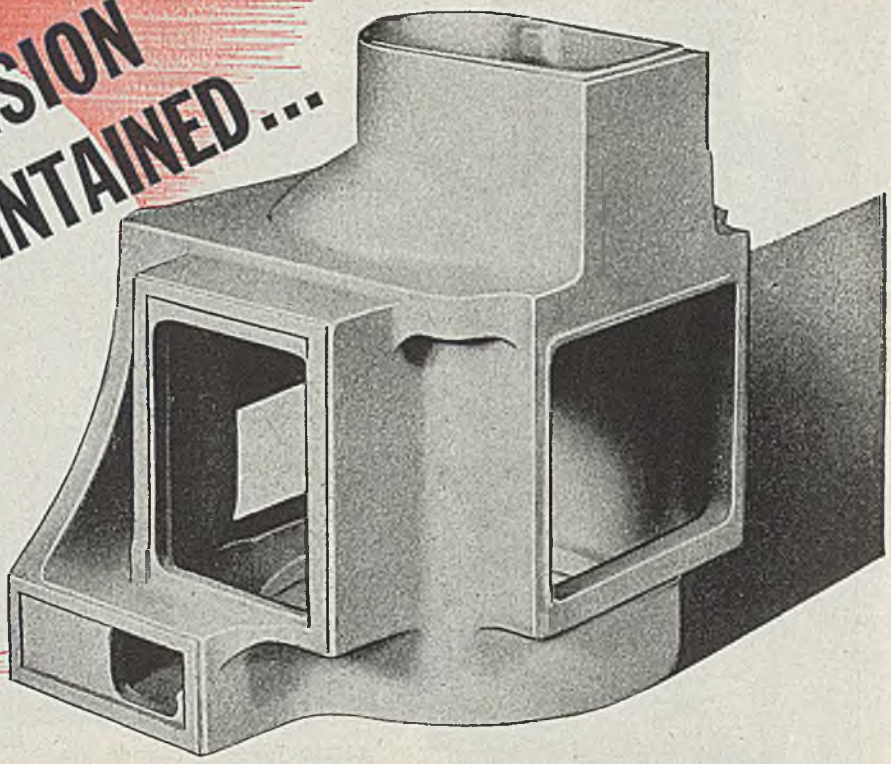

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PERMITE ALUMINUM ALLOY CASTINGS

gressed sufficiently to permit conclusions at this time.

In a similar manner, the treatment of zinc surfaces with a phosphate coating material, such as Bonderite, results in the formation of a zinc phosphate coating layer over the zinc. This coating is not affected by the acidic decomposition products of oleoresinous type vehicles, and therefore the reaction which results in poor adhesion on untreated zinc surfaces does not have an opportunity to take place. Lithoform No. 2 is another example of a material of this type which effectively transforms a zinc surface so that satisfactory adhesion results are obtained.

The surface treatment of aluminum and its alloys may require cleaning and a light chromic acid or phosphoric acid etch for certain purposes. Where greater corrosion resistance is required, particularly on the heat-treated alloys such as 17S and 24S, chemical treatment by the Alrok process, or by anodizing must be used.

Recommended procedures have likewise been established for all of the other less common metal surfaces.

Methods of Application: We have discussed at some length the surface preparation because of the great importance of this step in the proper finishing of metal surfaces. This brings us to methods of application which, I believe, we can deal with briefly primarily to mention a few principles that merit consideration. Various factors usually dictate the method of application that may be required and among which may be any one of the following:

Spray—either hand or mechanical
Dip—large or small dip tanks
Flowcoat
Rollercoat
Brush

Spraying is most generally used, although in this method there is considerable loss due to atomized finish that does not reach the object being sprayed. The efficiency of spraying is largely dependent upon the proper adjustment of air and fluid pressure and, in hand spraying, the operator's ability to avoid loss by cutting off the liquid flow promptly at the end of the stroke. Losses due to inefficient spraying often represent 60 per cent or more of the materials sprayed, and by proper adjustment can be reduced to 35 to 40 per cent. Spraying in an electrostatic field, as developed by Ransburg, will further reduce these losses where this type of installation is practical. To avoid dust from settling on the wet freshly finished ware, the room or booth in which spraying is done should be kept under low pressure of about ½-pound per square inch with a supply of filtered air.

Dipping, flowcoating, rollercoating and brushing are not subject to the type of loss of material incidental to spraying. Except for brushing, the use of these other methods of application is dependent on factors such as the size, shape, weight and contour of the object: For

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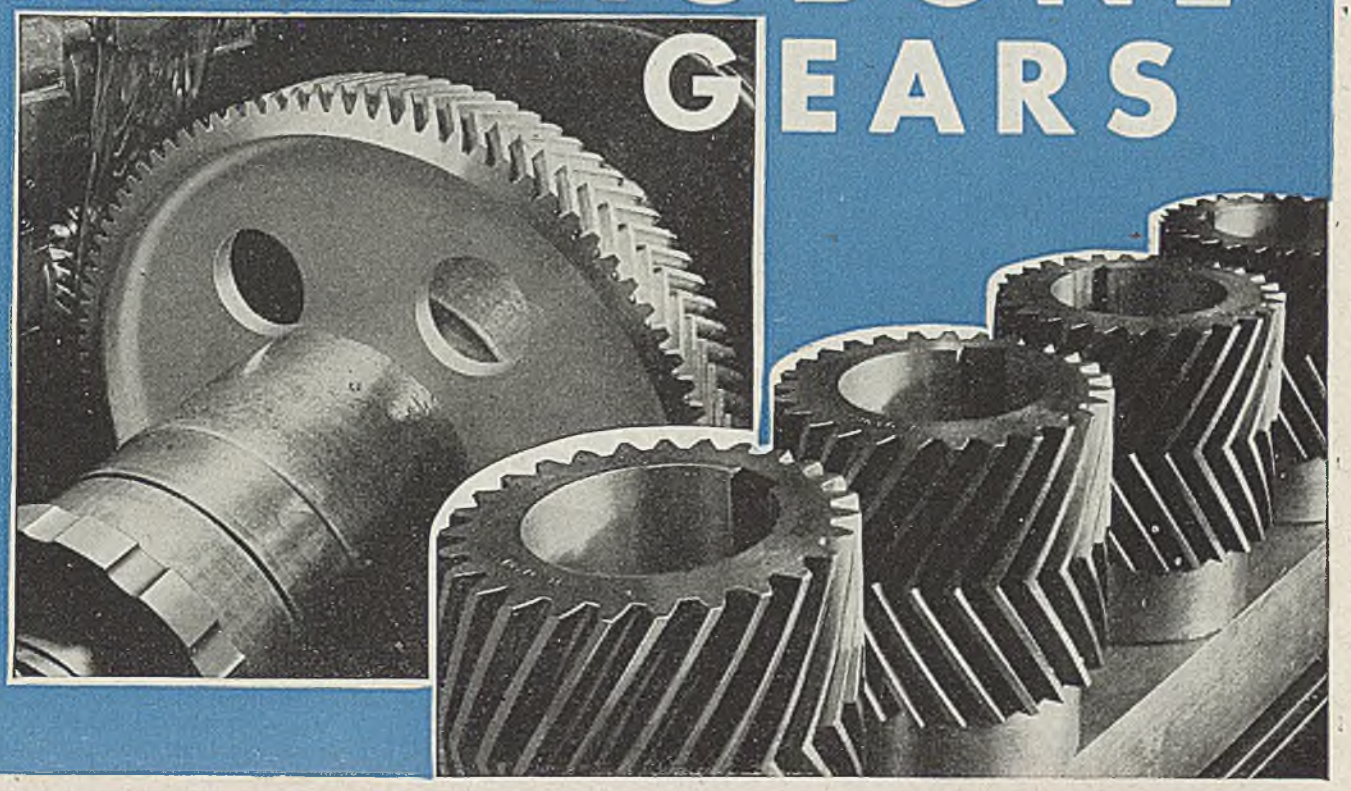

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example, rollercoating is practical only on flat sheets.

Dipping may be done in small dip tanks by hand dipping or in large dip tanks in connection with a conveyor operation. In the case of large dip tank installations, the size of the dip tank, the turnover or estimated consumption per month, the dimensions and shape of the part, and the conveyor speed or rate of withdrawal from the tank, must be determined to properly engineer for this method of application. With the proper adjustment of these factors and our system of dip tank control eminently satisfactory results can be anticipated based on many years of successful performance experience.

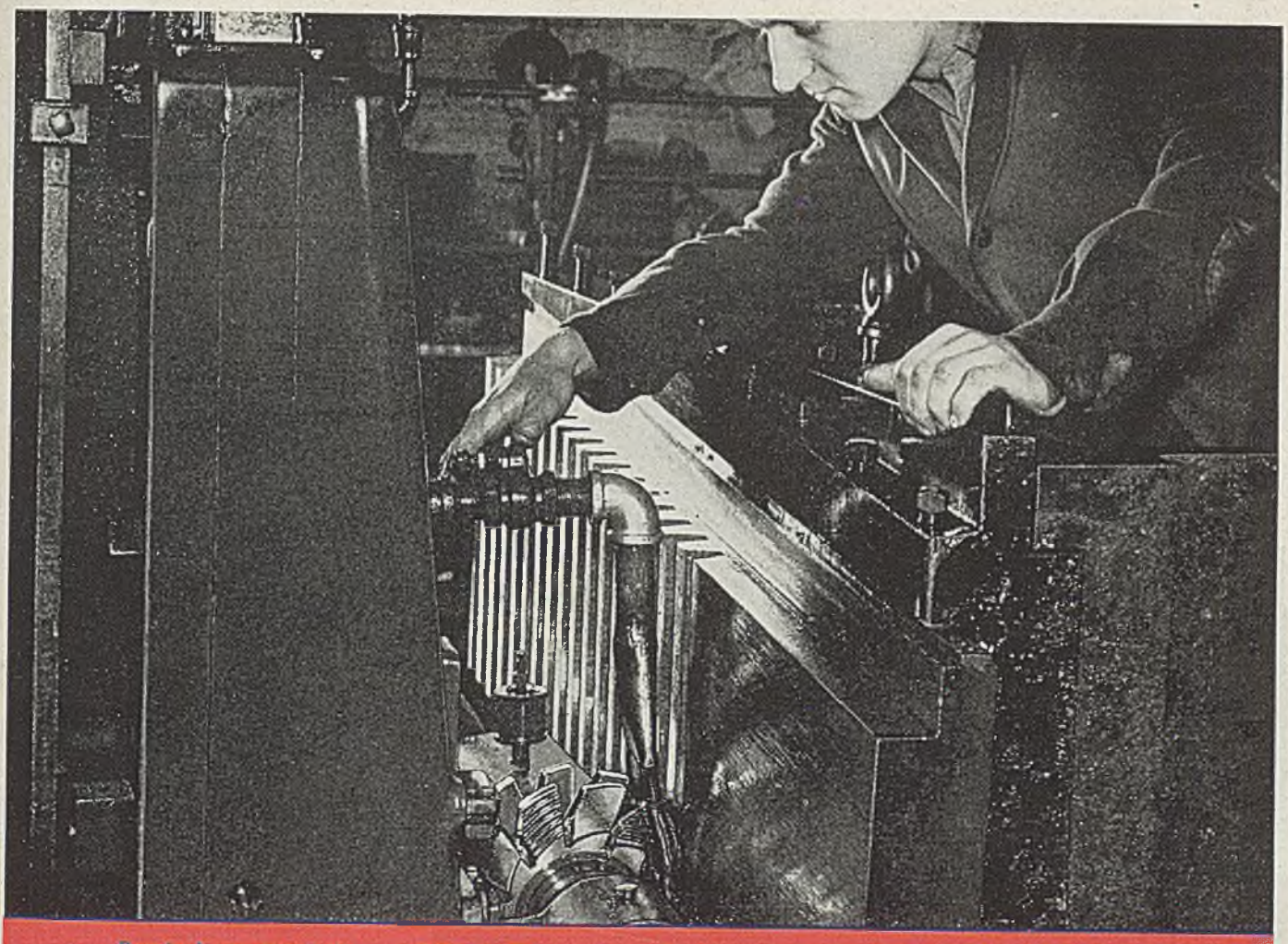
Drying Conditions: In any drying operation it is necesary that a certain minimum of air be circulated around the finished surface to carry off solvent vapors and to provide oxygen for oxidizable finishes, regardless of whether the finish is air dried, force dried or baked. Failure to provide sufficient air can result in films of low gloss caused by trapped solvent or soft films due to insufficient oxidation.

Air drying is best conducted at normal room temperatures of 60 degrees Fahr. or above and at relative humidities of 50 to 60 per cent. High relative humidity and/or low temperature retard proper air drying. Force drying is usually conducted in steam heated ovens or rooms at temperatures in the range of 120 to 150 degrees Fahr. In baking, temperatures ranging from 200 to 350 degrees Fahr. are generally used. In exceptional cases, higher temperatures of from 450 to 500 degrees Fahr. are encountered.

Types of Baking Ovens: The type of baking operation to be used is governed by the principle of heat transfer involved, such as convection, radiation or induction. Convection and radiant heating are the method principally used, and therefore the methods in which we are most interested.

Convection ovens may be heated by steam, oil, gas or electricity, though oil or gas are most generally used. In the case of oil or gas heated ovens, either direct or indirect fired ovens are available. Experience has indicated that, while the direct fired ovens are satisfactory for primers and undercoats, the discoloration and gloss loss resulting from the presence of the products of combustion makes this type of oven questionable for finish coat use. This is particularly true of white finishes where the indirect heated heated oven will be found to be most satisfactory and safest.

Radiant ovens are those which derive their heat energy from infra-red rays produced either by special infra-red electric lamps or special infra-red gas burners, such as used in the Burdett oven. The most efficient installations of this type are enclosed to take advantage of the convection heat that is also available. A characteristic of infra-red heat energy is its ability to develop rapid temperature rise on the part being heated. This varies with the reflectance of the color of the



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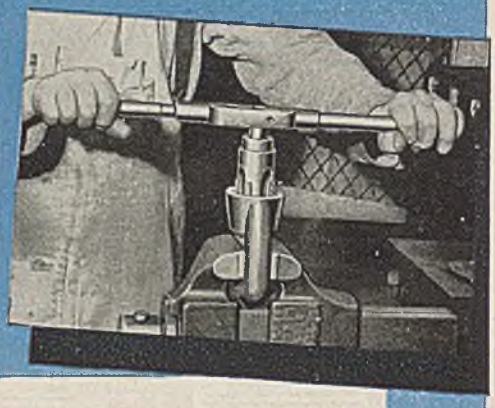

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finish, the temperature rise being more rapid with dark colors than with whites and light colors because of this fact. The radiant type of baking has caused considerable interest in so-called "short" baking schedules of 15 minutes or less as contrasted with normal baking schedules of 30 minutes or over.

In some recent oven designs radiant heat is used as the first stage of a normal convection oven to hasten the metal temperature rise of the part being baked in order to reduce baking time. In others this is being accomplished by use of high turbulence convection ovens in which the air velocity is increased from the normal 30 to 60 changes per hour to something like 300 changes per hour.

Importance of Metal Temperature: In all baking of finishes on metal parts, the metal temperature and not the oven air temperature is the governing factor. This applies equally to both radiant and convection ovens. All of the mass of metal being baked must be brought to the required baking temperature to provide satisfactory results on the finished article. The rate of metal temperature rise varies greatly with the thickness or weight of metal. A baking schedule determined for light metal would not be satisfactory for heavier gage metal. This fact is extremely important and becomes of greater significance as shorter baking schedules are considered. This can be illustrated by a series of temperature curves showing the effective bake given to typical finishes on different weight metals at 7 minute, 19 minute and 85 minute baking schedules.

Chart in Fig. 1 shows a 7 minute schedule with a peak temperature of 360 degrees Fahr. The finish in this case when applied to 20 gage steel is 100 per cent baked, whereas on the heavier metals is practically unbaked because the metals have not reached the required peak temperature until long after the 7 minute interval.

Chart in Fig. 2, for a 19 minute baking schedule with a 300 degree Fahr. peak temperature, again shows the finish on 20 gage steel, is 100 per cent baked but the 1/8-inch steel in this case is 35 per cent baked. To achieve a 100 per cent bake on the 1/8-inch steel would require a thirty minute bake at 300 degrees Fahr. temperature.

Chart in Fig. 4, showing an 85 minute baking schedule at a 250 degree Fahr. oven temperature, the finishes on the varying weights of steel are more thoroughly baked, the 20 gage steel 100 per cent, 1/8-inch steel 85 per cent, 1/4-inch steel 65 per cent and even the 1/2-inch steel corresponding more closely to the weight of metal castings is 45 per cent baked.

Chart in Fig. 3, gives a practical demonstration of these variations by comparing the bake on a kitchen cabinet door of 24 gage steel with a steel panel of the same gage in a 19 minute schedule at 360 degrees Fahr. oven temperature for a primer coat. The variation of metal temperature in the center of the cabinet door and the edge is the result of the

increased metal thickness at the edge and to the use of sound deadening material like cardboard in the center.

This discussion illustrates a factor too often overlooked that cannot be stressed too much. An underbaked film often feels dry to the uninitiated and may even approach the desired hardness. In physical property tests, however, these underbaked films will fail miserably and will be totally inadequate as compared with films of the same finish properly baked. This will be manifested by poor humidity and grease resistance in the case of a refrigerator finish or by poor soap resistance in a washing machine finish. It is, therefore, quite important to make metal temperature determinations by the use of thermocouple readings where metals of varying weights are involved. The shorter the baking schedule the greater the need for this precaution.

The successful use of short baking schedules requires the most careful standardization of operations in the choice of metal weights and timing in the oven to avoid under and overbaking. It is because of this that the use of baking schedules of from 30 to 45 minutes are more foolproof and provide greater flexibility in the operation. In certain industries, however, where uniform thin gage metal is coated, short baking schedules can be used without encountering the difficulties previously mentioned. Examples of such uses are coatings for metal venetian blinds and coatings for tin plate by the can manufacturer.

Film Thickness: The film thickness of the finishing system and the number of coats to be used need careful decision. This choice frequently lies between 1 1/2 to 2 1/2 mils of finish to both protect and beautify an expensive piece of equipment. When it is considered that 1 mil of finish is only 1/50th the thickness of a silver dime, it is apparent that the relatively thin coat of finish carries a tremendous responsibility in the successful utility of the finished article. It is, therefore, very questionable economy to risk the application of finishing materials in film thicknesses that are too thin to adequately protect as well as decorate your finished product.

Selection of Finish: The selection of finish is dependent on the requirements for the end use of the finished article as well as the shop conditions available. It must be a *balanced finish* in which an outstanding property in one characteristic is not gained at the sacrifice of other properties of equal importance. It must be one in which all property characteristics pertinent to the use of the finished article are brought to a high level of performance. Many factors, therefore, require consideration in selecting finishing systems for such uses as refrigerators, washing machines, stoves, automobiles, kitchen cabinets, electrical equipment and agricultural machinery.

An adequate and balanced finish requires:

1. Initial appearance
2. Retained appearance and color retention

KENNAMETAL—THE ALL-AMERICAN CARBIDE

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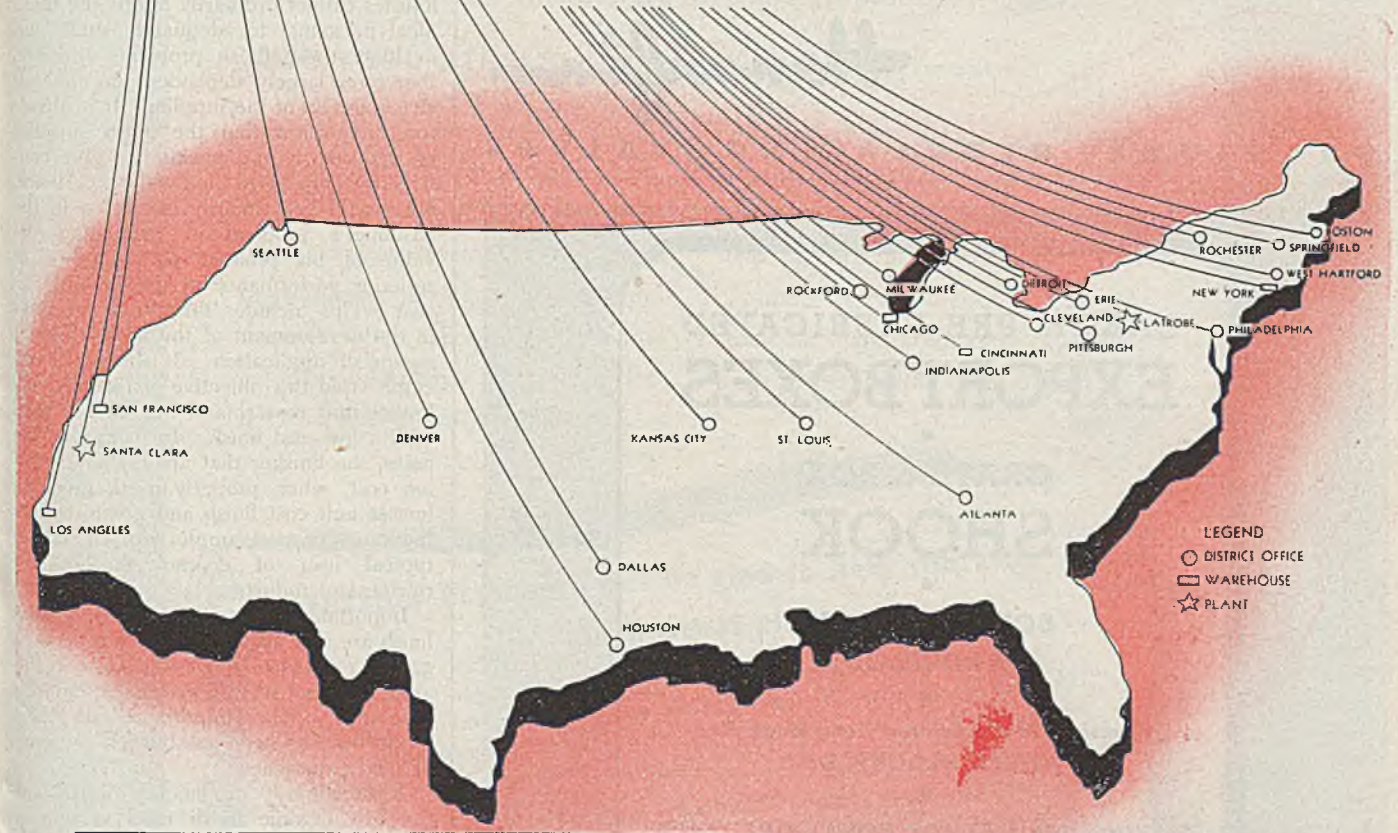
The ingredient that distinguishes steel-cutting Kennametal from other cemented carbides (the unique intermetallic compound, $WTiC_2$) is an American invention, developed in 1937 by the president of Kennametal Inc. Using $WTiC_2$ as the key ingredient, he began making Kennametal tool blanks, of graded compositions suitable for different steel-cutting purposes, in a small plant employing twelve persons, at Latrobe, Pa.

Kennametal soon became established as the tool material that made possible machining of hard steel, accurately, at economy-promoting speeds. In eight years its use has spread, until today Kennametal Inc. has grown to such stature that it successfully serves hundreds of America's major metal-working plants.

Kennametal Field Engineers are more at home in these plants than in their own offices. Their on-the-spot "know-how" enables Kennametal users to obtain optimum production from a tool material that has demonstrated amazing inherent effectiveness. Call on them—they are at your service to help you get maximum output with minimum consumption of carbide.



HOW YOU'VE GAINED FROM KENNAMETAL'S GROWTH

Kennametal—constantly improved throughout the years—now costs its users less than one-tenth of what it did when introduced. This price reduction has been achieved wholly because of increased production and improved manufacturing technique—the very conditions that you can help to bring about in your metal-working plant, through proper utilization of Kennametal tools.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

TRADE MARK REG. U. S. PAT. OFF.

KENNAMETAL Inc.; LATROBE, PA.

3. Mar resistance
4. Flexibility and chip resistance
5. Corrosion resistance
6. Moisture resistance
7. Ease of processing

The foregoing are properties that should be present in all finishes for general use but, in addition, certain other special properties are required if used in such typical fields as for example:

For refrigerators add grease resistance;
For washing machines add alkali resistance;
For stoves add heat resistance;
For automobiles and railway add exterior durability, etc.

We have covered the typical problems that face manufacturers of metal parts requiring proper finishes to adequately meet their service functions. Larger consumers of finishes have some form of technical organization to assume responsibility for the evaluation of finishes for their special use. However, in practically all such cases the finish manufacturer has a very co-operative technical liaison with him to achieve the full development for utmost performance and utility of these finishes.

Consumers of smaller quantities of finishes cannot ordinarily afford the technical personnel to adequately study and evaluate these finish problems and are, therefore, largely dependent on the advice and help of the supplier. It is, therefore, important that the finish supplier be one who is in a position to give constructive help based on a wide experience. He should be primarily interested in the customer's problem of enhancing the value of his product with finishes of superior performance at the lowest unit cost. This includes the ability to assist in the development of the most effective means of application. It should be re-emphasized this objective of reaching the lowest unit cost should not be confused with a low cost finish. In many or most cases, the finishes that are higher in gallon cost, when properly used, give the lowest unit cost finish and greatest satisfaction. As an example, we will take a typical user of enamel finishes—the refrigerator industry.

Important properties of refrigerator finish are appearance, moisture resistance, grease resistance, color and stain resistance, mar and scratch resistance and chip resistance. The importance of these properties has been established by years of field experience.

Nitrocellulose or lacquer finish was the first organic finish used in volume on mechanical refrigerators. It had advantages in ease of application and speed of drying characteristics of the Duco nitrocellulose lacquers used on automobiles, but its general level of performance was quite low on account of the composition modifications that were necessary to produce a glossy white finish. An improvement in one property could be obtained only by sacrifice in some other important feature —as, for example, improved grease resistance at the expense of increased

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(Including National Emergency Steel Compositions)

AIRCRAFT QUALITY for Airplane Parts

GUN QUALITY for Gun Barrels, Rifle and Torpedo Parts

TOOL STEELS for Cutting, Blanking and Forming

You can always be sure of a sound, clean product when it is made of any of these fine Disston Steels. They represent the latest developments in metallurgy and engineering, and have behind them the wide experience of the first company in America to produce electric tool steel of crucible quality.

Each of these highly specialized Disston Steels is made of carefully selected ingredients . . . by modern steel practice . . . in electric furnaces . . . under automatic control. You can count on them, at all times, for thorough dependability and uniformity.

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Disston Engineers will be glad to help you with your postwar plans

In working out your postwar plans, the choice of the right steels may be a factor of major importance. This has been true with a large number of manufacturers, many of whom have profited from consultation with Disston engineers and metallurgists.

This valuable service is also available to you. You may feel free to submit your steel problems to Disston, knowing that your communication will be held in strictest confidence. You will be advised frankly, and without obligation. When writing, please give full details.

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brittleness. The overall average of field experience with lacquer type finishes on refrigerators was not satisfactory and consumer good will was being jeopardized.

As a result of this experience the refrigerator manufacturer tended to lean toward porcelain but a swing in this direction was not necessary because of the introduction to the refrigerator industry of synthetic resin enamels. This finish afforded improved appearance and grease and chip resistance. Complaints almost disappeared and subsequent experience has shown the renewed confidence in organic finishes which it built up in the minds of the public.

Although a vast improvement, synthetic resin enamels were not perfect, and the introduction of urea-formaldehyde gave us a new tool to work with —to raise still higher the level of performance. By use of these finishes, the grease, stain and mar resistance have been further improved and the overall balance has been adjusted at a high level for all properties. These enamels also had certain processing advantages which resulted in shorter baking schedules that became important to the industry as production schedules were stepped up to meet increasing demands for domestic refrigerators.

At the same time that these improvements in the performance level of refrigerator finishes was being carried out, finish costs were drastically reduced. Cost has been reduced from 4½ cents to about 1 1/5 cents per square foot, reflecting not only the increased value passed along to the manufacturer but also the co-operation of service engineers with manufacturers' operating personnel. Cost of complaints and service per cabinet also has dropped sharply from 22 cents to less than 1 cent per cabinet.

These studies are typical of the work being carried on in an attempt to give industry further improvements in finishes based on the new developments in plastics or synthetic resins. In this we draw from the comprehensive work in all of the many laboratories of the duPont Co., who are constantly synthesizing new film forming and other types of plastics such as the nylons, the neoprenes, the methacrylate resins, and the polythenes, to mention a few of them. There are many more in the test tube or more advanced stage of development that have promise of producing finishes of superior performance under test in our laboratories.

The foregoing article by Mr. Merkle is made available through the co-operation of the Pressed Metal Institute.

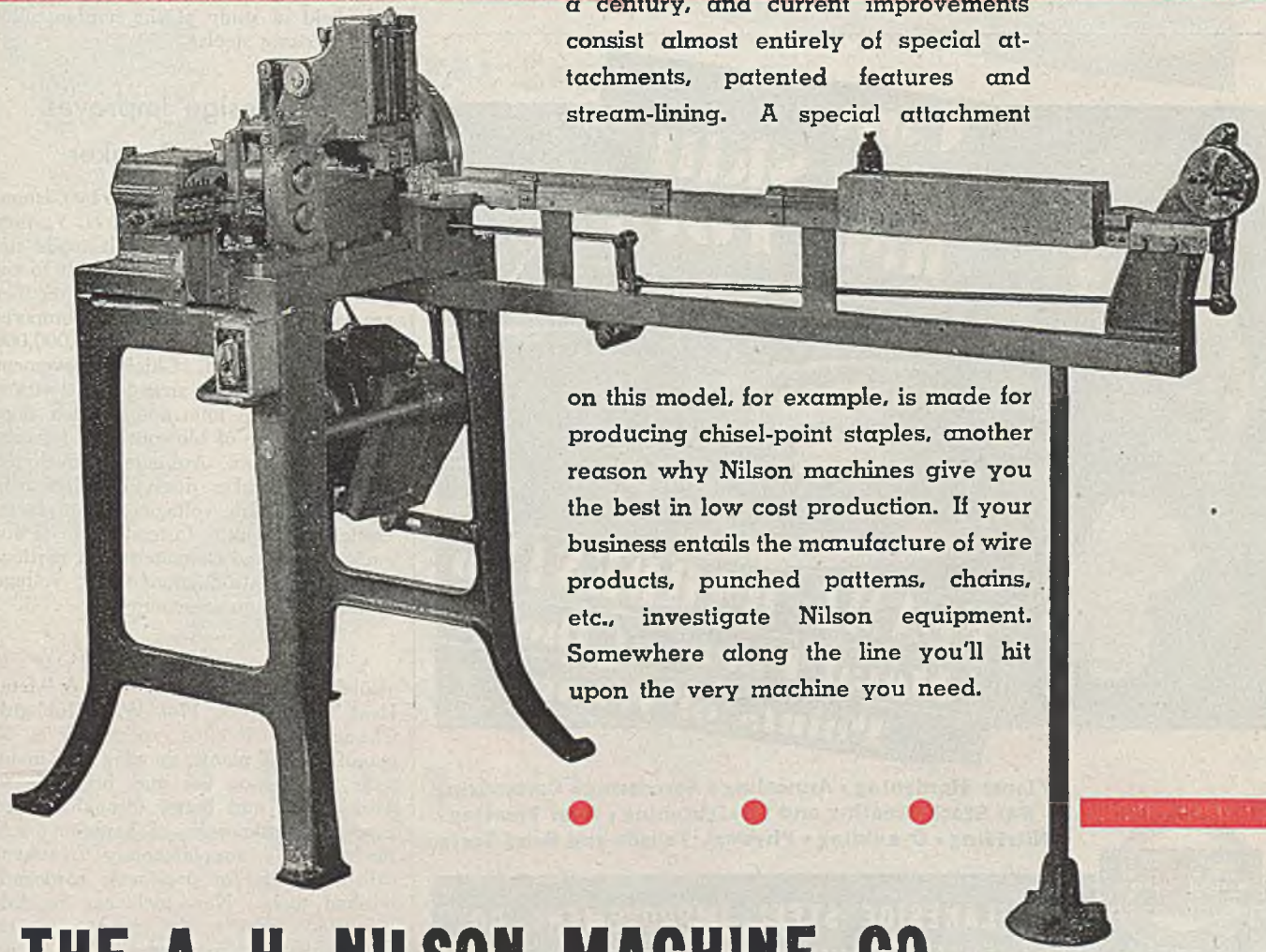
—o—

An illustrated folder entitled "Foundry Equipment of Welded Steel Plate Construction," pointing out how foundries utilize the welded steel process in constructing much of their equipment, is available from Central Boiler & Mfg. Co., 5818 Rivard, Detroit 11. It contains a list of the advantages of using this process as well as photographs of several products constructed of welded steel.

NILSON

AUTOMATIC STAPLE FORMING MACHINE

This plunger type, No. 2 model, insures greater speed without impairment of accuracy. Nilson has been designing and building special machines for half a century, and current improvements consist almost entirely of special attachments, patented features and stream-lining. A special attachment



on this model, for example, is made for producing chisel-point staples, another reason why Nilson machines give you the best in low cost production. If your business entails the manufacture of wire products, punched patterns, chains, etc., investigate Nilson equipment. Somewhere along the line you'll hit upon the very machine you need.

THE A. H. NILSON MACHINE CO. BRIDGEPORT, CONN.

Hardenability Behavior

(*Concluded from Page* 120)

4720, that is, the increase in hardenability obtained by an increased quenching temperature, an increase of 45 degrees Fahr. in the hardening temperature appeared to compensate. The cause of the increase in hardenability obtained by increasing the quenching temperature probably is due to increased solubility of the complex carbides.

Now, as to the order of hardenability, as determined by end quenching at 1650 degrees Fahr. to 1700 degrees Fahr. of the uncarburized specimens of the various alloy steels, compared with that obtained from the carburized specimens:

In general, there is a broad agreement with respect to certain steels. For example, the 2500 and 4800 series steels have higher ratings and the 4000 and 5100 series the lowest ratings by both methods. However, exact agreement is not obtained with numerous other alloy combinations. It is not unreasonable to assume that, with higher carbon contents, the reaction of the various alloys is not the same as when they are associated with a lower carbon content.

Despite the difficulties introduced by the use of carburized specimens, the method of test has value and the test difficulties are no greater than have been overcome in other instances of the standardization of test procedures. It must be admitted that there remains a considerable field of study of the hardenability of carburizing steels.

Special Design Improves Anode Circuit Breaker

Design improvements made by General Electric Co., Schenectady 5. N. Y., in a 6-pole, 1600-ampere, 750-volt anode circuit breaker are said to enable it to repeatedly interrupt mercury arc rectifier arc-back currents up to 90,000 amperes at rates of rise in excess of 11,000,000 amperes per second. Chief improvement is an arcing contact arrangement with a streamlined arc interrupter which does not require use of blowout coils for current interruption. Arc energy developed by anode breaker does not necessarily decrease as arc voltage is introduced earlier in circuit. Instead there is for each arc voltage characteristic a particular time of introduction of arc voltage giving maximum arc energy.

—o—

A booklet entitled "Fifty Facts" is available from Perfection Tool & Metal Heat Treating Co., 1740 West Hubbard, Chicago 22. It cites experiences in 50 manufacturing plants, showing how many tools in common use may be made to work longer and better through use of new and better ways of hardening soft steels and a supplementary treatment called Ad-Life for previously hardened, finished tools. New tools can be Ad-Lifed, according to the company, as no rehardening is required, there is no danger of fracture or distortion.

HEADQUARTERS FOR ENGINEERED CUTTING TOOLS

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Progress in metal cutting tool efficiency demands constant research with new alloys. Illinois Tool metallurgists through continuous experimentation have developed many new qualities in high speed steel which are producing exceptional results on a wide variety of metal cutting applications. Enjoy the benefits of this research by asking for an Illinois Tool engineer. Your tooling will be analyzed in consultation with our metallurgists to assure properly engineered tools produced from the alloy proved most efficient for your purpose.

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MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

Progress on Open Hearth

(*Continued from Page* 122)

mer is influenced by the size of the rammer head, the air pressure, and the number of blows per minute, and these variables must be controlled in any study of the obtainable density.

Long experience has shown that a dense bottom can be burned in with coarse magnesite and slag, but it takes a number of days. Opinion is that a satisfactorily dense hearth can be built by using fine magnesite and fine slag and that this material can be put in rapidly enough to compete with a rammed hearth, especially where labor is not available for a fast ramming job with several gangs working in different parts of the furnace at the same time. At several open-hearth shops, layers of 4 inches of magnesite plus 10 per cent slag have been put in in 30 hours.

While the cold-rammed bottom does not receive the thorough firing that is characteristic of the customary burned-in bottom, it does receive some preliminary heating, varying in intensity and time in different shops. Furthermore, the bottom is sometimes duplex, comprising a rammed base upon which a thin layer of conventional magnesite plus slag is superimposed by burning in as usual. The effects of these various procedures on the density are now to be considered.

From the economic point of view it seems that the fuel cost would be the chief difference between the methods, and that the differential in favor of cold ramming would be less if a 36-hour holding time is recommended for the rammed bottom. This extended holding at high temperature may or may not be necessary.

Requires Careful Firing

There are disadvantages to any method of thorough firing. To sinter in the material requires high surface temperature and all the brickwork in the furnace expands while the magnesite is also at high temperature. Consequently, shrinkage cracks form throughout the cooler portion of a solid magnesite-slag working bottom, and in addition, there is a contraction of the brickwork. These cracks may be filled with iron oxide or with liquid compounds of iron oxide with lime which have the black appearance observed when an old bottom is removed.

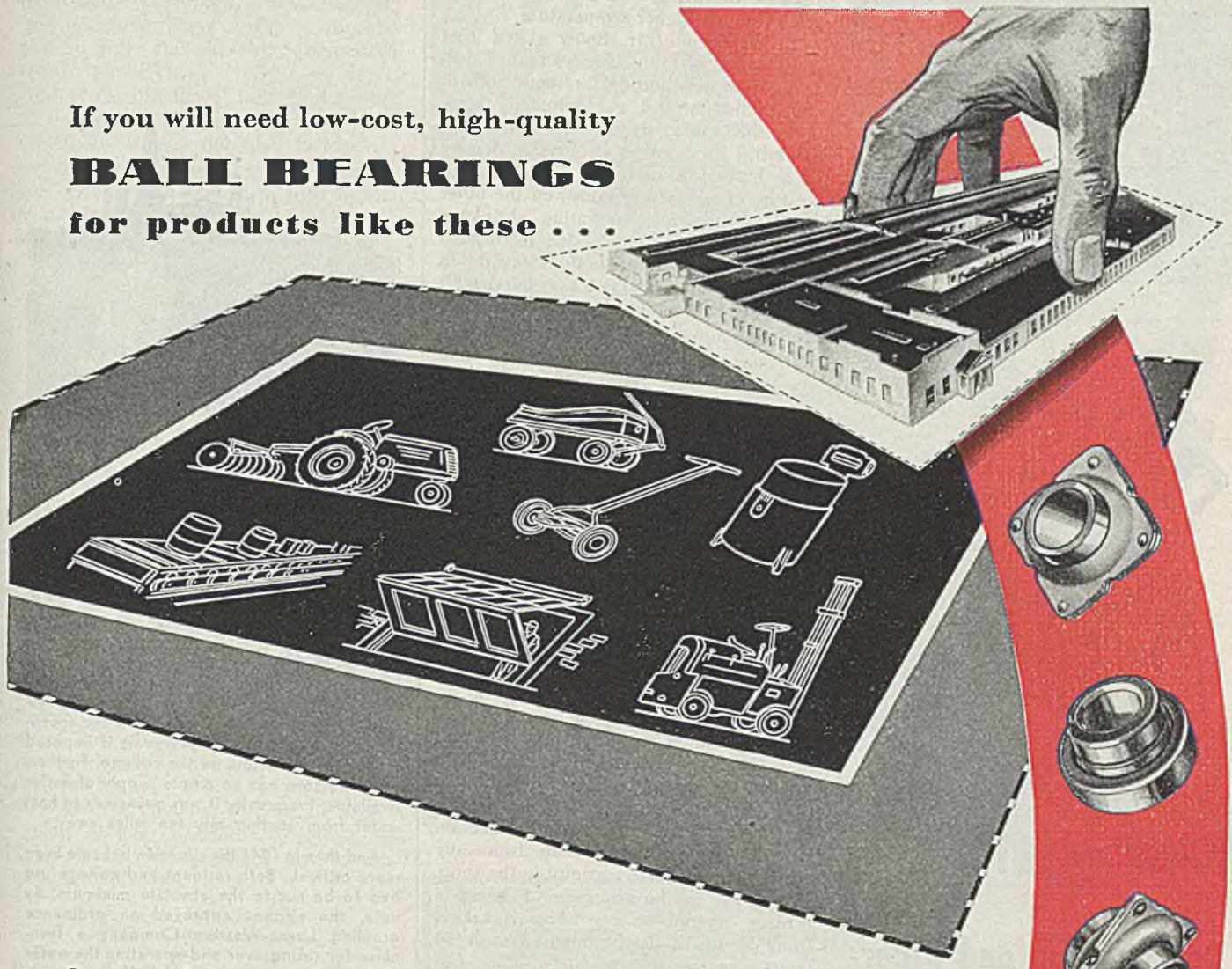
In the rammed and prefired bottom there is a surface layer that has had its shrinkage removed by the high temperature; the vertical cracks have been filled with a liquid or low-fusing slag. The layers below the dense surface are porous unless the pores have become filled with slag or low-fusing products from the sintered layers above, or have been closed by pressure of the metal and bottom material above originally porous material.

Volume stability of ramming mixes indicates that shrinkage cracks and thermal cracks probably do not form in the rammed layers immediately above the brick unless the burning-in period is unusually long. Shrinkage cracks should not be present in the brickwork during normal operation of the rammed bottom.

If you will need low-cost, high-quality

BALL BEARINGS

for products like these . . .



Our plant facilities and experienced manpower belong in *your picture* . . .

They belong in your picture because they will make it possible for you to secure, at low-cost, extremely high quality frictionless bearings for non-precision use. Such bearings will be in greater demand than ever before. For, in many cases, they will provide the answer to the post-war demand for higher performance standards at no increase in product cost.

For years before the war, many leading producers of products, like those illustrated here, relied upon this organization for such bearings. Today, with augmented facilities and enriched experience, we are in a position to design and manufacture practically any type of high-quality, low-cost ball bearing of the semi-precision and non-precision types, radial, thrust or combination.

Let's talk it over . . .

Write for *the Free Booklet on our post-war facilities for the production of piston pins, ball bearings, hardened and ground screw machine parts; and heat treated, hydrogen copper brazed steel stamping or forging assemblies. Burgess-Norton Mfg. Co., 100 Peyton Street, Geneva, Illinois.*

ARMY NAVY

Burgess Norton

MANUFACTURING COMPANY

42 years in GENEVA, ILLINOIS

A Part is Never Made Right Unless it is Satisfactory to Our Customers

because the brick have not cooled down from a much higher temperature.

In conclusion Mr. Snow stated that examination of lump samples and of drill cores from new and old bottoms, both of the burned-in and cold-rammed types, show that the rammed bottom falls considerably short of attaining the density of a burned-in bottom. Too thorough beating of rammed bottoms, on the other hand, results in penetrating shrinkage cracks, as well as cracks due to thermal contraction when the bottom reverts to the temperature gradient associated with normal operation.

Silica Refractories. An average of 100 more heats were made at one shop on a suspended type roof than on a sprung arch roof. Average heats obtained on a regular silica roof was 133 compared to 184 with one laid up with super-duty brick. Refractories used per ton of steel are totaling 3.906 pounds of regular brick compared to 3.015 pounds for super-duty grades. Results also show that 20 per cent less replacements are required with super-duty silica brick.

At a plant in the Chicago district, 470 heats were secured on a sprung silica brick roof compared with 515 heats with the suspended type.

At a Detroit open-hearth shop and on a 180-ton stationary open hearth with a suspended super-duty roof, it is estimated that this type construction afforded a saving in cost of labor of $13,000 based on a campaign of 202 heats. During this run, 18.8 more tons production per day was obtained than from any other furnace of like capacity in the shop.

Because of the shortage of labor, a furnace rebuild at one shop is taking from 10 to 12 days compared with 91 hours a year or so ago.

Some of the steps involved in testing graphite stopper heads are chemical analysis, porosity inspection, checking for the adherence to specified size, thermal shock test, cold test, conductivity test and service test. If the graphite content is too low, erosion usually results. The heads contain from 14 to 21 per cent graphite and include from 34 to 45 per cent aluminum. Porosity usually ranges from 22 to 28.

Residual Metals in Scrap. Residual metal contents of plain carbon open-hearth steels made in 1944 averaged generally somewhat higher than in 1938, according to a report submitted by J. D. Sullivan and A. E. Pavlish, both of the staff of the Battelle Institute, Columbus, O. Nickel has demonstrated the most marked increase and the content now almost equals that of copper. The average of all plants based on weighted tonnage capacity was 0.080 per cent, which contrasts with 0.044 in 1938.

Copper has not changed appreciably. Residual manganese is relatively high, particularly in some plants, which reflects the production of proportionally less low-carbon and more high-carbon heats. Chromium content increased from 0.080 to 0.038 per cent.

Molybdenum, for the first time, is reported for all plants. The average now is about the same as for tin, and the in-

dividual plants varied from a low of 0.005 per cent to a high of 0.029 per cent. Tin has held about constant for the past 10 years and shows no appreciable change for 1944.

Mold Conditioning. One shop reports 20 per cent better ingot surface with tar coated molds over uncoated molds.

Proper ingot structure, according to one operator, depends upon such factors as melting and deoxidizing, sulphur content of the steel, mold design, temperature and rate of pouring, and proper soaking pit practice. Other factors affecting the structure of ingots are track time, the ratio of pit time to track time, location of the ingot in the soaking pit, and the type of flame employed.

Optimum pouring temperature ranges from 2870 to 2890 degrees Fahr. Above or below this range, cracks develop on the surface of the ingot.

In reviewing some of the economic aspects of deoxidation, Mr. Tenenbaum, Inland Steel Co., Indiana Harbor, Ind., drew attention to the fact that total deoxidation cost is determined by two factors—the actual cost of the alloy additions and the cost equivalent of the furnace time involved. Basic costs of deoxidizing additions in dollars per pound were stated as: Spiegel (20 per cent manganese) 1.9 cents, 15 per cent ferrosilicon 2.4, silicomanganese 6, ferromanganese (80 per cent manganese) 6.4, 50 per cent ferrosilicon 3.4, Alsifier 5.8, and ferrotitanium (medium carbon) 7.9.

Cost of five deoxidation practices on S.A.E. 1045 steel in dollars per net ton of ingots follows:

Type	Cost of additions	Cost equiv. of deoxidation time	Total costs
Double	$2.52	$0.28	$2.80
Single	2.29	0.20	2.49
Spiegel	2.19	0.18	2.37
Silicomanganese	1.98	0.06	2.04
No bath	1.82	0.04	1.86

To evaluate the cost equivalent of the deoxidation time, a furnace operating cost of 7/10-cent per minute per ton was used. This value represents a fair estimate of the current operating costs on 150 to 175-ton furnaces using regular scrap-hot metal charges.

In the foregoing table there is considerable cost margin between various deoxidation practices. There is a difference in cost of 94 cents per ton of ingots between the extremes of the double deoxidation and the open-bath practices. If an ingot to product yield of 75 per cent is assumed, it can be seen that savings of well over $1 per ton of product can be effected in open-hearth costs merely by varying deoxidation practice.

Factors summarized in the foregoing table apply directly to a single steel grade. However, the number of practices which can be used on any grade is often restricted by certain features in the ordered analysis. For instance, silicomanganese deoxidation cannot be considered on grades where the specified manganese is not high enough to permit the use of an adequate furnace block.

THE BUSINESS TREND

Cutbacks Not Affecting Current Output Schedules

MOST industrial indicators tended toward higher levels during the latest period, with gains recorded in steelmaking operations, bituminous coal production, engineering construction awards, petroleum production and revenue freight carloadings. Cutbacks in aircraft, shipbuilding, tank and ammunition programs to date have not materially affected current operating schedules.

Easing in the coal supply situation has made it possible for the national steel rate to rebound to the level prevailing early in April, and currently steel ingot output is only slightly below the highest point reached this year. Freight traffic is well sustained at the year's best pace to date, while crude oil output and electric power consumption are close to the highest levels reached this year.

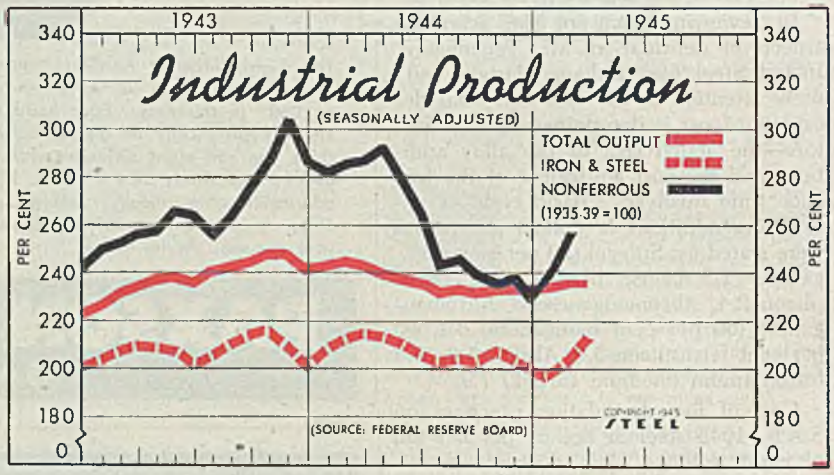
FRB's INDEX—Output at factories and mines was maintained in March at the rate of the preceding month. In the machinery industries activity showed little change in March. Output of transportation equipment continued to decline owing to further curtailment of operations at shipyards. Aircraft production held at the February pace. The Federal Reserve Board's seasonally adjusted production index remained unchanged at 236 during March, comparing with 242 and 235 in the like months of 1944 and 1943.

COKE STOCKS—A decline of 13 per cent in by-product coke stocks at producers' plants to 676,613 net tons occurred during March. Stocks of bituminous coal at these plants decreased 158,069 tons in March, and on April 1 were sufficient for 21 days' requirements at the March consumption rate.

Daily average output of by-product and beehive coke increased 2116 tons during March, bringing total production for the period to 6,170,651 net tons. March output of by-product and beehive coke was up 0.8 and 4.5 per cent, respectively, on a daily average basis.

FOUNDRY EQUIPMENT—Sharp upturn in foundry equipment orders developed during March, forcing the Foundry Equipment Manufacturers Association's index to reach the highest level since July, 1942. The March index figure of 604.7 compares with 498.4 in the like 1944 month and peak of 1122.4 registered during March 1942. The index recorded a gain of 139.4 points during the latest period.

A 2.4 per cent gain in gear sales, excluding turbine and propulsion gearing, occurred during March, raising the American Gear Manufacturers Association's index for the period to 339, compared with 331 in the preceding month. The wartime peak registered by the index was 485 in March last year.



Federal Reserve Board's Production Indexes
(1935-39 = 100)

	Total Production			Iron, Steel			Nonferrous		
	1945	1944	1943	1945	1944	1943	1945	1944	1943
January	234	243	227	197	208	204	240	281	250
February	236	244	232	202	212	208	257	285	252
March	236	242	235	211	214	210	...	286	256
April	...	239	237	...	213	209	...	292	257
May	...	237	238	...	210	208	...	279	266
June	...	235	236	...	204	201	...	264	264
July	...	231	240	...	202	204	...	243	256
August	...	232	242	...	203	210	...	245	264
September	...	231	244	...	202	214	...	239	277
October	...	232	247	...	206	215	...	236	286
November	...	232	247	...	201	209	...	239	304
December	...	232	241	...	198	200	...	229	277
Average	...	238	239	...	206	208	...	260	267

FIGURES THIS WEEK

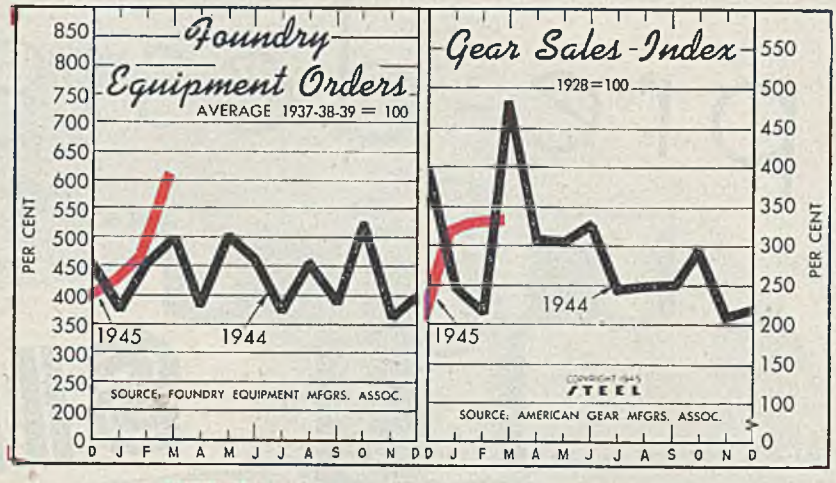
INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	94.0	92.0	97.0	99.5
Electric Power Distributed (million kilowatt hours)	4,416	4,411	4,329	4,336
Bituminous Coal Production (daily av.—1000 tons)	1,830	1,717	1,967	2,035
Petroleum Production (daily av.—1000 bbls.)	4,805	4,798	4,783	4,431
Construction Volume (ENR—unit $1,000,000)	$32.2	$22.2	$37.3	$26.7
Automobile and Truck Output (Ward's—number units)	20,045	20,335	20,335	16,045

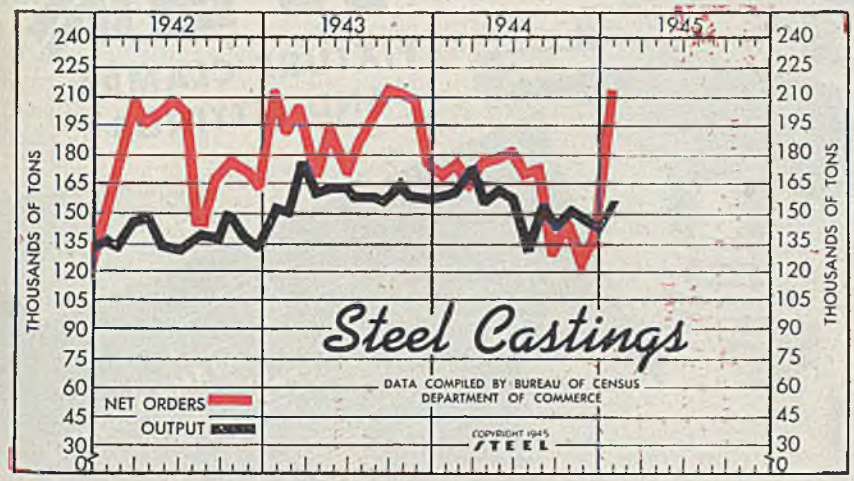
*Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	870†	864	835	852
Business Failures (Dun & Bradstreet, number)	20	24	28	41
Money in Circulation (in millions of dollars)‡	$26,074	$26,068	$25,834	$21,396
Department Store Sales (change from like week a year ago)‡	+3%	−13%	+24%	−11%

†Preliminary. ‡Federal Reserve Board.

	Foundry Equipment Orders			Gear Sales		
	Monthly Average (1937-38-39=100)			Index (1928=100)		
	1945	1944	1943	1945	1944	1943
Jan.	422.4	442.8	429.8	323	246	268
Feb.	465.3	378.3	399.5	331	214	303
Mar.	604.7	498.4	562.7	339	485	334
Apr.	....	385.7	362.7	...	308	240
May	....	503.9	348.9	...	305	342
June	....	466.1	413.6	...	328	401
July	....	375.8	379.4	...	242	374
Aug.	....	450.5	390.4	...	247	312
Sept.	....	388.0	346.6	...	248	320
Oct.	....	526.5	436.6	...	293	368
Nov.	....	369.5	388.0	...	209	387
Dec.	....	397.4	442.8	...	219	387
Avg.	....	426.9	440.3	...	279	336





Commercial Steel Castings†

(Net tons in thousands)

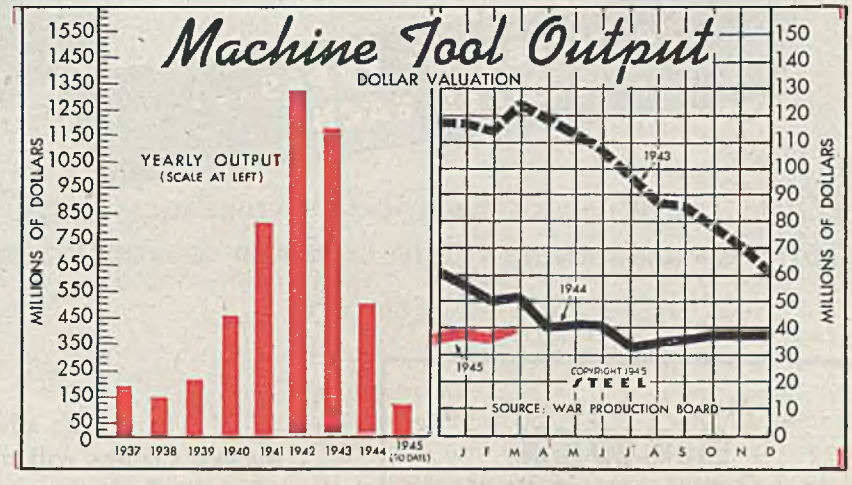
	Orders		Production	
	1945	1944	1945	1944
Jan.	210.2	167.7	157.2	159.8
Feb.	....	173.6	....	161.4
Mar.	....	162.6	....	174.6
Apr.	....	175.1	....	155.8
May	....	177.0	....	161.3
June	....	181.8	....	157.4
July	....	169.9	....	131.9
Aug.	....	171.3	....	154.9
Sept.	....	129.8	....	144.5
Oct.	....	146.1	....	150.7
Nov	....	120.7	....	146.4
Dec.	....	138.7	....	144.2
Total	....	159.5	....	153.6

†For sale.

Machine Tool Output

(000 omitted)

	1945	1944	1943	1942
Jan.	$37,498	$56,363	$117,384	$83,547
Feb.	36,018	50,127	114,594	84,432
Mar.	39,374	51,907	125,445	98,358
Apr.	.....	41,370	118,024	103,364
May	.....	41,819	113,859	107,297
June	.....	41,471	108,736	111,090
July	.....	32,753	97,428	113,596
Aug.	.....	35,177	87,405	117,342
Sept.	.....	35,876	85,842	119,883
Oct.	.....	37,516	78,300	130,008
Nov.	.....	36,277	71,811	120,871
Dec.	.....	36,782	60,861	131,960
Year				
1944	.....			497,438
1943	.....			1,179,689
1942	.....			1,321,862
1941	.....			812,462
1940	.....			450,000



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,192	$10,191	$10,748	$9,348
Federal Gross Debt (billions)	$235.7	$235.5	$234.7	$187.0
Bond Volume, NYSE (millions)	$81.4	$69.5	$30.3	$44.0
Stock Sales, NYSE (thousands)	8,280	9,684	4,197	3,060
Loans and Investments (millions)†	$57.3	$57.4	$58.1	$51.5
United States Gov't. Obligations Held (millions)†	$43,143	$43,327	$15,016	$38,110

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$57.55	$56.73
All Commodities†	105.6	105.5	105.1	103.6
Industrial Raw Materials†	117.7	117.3	116.0	113.0
Manufactured Products†	101.9	102.0	101.8	100.9

†Bureau of Labor's Index, 1926 = 100.

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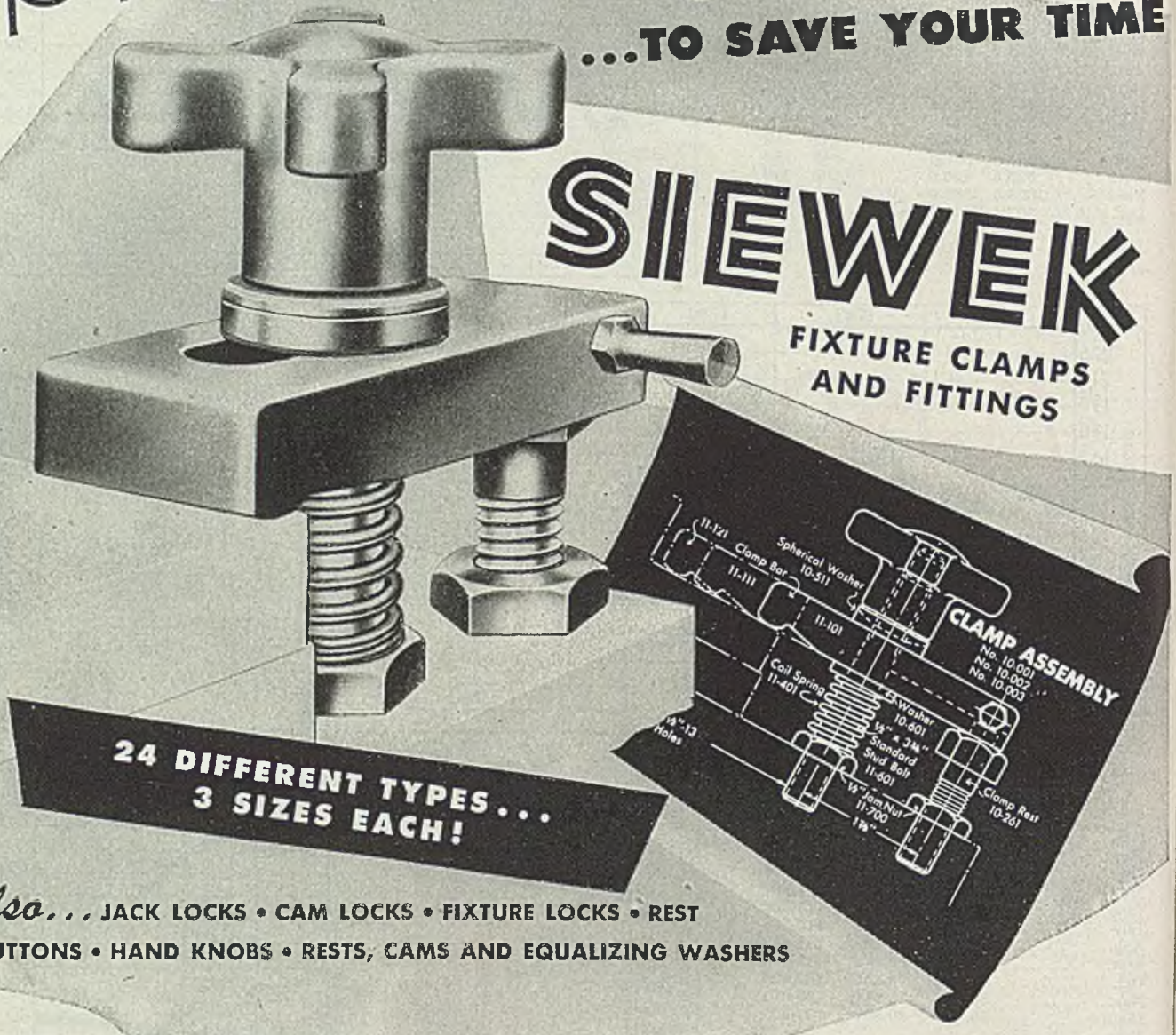

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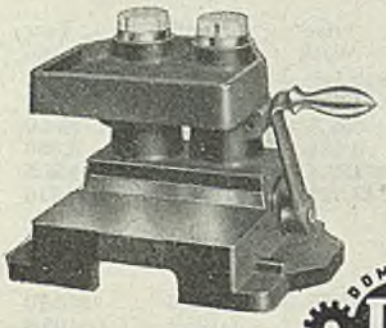

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Steel Buying Slower But Still Exceeds Production

Fewer cancellations, mainly affecting remote deliveries . . . Some progress toward civilian releases . . . Pig iron supply low

ALTHOUGH steel buying continues to exceed production and shipments, there appears to be a drop in the rate and some mills recently booking double production capacity now are receiving not more than 70 per cent excess.

Cancellations show no increase and in some cases April brought less than March, one factor probably being that cutbacks have not yet reached the subcontracting level, another being that claimant agencies may be holding positions on mill books for later needs.

With end of the European war in sight, steel consumers are cautious and further cancellations are expected. While Washington is working fast on its transition planning, a substantial drop is expected before civilian production is well under way. Requirements Committee of the War Production Board is screening requests of procurement agencies for materials tentatively asked for the Japanese phase of the war. The problem of quantities and types of material for that use is complicated by the question as to how much military equipment now in Europe will be available for use in the Far East.

Limitations orders are being noticeably relaxed and more than half those recently in effect are expected to be revoked within a short time, affecting steel and other materials and allowing moderate increase in civilian production. A step in this direction is restoration of the spot authorization plan on a nationwide basis. While manufacturers permitted to operate under this plan will not be given allocations at present on prime materials they will be allowed greater access to idle and excess steel.

Cutbacks to this time have affected plates most importantly, with producers now able to quote 60 to 90 days delivery. Platemakers believe most of their cutbacks are past, a situation not existing in other leading products, notably in sheets and bars. There have been cancellations and adjustments in both these but not to the same degree and deliveries still are well extended. Where cancellations have been made they have fallen principally on future positions.

Average steelmaking operations last week are estimated at 95 per cent of capacity, an increase of 1 point from the prior week. Pittsburgh gained 1½ points to 92 per cent, Wheeling 4½ points to 97 and eastern Pennsylvania 3 points to 93 per cent. Chicago dropped ½-point to 98, Cincinnati 4 points to 90 and Cleveland 4½ points to 92½ per cent. Unchanged rates were as follows: St. Louis 80, New England 90, Youngstown 94, Birmingham 95, Detroit 86 and Buffalo 90½.

Pig iron supply is lowest in 18 months, War Production Board reports, and plans are in making for relighting idle blast furnaces when coke supply and manpower are available. One stack in the Youngstown, O., district will be blown in soon, after being idle since last fall. Limited supply of steelmaking scrap has caused increased use of pig iron, a main cause of the shortage. Of 214 available blast furnaces 207 were in production April 1, WPB reports.

Caution is evident in the attitude of scrap dealers and consumers, in view of the war situation, and an eastern Pennsylvania consumer has cut its offered price on steelmaking grades, by $2 per ton and no commission, including No. 1 and No. 2 heavy melting steel and No. 2 and No. 3 bundles. No sales have been made at the new prices. Little improvement is noted in the labor situation, which limits collection and preparation.

April movement of Lake Superior iron ore set the second highest mark for that month, with 7,782,074 gross tons, 1,993,995 tons greater than in April, 1944, and exceeded only by the record of 7,857,106 tons shipped in April, 1942.

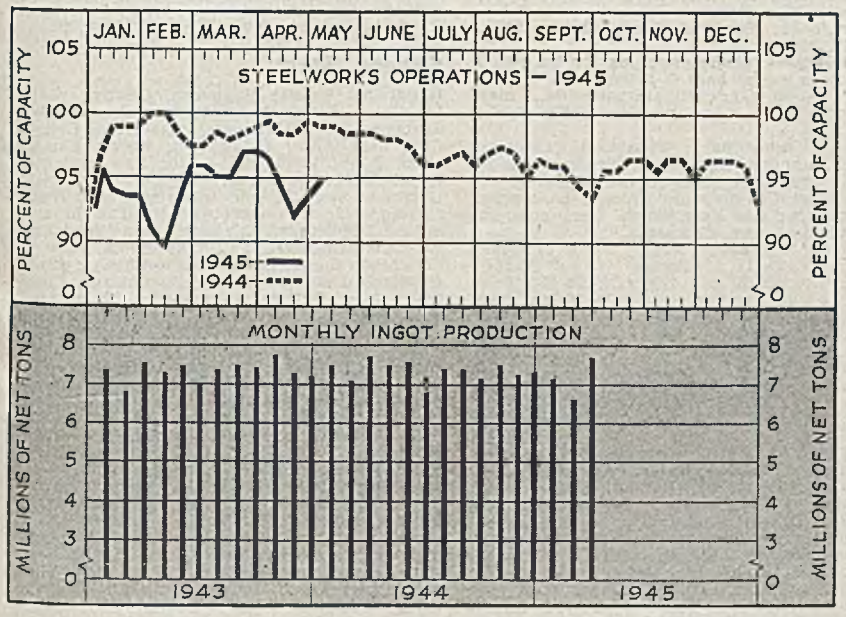
Average composite prices of steel and iron products are unchanged, ceiling prices prevailing. Finished steel composite is $57.55, semifinished steel $36, steelmaking pig iron $24.05 and steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended May 5	Change	Same Week 1944	Same Week 1943
Pittsburgh	92	+1.5	94	100
Chicago	98	—0.5	101.5	99
Eastern Pa.	93	+3	94	94
Youngstown	94	None	96	95
Wheeling	97	+4.5	100	92.5
Cleveland	92.5	—4.5	94	88
Buffalo	90.5	None	90.5	90.5
Birmingham	95	None	95	100
New England	90	None	88	90
Cincinnati	90	—4	89	94
St. Louis	80	None	77	87
Detroit	86	None	88	96
Estimated national rate	95	+1	°99	°98.5

°Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	May 5	April 28	April 21	One Month Ago April, 1945	Three Months Ago Feb., 1945	One Year Ago May, 1944	Five Years Ago May, 1940
Finished Steel	$57.55	$57.55	$57.55	$57.55	$57.55	$56.73	$56.08
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	23.55	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	17.30

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	May 5, 1945	April, 1945	Feb., 1945	May, 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.20	2.20	2.20	2.10
Plates, Philadelphia	2.25	2.25	2.25	2.15
Plates, Chicago	2.20	2.20	2.20	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.65	3.65	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.65	3.65	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.80	2.80	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts	2.00	2.00	2.00	2.00

Finished Material	May 5, 1945	April, 1945	Feb., 1945	May, 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$25.69	$25.19
Basic, Valley	24.50	24.50	24.00	23.50
Basic, eastern del. Philadelphia	26.34	26.34	25.84	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.19	24.69
No. 2 foundry, Chicago	25.00	25.00	24.50	24.00
Southern No. 2, Birmingham	21.38	21.38	20.88	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	24.80	24.30
No. 2 fdry., del. Phila.	26.34	26.34	26.34	25.84
Malleable, Valley	25.00	25.00	24.50	24.00
Malleable, Chicago	25.00	25.00	24.50	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	24.69	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $38 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. bll. f.o.b. Pac. Ports, $52.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles).

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lbs., $2. Do., over ⅜—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 freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pitsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c.; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
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, 3.10c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c
Woven fence, 15½ gage and heavier, per base column ..... .67c
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	⅛	24	3½
¼ & ⅜	59	40½	¼	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base, Standard spikes, 3.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅜ and ⅝ x 6-in. and shorter ... 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1½-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 12.80

*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 9400 series
Boston	4.044[1]	3.912[1]	4.012[1]	5.727[1]	3.874[1]	4.106[1]	5.106[1]	5.374[14]	4.744[14]	4.144[11]	4.715	6.012[21]	6.012[21]
New York	3.853[1]	3.758[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[12]	4.613[14]	4.103[11]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.705[1]	5.272[1]	3.618[1]	3.922[1]	4.272[1]	5.168[15]	4.872[15]	4.072[21]	4.772	5.816[23]	5.860[20]
Baltimore	3.802[1]	3.759[1]	3.694[1]	5.252[1]	3.494[1]	3.902[1]	4.252[1]	5.044[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.896[1]	5.341[1]	3.696[1]	4.041[1]	4.391[1]	5.346[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	4.071[1]	5.465[1]	3.871[1]	4.165[1]	4.515[1]	5.521[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.73[1]	5.26[1]	3.45[1]	3.819[1]	3.819[1]	4.90[15]	4.40[10]	3.75[21]	4.669	5.60[23]	5.75[22]
Buffalo (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.81[1]	3.50[1]	4.80[15]	4.30[10]	3.65[21]	4.35	5.60[23]	5.75[22]
Pittsburgh (city)	3.35[1]	3.40[1]	3.50[1]	5.00[1]	3.45[1]	3.60[1]	3.60[1]	4.90[13]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.50[1]	3.50[1]	4.80[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.50[1]	5.188[1]	3.45[1]	3.60[1]	3.60[1]	5.027[13]	4.40[24]	3.75[21]	4.45[21]	5.60[23]	5.65[24]
Cleveland (country)	3.25[1]	.....	3.40[1]	.....	3.35[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.709[1]	5.281[1]	3.550[1]	3.700[1]	3.700[1]	5.15[13]	4.500[24]	3.800[21]	4.659	5.93[23]	5.93[22]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.265[1]	5.765[1]	3.965[1]	4.215[1]	4.215[1]	5.758[13]	5.443[24]	4.443[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.165[1]	5.665[1]	3.865[1]	4.115[1]	4.115[1]	5.658[13]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.761[1]	5.291[1]	3.525[1]	3.675[1]	3.675[1]	4.975[13]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.55[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.35[1]	3.50[1]	3.50[1]	4.80[15]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.65[1]	5.15[1]	3.35[1]	3.60[1]	3.60[1]	5.381[15]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[22]
Milwaukee	3.637[1]	3.687[1]	3.787[1]	5.287[1]	3.487[1]	3.737[1]	3.737[1]	5.422[15]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[22]
Indianapolis	3.58[1]	3.63[1]	3.73[1]	5.23[1]	3.618[1]	3.768[1]	3.768[1]	5.068[15]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[22]
St. Paul	3.76[2]	3.81[2]	3.91[2]	5.41[2]	3.61[2]	3.86[2]	3.86[2]	5.407[13]	4.48[24]	4.361[21]	5.102	6.09[23]	6.19[22]
St. Louis	3.647[1]	3.697[1]	3.797[1]	5.297[1]	3.497[1]	3.747[1]	3.747[1]	5.322[15]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[22]
Memphis, Tenn.	4.015[5]	4.065[5]	4.165[5]	5.78[5]	4.065[5]	4.215[5]	4.215[5]	5.415[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.65[1]	5.903[1]	3.55[1]	3.70[1]	3.70[1]	4.90[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	4.00[4]	5.85[4]	4.158[4]	4.20[4]	4.20[4]	5.40[26]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[2]	4.25[5]	4.35[2]	5.50[2]	3.863[2]	4.313[2]	4.313[2]	5.463[15]	4.10[10]	3.65[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	5.05[4]	7.20[4]	5.10[4]	4.95[4]	6.75[4]	6.15[12]	7.20[6]	5.583[30]	5.613	5.85[23]	5.95[22]
San Francisco	4.15[7]	4.35[7]	4.75[7]	6.35[7]	4.65[7]	4.50[7]	5.75[7]	6.50[15]	7.30[15]	5.333[21]	7.333	8.304[23]	8.404[22]
Portland, Oreg.	4.45[27]	4.45[27]	4.85[27]	6.50[27]	4.75[27]	4.75[27]	6.30[27]	5.90[15]	6.60[15]	5.533[16]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.85[6]	6.50[6]	4.75[6]	4.25[6]	5.45[6]	6.10[15]	7.05[15]	5.783[21]	.....	.....	8.00[22]
Seattle	4.35[6]	4.45[6]	4.85[6]	6.50[6]	4.75[6]	4.25[6]	5.45[6]	6.10[15]	7.60[15]	5.783[21]	.....	.....	8.00[22]

*Basing point cities with quotations representing mill prices, plus warehouse spread.
NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70 .90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Beirolt, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos, 0.40 Sulphur, 1.00% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases	61.65

Silica Brick

Pennsylvania	52.65
Joliet, E. Chicago	60.65
Birmingham, Ala.	52.85

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir 5-7%, tit. 9-11% and boron 0.55-0.75%), 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, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 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. 58-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight 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. ern, add .5c for c.l., and 2c for c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; **westsilicon,** bulk, c.l., 5.80c, 2000 lbs. to 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract bass, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	10.75-11.75
Machine Shop Turnings	10.75-11.75
No. 2 Busheling	14.50
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	8.25
Mixed Borings, Turnings	8.25
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	11.50-12.00
Short Shovel Turnings	13.50-14.00
Mixed Borings, Turnings	11.50-12.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	12.50-13.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06*
No. 2 Heavy Melt. Steel	14.06*
No. 1 Bundles	14.06*
No. 2 Bundles	14.06*
No. 1 Busheling	14.06*
Machine Shop Turnings	8.00
Mixed Borings, Turnings	8.00
Short Shovel, Turnings	10.00
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
Short Shovel, Turnings	16.00
Mach. Shop Turnings	14.00
Mixed Borings, Turnings	14.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	14.00-14.50
Cast Iron Borings	13.00-13.50
Machine Shop Turnings	12.00-12.50
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-12.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	16.25-16.75
No. 3 Galv. Bundles	14.25-14.75
Machine Turnings	9.00- 9.50
Mix. Borings, Sht. Turn.	12.00-12.50
Short Shovel Turnings	12.00-12.50
Cast Iron Borings	12.00-12.50
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	13.00
Short Shovel, Turnings	15.00
Mixed Borings, Turn.	13.00
Cast Iron Borings	14.00
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	8.75- 9.25
Short Shovel Turnings	10.75-11.28
Short Turnings	10.75-11.25
Cast Iron Borings	10.00-10.50
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	6.50- 7.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum; 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $158 to $163 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	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.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more: New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 202

Sheet and strip deliveries show little effect of increased capacity as plate tonnage on continuous mills is lessened. Deliveries in general are in fourth quarter and early next year. Demand continues heavy and absorbs capacity as rapidly as it is made available. Some cancellations continue to be received but have little effect on the generally tight position of producers.

Philadelphia — In general hot and cold-rolled sheet deliveries fall late in fourth quarter and early next year, although there are important exceptions. One large seller, while booked solidly into January on hot-rolled pickled sheets, can offer some plain hot-rolled material for delivery in August. Galvanized shipments fall late in the year and beyond, with one seller now practically in April. On the other hand, some galvanized in 16-gage and heavier, in widths of 36 inches and less, can be had in August. Stainless steel sheet deliveries range from late August into October, with schedules sensitive to readjustments in the aircraft program. Orders for stainless steel strip for 48 passenger cars to be built by Edward G. Budd Mfg. Co., Philadelphia, are expected to be placed tentatively within a short time.

Cleveland — Sheet steel production is expected to be substantially larger later this month for considerable rolling space is expected to develop on mills currently clearing up plate orders. Perhaps typical of this situation is that of Republic Steel Corp.'s strip mill at its Corrigan McKinney plant, which during most of the war period was operating on a schedule of 80 per cent plates and the balance sheets and strip. There are strong indications that this ratio will be reversed by the close of this month. Sellers state that considerable headway has been made against carryover sheet tonnage the past 30 days, with expectation that this tonnage will be cleared up soon.

Chicago — Continued demand for all forms of sheet and strip moves virtually all delivery dates on new orders farther away. Hot-rolled sheets are in January, and hot-rolled pickled in February. Cold-rolled are obtainable in December and strip mill sizes in January. Narrow and wide strip, hot-rolled and hot-rolled pickled strip are all in February. Galvanized sheets have advanced from January to February.

Boston — Slackening in narrow cold-rolled strip orders has put shipments ahead of bookings with some producers for the first time in months. Cutback revisions thus far have had slight effect on mill schedules; while deliveries have not improved on high-carbon grades, they are not being extended materially with October quite general. Several fabricators of three and four-blade knives for the services are relatively heavy buyers, mostly hot-rolled high carbon. Sheet inquiry is less active, but as in strip, deliveries cover a wide range. The car building shop in this area is producing lighter units and is a substantial consumer of both at this time. Limitation and other control orders covering steel revoked thus far have not developed new volume to any degree.

Cincinnati — Deliveries on hot and cold-rolled sheets are extended into January and February. Any change in rolling practices, from plates to sheets, will have slight effect on production in this district and hence give little relief on crowded schedules. Cancellations so far are for unimportant tonnages so that mills have no indication of the effect of V-E Day. Pressure for shipments is unrelaxed.

St. Louis — The worst labor shortage since the beginning of the war has developed in sheet and strip mills, resulting in unfinished sheets, strip, and tin plate piling up so as to delay deliveries as long as six weeks. Labor for shearing and loading is tightest, holding up 7000 to 8000 tons at one mill. Deliveries on hot and cold-rolled material are extended to January and February. Mills probably would be on a current basis except for the labor situation. Sheet cancellations have increased slightly but still affect only remote deliveries.

New York — New buying in sheets has slowed noticeably. This is ascribed to uncertainty as to future requirements now that the end of the war in Europe is virtually at hand and also to the fact that delivery schedules continue greatly extended, especially on hot-pickled, cold-rolled, and galvanized sheets. Meanwhile, there have been few cancellations, although the trade in general believes that substantial cutbacks will develop shortly. Principal cutbacks to date have been in stainless steel sheets, reflecting curtailment in the aircraft program. However, stainless steel delivery promises have not been revised appreciably in most cases, with general overall spread in shipments 90 to 120 days.

Schedules on electrical sheets continue to stiffen. On low silicon grades, required principally for fractional horsepower motors, some producers are now booded up solidly into spring of next year; at the same time they are booked more extensively on the high silicon sheets required for radar and signal corps applications. Several leading sellers now quote November on these higher grades, compared with October only recently.

Pittsburgh — Buying in all sheet categories is steady but not particularly heavy. Mills are sold out through the balance of this year and through first quarter of next year in some cases. Hot-rolled and cold-reduced sheets and strip are all in about the same situation, while galvanized sheet deliveries are even further extended. Currently some mills have carryover tonnage equal to a full month's production but the general balancing work being done by War Production Board officials is alleviating the situation to some extent and most mills anticipate that the general level will have been balanced and carryovers largely eliminated by the end of second quarter. This does not necessarily mean that directives have been dropped to any considerable degree. As a matter of fact, in some sheet products directives being received now are heavier than a month ago. Every day brings new directive tonnages to complicate the existing delivery situation.

Steel Bars . . .

Bar Prices, Page 202

Bar deliveries, weighted by heavy requirements of the shell program, fall in fourth quarter and next year in most instances. Mill schedule shifts because of shell cancellations have not had material effect in easing delivery. Little capacity is open for common grades of bars in third quarter and most sellers are booked through fourth quarter on hot-top quality. Alloy bar schedules have been further extended, reaching well into fourth quarter on all grades.

Cleveland — Some shifting on mill schedules has resulted from recent ammunition contract cancellations, but current schedules were not altered and sellers are booked through fourth quarter on hot-topped quality bars, and only relatively few openings are available in late third quarter on regular commercial quality bars. Even electric furnace alloys generally cannot be obtained until fourth quarter. November is earliest delivery available for cold-drawn bars in most instances. Overall new demand has tended to ease, but pressure for delivery has shown no abatement. Some increase in requirements for farm implements and machine tools is indicated over the next 60 days, although overall rated order backlogs of the latter industry have been reduced in recent weeks.

Philadelphia — Carbon bar shipments for the most part fall in fourth quarter and early next year. In some cases September can be done on small common carbon bar rounds and even earlier on carbon bar angles. However, on medium and larger sized specifications deliveries are extended six months or more and on hot-top quality bars some producers are booked for the year and even into April on larger rounds, reflecting heavy shell requirements. Alloy bar schedules are more extended, with electric furnace grades now quoted for October and November and open-hearth grades in late November and beyond. One producer quotes January on 7¾-inch rounds of open-hearth alloy.

Pittsburgh — While no new programs have been announced and it is understood no major programs now being considered on items which would require substantial bar tonnages, there is a steady flow of new orders, which while not as heavy as current shipments, aid in maintaining a sold-out condition on bar mills for the balance of this year. There is no indication that cessation of hostilities in Europe will do much to change current orders.

New York — Major cutbacks in bars still lie ahead, as shell work continues heavy notwithstanding recent cancellations. Except for lighter specifications, bar producers quote shipments for fourth quarter and beyond, and in the case of hot-top quality bars, in most cases for first quarter delivery. A slight easing is reported in cold-drawn bars, although in ammunition sizes, which cover a wide range, schedules appear about as tight as ever. This is especially true of rocket sizes, ranging from 2 inches up to more than 5 inches in diameter, with only a little of this tonnage still available for late this year.

Alloy bar schedules are a shade more extended, with electric furnace grades quotable in October and November and open-hearth grades in late November and beyond. One producer has none of the latter grades available before January.

Boston — Several factors contribute to slower trend in bar buying, both quality carbon and alloys, including coverage against most outstanding contracts, decline in new awards involving bar stock and extended deliveries, although the latter are more stabilized. Outright cancellations for the most part affect tonnage

which never reached the scheduling stage. Consumption of bars, except for more spotty activity in small arms and ammunition, is holding for the present, but further revisions would not be surprising even to the extent of warehouse tonnage. Indications are machine tool and other machinery requirements are slightly heavier.

Steel Plates . . .

Plate Prices, Page 203

Plate demand continues to ease and current orders can command June delivery, though most producers quote July and August. Recent abandonment of construction of tankers has taken considerable tonnage from some mills, reducing their directive materially. Shift of tonnage from continuous mills is proceeding, making more sheet and strip capacity available.

Philadelphia — Most plate producers quote July and August delivery on current buying, but some tonnage can be placed for June. Cutbacks have eased, with indications the worst is over in this respect. Meanwhile new orders are relatively light. One district mill is back in production after suspending operations for about a week because of labor trouble.

Platemakers believe most of their cutbacks are past. They regard President Truman's $7 billion slash in the Maritime Commission budget is largely a "paper" reduction affecting authority to place ship contracts which had not yet been decided on and therefore had meant nothing to tonnage backlogs of mills.

Chicago — In the face of easing plate demand, mills may face the situation soon of insufficient orders to maintain satisfactory rolling schedules. From one local producer Maritime Commission has withdrawn a small tonnage for West Coast shipment to be placed with mills needing tonnage. In its place, however, WPB has substituted plate for a midwestern bombmaker. Another platemaker with mills here and elsewhere lost 50,000 tons by canceling of the 30 maritime tankers. Consequently, it has arranged for an additional cut in its production directive for June of 16,500 tons, making the total for that month 25,000 tons below April. An equipment maker in this area has a letter of intent which, if followed by a contract, will create a need for 2600 tons of armor plate. Narrow sheared plates have moved from September to January delivery, while wide sheared stand at July. Universal plates are available in September.

Boston — Distribution of about 6000 tons for July delivery about closes maritime ship tonnage in this area. Odds and ends which may be required, including repairs, will be taken from warehouse; the latter are taking a more conservative policy in plate commitments. While in a few spots, plate fabricators are holding on fairly well, trend in demand is downward with indications the reduced Navy ship program will support tonnage during balance of the war. Railroads have placed some third quarter volume, but actual releases are not expected to increase much, while miscellaneous industrial buying is on the decline. Sheared plates are still available for July delivery, although some mills are in August.

St. Louis — Plate production has been cut materially, with most open capacity diverted to sheets. Schedules have been reduced but still extend to October and November. A suddenly worse labor situation has slowed production. Unfinished plate is piling up, due to shortage of finishers and handlers. Inventories are low. Plate capacity is expected to have been entirely shifted to sheets by midsummer.

Cleveland — Plate production schedules are expected to be sharply reduced later this month for mills are rapidly clearing up order backlogs and there are indicatons that the Republic Steel Corp.'s strip mill again will be largely producing sheets and strip soon. City of Cleveland took bids late last week on about 900 tons for a 48-inch water pipe line, alternate concrete and steel. Besides the reduction in ship plate construction requirements, an easing in miscellaneous demand is noted.

Pittsburgh — With the situation in flat-rolled products completely reversed from its position of a year ago, continuous strip-sheet mills have not only ceased producing plate but a portion of their heavier gage sheet business is now being rolled on plate mills at some points. Plate demand continues to dry up rapidly and most observers see a virtually normal situation existing from now to the end of the war in the relationship between plates and other products. Progress in reconversion of industry to production of civilian goods has resulted in a number of inquiries for miscellaneous plate applications and there is good rea-

son to expect a substantial proportion of these will result in plate business, which under existing conditions can be booked for delivery as early as third quarter. This depends on size and gage and availability of the proper mill to produce it.

New York — Miscellaneous plate demand is at the lowest level this year, some leading district sellers report. Ship work is fairly well sustained here, but general requirements are off. Tank fabricators are running out of war work and have not yet been allowed to go ahead on considerable civilian work known to be in prospect and railroad equipment manufacturers are still limited in what they can purchase. Jobbers, instead of pressing for tonnage, as was the case earlier in the year, are now canceling orders for plates in some cases. However, until shipbuilding and repair activities decline far more substantially the general movement of plates here will remain substantial.

Wire . . .

Wire Prices, Page 203

New York — The few cancellations and cutbacks appearing in wire mill schedules, for the most part are balanced by new urgent war tonnage where suitable equipment is available. Capacity is still sought for rope, tire bead and signal corps wires, although little is open for these products. There are spotty revisions in aircraft requirements and overall new buying has slackened, but mill schedules are filled into fourth quarter on numerous specialties. On the other hand, production directives limit output in some types of wire and there are spots where finishing capacity is not fully engaged. Expecting further cutbacks, a time lag during which existing backlog schedules will be reshuffled is probable before the slack is taken up by accumulated civilian demand. Duration of this period depends on the extent and speed of reconversion in large consuming industries. Another factor is that a substantial part of this accumulated demand is for sizes and grades similar to firmer orders which will be last to be disturbed. This will limit capacity in some cases.

Boston — Except for some specialties, decline in wire buying has brought shipments up to and in several instances in excess of bookings. Larger war programs under continuing directives are not disturbed, but there have been minor cutbacks and cancellations, including aircraft tonnage. These have not been important enough to result in much schedule revision or reflect any material improvement in deliveries, which for numerous products, including music spring wire, range into and through fourth quarter. There is some sounding out production prospects by the automotive industry for space and time, but this has resulted in little, if any firm volume.

Tin Plate . . .

Tin Plate Prices, Page 203

Pittsburgh — In Washington this week the tin plate industry advisory committee will discuss third-quarter problems. Third-quarter production schedules depend on tin primarily. It is generally assumed sufficient steel will be available to meet all tin plate demands despite the apparent tight situation now existing on cold mills. The big unanswered question is the future prospect of tin supply. Increasing military action in the heavy tin producing region of the world gives some hope that our forces in the near future may be in a position to recapture tin mines and reestablish flow of tin ore to market.

Chicago — Increasingly better supply of box cars enables tin plate makers to move current production as well as to make further inroads on finished material laid down during the recent car shortage. Strong demand for plate, particularly for containers, has deferred deliveries on new business from August to January.

Structural Shapes . . .

Structural Shape Prices, Page 203

Boston — Structural steel fabricating industry may be said to have finished its war job, which was two-fold, industrial plant expansion and shipbuilding under subcontracts. Few of the latter are outstanding in any category and most shops are in need of tonnage. Industrial plant reconversion in itself will not furnish much work, except for alterations and repairs. At this pace fabricators will plod along until postwar public works programs become active and restrictions on materials and labor become easier. Extended deliveries, August-September, are out of line with light demand, due to pressure on mills from other directions.

Philadelphia — Because of heavy requirements for the shell program shape mill schedules are still extended. Some tonnage can be picked up in August, but at least two producers are booked solidly

into September. While somewhat more of a factor, building construction continues generally light. New demand includes 500 tons for a locomotive shop addition for the Pennsylvania railroad at Columbus, O., on which bids have just gone in. Ship requirements are less.

Cleveland — Mills are closed on August shape rollings, with further extension of deliveries noted for light shapes. New inquiry is coming out slowly and no awards of significance have been placed recently. Local fabricators are busy on old contracts, involving miscellaneous work on structural parts for trucks and industrial machinery. However, there are indications that this type work will taper soon. Near record volume of structural tonnage is involved for postwar projects in this area, much of which is past the design stage.

New York—Structural activity is somewhat better, with an increasing number of projects being brought out in anticipation of easing in material limitations in the transition period now getting under way. A fair amount of structural work is definitely going ahead, including 600 tons for a plant addition for Congoleum-Nairn Corp., Kearny, N. J., and 200 tons for a paint spray shop for Eastern Aircraft Division of General Motors Corp. at Linden, N. J.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 203

New York—Although orders are still heavy, some bolt and nut producers report an easing in backlogs, with delivery promises now 8 to 10 weeks on the more standard items, as against 10 to 12 weeks recently. Were more manpower available, backlogs could be cut more materially. However, bolt and nut makers anticipate substantial activity for some time, with the effect of cutbacks cushioned by an easing in limitations on civilian requirements, particularly in the construction field, and by heavy rehabilitation needs in Europe.

Bolt and nut makers anticipate an easing in bar deliveries for third quarter. At present carbon bar shipments are still tight, with little available before August.

Rails, Cars . . .

Track Material Prices, Page 203

New York—Domestic railroad equipment buying is spotty at the moment, pending an easing in steel and other raw materials, which equipment builders expect to see in substantial degree by the third quarter. Current orders include five 1000-horsepower diesel-electric switch engines for the New York Central, placed with the Electro-Motive Division of General Motors Corp., La Grange, Ill. These locomotives replace an order for five 600-horsepower units originally placed in 1942 and subsequently canceled. Car business includes 48 stainless steel passenger cars, 30 for the Seaboard Air Line, 10 for the Pennsylvania, and 8 for the Richmond, Fredericksburg & Potomac, all placed with the Edward G. Budd Mfg. Co., Philadelphia.

Pig Iron . . .

Pig Iron Prices, Page 205

Pig iron supply is lowest for 18 months and consideration is being given to relighting idle furnaces if fuel and manpower can be assured. Shortage of steelmaking scrap is one factor, causing larger use of iron. A stack in the Youngstown, O., district is to be relighted soon. Both producers' and consumers' inventories are low.

Washington—Pig iron inventories in producers' yards are at lowest levels of 18 months, War Production Board officials have informed members of the Pig Iron Industry Advisory committee. Consumers' inventories also are low, as a result of small deliveries recently, and also because of lack of heavy melting scrap, which has caused increasingly large use of pig iron for steelmaking. The committee was informed that consideration has been given to resumption of operation at several blast furnaces shut down last fall, but plans are held in abeyance until it is assured fuel and manpower will be available. Of a total of 214 available blast furnaces 207 were in blast April 1 and seven were down temporarily for relining, WPB reported.

New York—Continued tightening in manpower, rather than cutbacks in the war program, has resulted in a slight tapering in pig iron melt. This, in turn, has lifted some pressure on furnaces and indicative of this at least one large Buffalo producer has recently begun to ship pig iron for this district over the New York state barge canal. However, these shipments will probably be limited for a while, and as summer approaches and munitions cutbacks increase, be stepped up rather materially.

While devoid of especially large inquiries, export demand for pig iron has

undergone a spurt over the past week or ten days. Particularly active, it is said, is demand for South America and the Near East. Foundry iron appears in principal demand.

Youngstown, O.—Struthers Iron & Steel Co. will relight its blast furnace stack at Struthers, O., as soon as repairs can be made and a labor force rounded up, announces William C. Holzworth, president. Large orders for pig iron have been booked, sufficient to assure operation at least for the remainder of the year. Coke and iron ore supply has been arranged. This is the last merchant furnace in the Youngstown district, has been idle since November and was not expected to operate again.

Buffalo — Leading merchant pig iron sellers expect shipments to be maintained through May, regardless of the war situation. Foundries still report more work available than they can handle under present conditions of labor shortage. End of the European war is not expectetd to affect consumption for at least two to three weeks, until cuts in prime contracts are felt in subcontracts.

Cincinnati — Requisitions for pig iron this month are slightly heavier than in April as melters strive to build stocks toward the 30-day limit, many having fallen as low as 10 days. A tight situation, with both northern and southern shipments frequently tardy, has helped defeat the aim of larger stocks. Cancellations of castings orders have appeared and gaps in schedules are quickly filled by business which has been pressing on melters for months.

Philadelphia—With labor difficulties adjusted Alan Wood Steel Co. is again taking hot iron from its No. 1 furnace. Meanwhile, other consumers of basic appear to have received enough to bridge their recent shortage and with furnaces in other districts getting back into production as a result of easing in coking coal it is believed these consumers will not encounter much further trouble.

Boston — Most consumers who took no iron last month will take tonnage in May; deliveries are closely geared to 30-day inventory limitations, representing current melt with reserves generally held to one month supply. Larger consumers in the textile mill equipment industry are moving toward reconversion to normal products, including Draper Corp., Hopedale, Mass.; Saco-Lowell Shops, Biddeford, Mt., and others, although some have dwindling war contracts to complete. While less than requested, Saco-Lowell has been authorized to increase textile machinery prices. Gray iron castings are a choke point in this reconversion because foundry labor is lacking, both among primary shops and subcontractors. Open-hearth and hot mill operations are also endangered despite heavy layoffs at shipyards. One steel works canvassed the Portland, Me., area, where thousands have been let out by shipyards, without success. Cutbacks and revisions are appearing in war contracts, but not in volume to affect melt seriously.

Cleveland — Pig iron output in this district is at the highest level in months, with all 14 furnaces operating. This is in sharp contrast with the situation a few weeks ago, resulting from the soft coal shortage. Some sellers are beginning to build up depleted inventories, although indicated increase in shipments this month will be a retarding factor. Inventories at foundries now are well within the WPB 30-day limitation, which should mean an increase in deliveries to consumers this month even though the melt remains practically unchanged. Cutbacks in the aircraft, shipbuilding and tank programs are mainly paper adjustments on castings suppliers' order backlogs.

Pittsburgh—All blast furnaces banked or slowed down as a result of the coal strike were back in normal production by the first of last week. There are now 42 blast furnaces in operation in this vicinity, with at least one additional furnace ready to begin operations as soon as the necessary labor force can be recruited. The merchant stack of Struthers Iron Corp., Struthers, O., is also set to resume operations as soon as labor is available. Demand for merchant iron, both from foundry and steel producing sources, continues heavy and the situation is tight.

Scrap . . .

Scrap Prices, Page 206

Caution in the face of expected end of the European war rules in the scrap market and both dealers and consumers are wary of committing themselves too far. Prices for steelmaking grades have been lowered by an eastern Pennsylvania steelmaker on open-hearth grades by $2 per ton and no commission paid.

Philadelphia — With two district mills eliminating the payment of brokerage commissions and dropping their buying

prices substantially on No. 2 and No. 3 bundles, the local scrap market on open-hearth grades has slumped. One of these mills has dropped its price on No. 2 and No. 3 bundles $2 a ton in addition to refusing to pay brokerage commission, while the other mill has made a corresponding drop of $3 a ton. No business has been done at the levels offered by the latter mill, which now is understood, in fact, to have withdrawn from the market.

Thus, the going market on No. 1 and No. 2 steel and No. 1 bundles is $18.25 to $18.75, delivered consumers plants, No. 2 bundles, $16.25 to $16.75 and No. 3 bundles at $14.25 to $14.75. Also there has been a further easing in machine shop turnings and mixed borings and turnings, which are now holding at $10.25 to $10.75, delivered. This softening reflects the virtual collapse of Germany, and the likelihood of further cutbacks and cancellations in war munitions. It is generally conceded that there may be still further revisions in the grades above mentioned, with the weakness extending to still other items. Cast scrap, in fact, is the only material reflecting real strength, as demand still exceeds supply.

New York — Buying by an eastern Pennsylvania consumer, minus broker's commission, has resulted in a reduction in dealers' buying prices on No. 1 and No. 2 heavy melting steel to a spread of $14.78 to $15.33, and with an additional reduction of $2 a ton in this consumer's price on No. 2 and No. 3 bundles, and with business done, the brokers' market now stands at $12.83 to $15.33 and $11.83 to $13.33, respectively.

Another eastern Pennsylvania mill, in addition to eliminating the brokerage fee on all open-hearth grades, recently dropped its price $3 a ton on No. 2 and No. 3 bundles and is said to have withdrawn from the market, with no business done at these lower prices and hence are not reflected in brokers' buying prices. Machine turnings and mixed borings and turnings are nominally unchanged at $8.25 although the market is decidedly weak.

Cincinnati — Further weakening has developed in borings and turnings. Material is moving as rapidly as possible with available labor, but some hesitancy has appeared, possibly due to mill reluctance to expand inventories. The undertone was also affected by weakness in specialties. Open-hearth grades, cast, rails and plate scrap are being absorbed readily. Yard stocks are growing, in part a reflection of the manpower situation which curtails preparation and shipments as fast as desired by dealers.

Buffalo — Despite arrival of considerable scrap by lake and canal and near approach of the European war end dealers report substantial scrap inquiry. Dealer sentiment has been bolstered by this situation and the feeling prevails that V-E Day may not cause a sharp break in prices. Dealers believe the inquiries reflect a large accumulation of civilian orders for steel products, which may fill the gap created by cuts in war materials. Three more cargoes of 5000 tons each from the head of the lakes have arrived, making six for the season. A fleet carrying 2500 tons of scrap has arrived by the barge canal and two others are en route.

Cleveland — Mills have taken a waiting attitude lately, although practically all interests are taking all good open-hearth grades offered. However, many mills have held up buying of machine shop turnings for May delivery and this situation has depressed the market further in some centers. Dealers are anxious to finish deliveries on old contracts and are not buying additional tonnages except from regular suppliers. Production scrap is still coming out in large quantities despite cutbacks in some key war programs. One boatload of about 3000 tons of short turnings has arrived here for Jones & Laughlin Steel Corp.'s account. No change in prices has developed in recent weeks.

Boston — Machine shop and short shoveling turnings have sagged another 50 cents to $8 to $10, shipping point, respectively. Easier, but mixed trend, in low phos and unprepared scrap continues without further definite weakness. Heavy melting, including bundles, is at ceiling with district steel works buying, although holding strictly to specifications. Numerous bids for low phos, largely plate clippings, are $2 under ceiling, but supply of this grade is dwindling with curtailment in ship work. Light industrial scrap is in heavy supply. Cast scrap continues scarce, barely sufficient to maintain melts, which include higher ratios of pig iron, without adding to reserves which in most instances are below limits.

Pittsburgh — There has been no change in the current scrap situation here.

Tenor of the market is a little less certain than in recent weeks as factors here reflect weakness in some of the more popular grades in adjoining districts. Top ceiling prices have been paid within the past two weeks by producers here for almost every grade and all railroad items on currently closing lists are expected to bring full ceiling.

Iron Ore . . .

Iron Ore Prices, Page 204

Shipments of Lake Superior iron ore in April, reported by the Lake Superior Iron Ore Association, Cleveland, totaled 7,282,074 gross tons, an increase of 1,993,995 tons over the 5,288,079 tons shipped in April, 1944. The record was set in April, 1942, with 7,857,106 tons. Thus April shipments this year are second highest in history for that month. Details of the movement, by ports, in gross tons, are as follows:

	April, 1945	April, 1944
Escanaba	560,048	524,753
Marquette	417,111	214,999
Ashland	507,334	310,393
Superior	2,053,653	1,666,880
Duluth	1,795,579	1,181,476
Two Harbors	1,901,422	1,355,899
Total, U. S. ports	7,235,142	5,254,400
Michipicoten	46,932	33,679
Grand total	7,282,074	5,288,079

Increase from year ago, 1,993,995 tons, 37.70 per cent.

Warehouse . . .

Warehouse Prices, Page 204

Cleveland — No lessening in shipment out of distributors' stocks has developed, despite cutbacks in some key war programs. Some stimulant to new demand has originated from war plants turning to warehouse for steel requirements to complete their contracts as soon as possible. Distributors have not been able to handle all business offered them because of depleted inventories in sheets and certain bar sizes. Most warehouse interests report near record shipments last month, and no easing is anticipated during May, barring early termination of the European war. Manpower shortages continue to plague distributors, with cutting and shearing operations delaying shipments a week to ten days in most instances. Unless distributors furnish financial statements it is expected OPA may rescind the recent increase in prices granted them to compensate for increased mill prices on certain items.

Pittsburgh — Although the general situation apparently has eased somewhat and mills backlogs trend downward, there is no apparent parallel of this situation in the secondary market. Warehouse stocks are lower than for some time, particularly on flat-rolled products and all galvanized items. One warehouse here reports more than an adequate stock in structural shapes and a good supply of most plate items, but few sheets and only small quantities of strip. There apparently is sufficient tonnage of bars in smaller sizes, but large bars are difficult to obtain. Demand for

New York — Outgoing tonnage with most warehouses continues in excess of replacements. As this has been the case for weeks, inventories are becoming badly out of balance. Demand for steel from distributors is heavy and unabated, but sales are frequently restricted by lack of stock; in most cases where April sales were below March this has been a major factor in the decline. Mills are filled with warehouse load tonnage to an extent deliveries on numerous products are extended well beyond those to consumers. On certain structural shape sizes producers can make August-September shipment to consumers, but are in October-November on warehouses.

Metallurgical Coke . . .

Coke Prices, Page 203

Pittsburgh — Labor difficulties last week again reduced coal production and caused a commensurate decline in beehive coke production and for a while threatened to reduce production of by-product coke. Chief difficulty was the fact that approval of the soft coal miners' new contract did not come until the last day of April and the word from John Lewis to his miners to continue work was not received at all mines in time to prevent work stoppage during the early part of last week.

Canada . . .

Toronto, Ont. — While further reductions in Canada's war production program have been announced, chiefly through cancellation or reduction in United States orders, there has been no noticeable slackening in demand for steel in the Canadian market. Officials of various Canadian steel mills have reported in the past week or ten days that plants are at virtual capacity, operating to the limit of labor and raw material supply, and most

have sufficient backlogs to enable them to maintain this production rate almost to the end of the year. However, there is the chance that the end of fighting in Europe may change this outlook as Canadians at large have been advised through government channels that when the European war is over, war production will be cut immediately 20 per cent and undoubtedly this will have some effect on demand for steel. On the other hand it is pointed out that sufficient civilian business is booked and in prospect to take up more than the slack created by reduced war demand for steel.

Buying of steel and iron continues brisk despite the fact that on some items mills have only minor open capacity to the end of this year. Actually there has been no easing in supply and no betterment to nonwar consumers.

In both black and galvanized sheets sales volume has dropped in the past week or ten days, due more to the fact that mills are filled with orders almost to the end of the year, rather than to slackening demand. Actually demand for sheets is well in excess of production and only essential consumers are being supplied. Warehouse operators also report shortage, with stocks at a minimum.

Merchant pig iron sales show little change. Blast furnace operators state that forward delivery buying has dried up and current business is for spot delivery, ranging in lots of 50 to 200 tons, with total awards for the week approximately 7000 tons.

Scrap iron and steel receipts are increasing daily, with larger tonnages from the rural districts where considerable stock piles were established in the winter. Local dealers are again building yard stocks for future sorting and at the same time have speeded deliveries to consumers. It is stated that steel scrap is now running about even with demand, while iron grades are not quite sufficient to meet all requirements, but the supply has improved considerably.

Formula for Pricing Copper-bearing Scrap

Office of Price Administration has announced a formula for computing maximum prices of open-hearth or blast-furnace grades of scrap containing 5 per cent or more of copper. Under 5 per cent no addition may be made. From April 26 maximum price of copper bearing scrap for these two uses only shall be the value of the contained copper at 9.75 cents per pound plus the maximum shipping point price of the grade of steel for the actual quantity of steel in each gross ton.

A limited tonnage of copper-clad or gilding metal clad steel scrap is appearing as a result of the ammunition shell program, bearing 5 to 20 per cent of copper, OPA said, and this formula is to facilitate pricing.

Steel in Europe . . .

London — (*By Radio*) — Sheet bar demand continues to increase in Great Britain but finished steel is irregular. Locomotive and railroad car material is heavily booked by all producers. Pig iron output is moderate. Orders for tin plate are increasing.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

200 tons, bus terminal at Fairview, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

150 tons, Pittsburgh Corning Corp., Port Allegany, Pa., to Bethlehem Steel Co., Bethlehem, Pa., through John W. Cowper Co. Inc., Buffalo, N. Y., contractor.

420 tons, boiler house, toluene plant, Lake Charles, La., for Cities Service Refining Corp., to Mosher Steel Co., Houston, Tex.; M. W. Kellogg Co., New York, contractor.

STRUCTURAL STEEL PENDING

1200 tons, stripper building, Rouge plant, Ford Motor Co., Dearborn, Mich.

500 tons, locomotive shop for Pennsylvania railroad at Columbus, O.; bids in.

400 tons, storehouses, Pocatello, Idaho, for Bureau of Yards and Docks, U. S. Navy.

REINFORCING BARS . . .

REINFORCING BARS PLACED

200 tons, Parkside elementary school, Washington, to Hudson Supply & Cement, through J. D. Hedin Co., contractor.

100 tons, Radford ordnance plant, Radford, Va., to Dietrich Bros., Inc., Baltimore, through Mason & Hangar Co., contractors.

500 tons, Armstrong Rubber Co., Westhaven, Conn., to Truscon Steel Co., Youngstown, O.

REINFORCING BARS PENDING

950 tons, addition to building 22, Delco Products division, General Motors Corp., Dayton, O.; bids May 4.

400 tons, aviation engine plant No. 1, Chevrolet Motors, Tonawanda, N. Y.

400 tons, wharf, U. S. Coast Guard, Boston; bids May 3.

RAILS, CARS . . .

RAILROAD CARS PLACED

Bangor & Aroostook, 50 hopper cars, to Bethlehem Steel Co., Bethlehem, Pa., and 50 rack cars to the Magor Car Corp., New York.

Seaboard Air Line, 30 stainless steel passenger cars; Pennsylvania, 10; and Richmond, Fredericksburg & Potomac, 8, all awarded to the E. G. Budd Mfg. Co., Philadelphia.

LOCOMOTIVES PLACED

New York Central, five 1000-horsepower diesel-electric switch engines, to Electro-Motive Division of General Motors Corp., La Grange, Ill., replacing five 600-horsepower engines placed in 1942 and later canceled.

War Stimulates Growth of Mexico's Steel Industry

(*Concluded from Page* 81)

exceed 12,000 metric tons annually in the aggregate. In addition, a number of small companies produce billets from packaged iron and steel scrap. Their product is mostly reinforcing bars. High labor costs entailed in preparation and handling of scrap characterize the operations of these plants.

Two companies were established in Monterrey in 1944 to manufacture welded pipe in diameters of 8 to 72 inches. One is the Compania Manufacturera de Tubos de Acero, S. A., operated by the Kane Boiler Works, Galveston, Tex. The other is Tuberias Monterrey, S. A. Both companies, as new enterprises, enjoy exemption from import duties.

Two projects now in development are concerned with production of welded pipe in small diameters. The largest is a joint venture of the Compania Fundidora de Fierro y Acero de Monterrey, S. A., and the Republic Steel Corp., Cleveland. This plant may be ready for operation prior to the end of 1945. A small plant for making small-diameter welded pipe has been established at Monterrey by Tuberias Monterrey, S. A., with used equipment from the United States.

Most of the galvanized pipe requirements of Mexico now are being supplied by two companies which are galvanizing black pipe brought in from the United States; these are the Compania Panamericana de Tubos y Galvanizacion, S. A., and Tubo Galvanizado, S. A. At present these companies are forced to charge somewhat higher prices than paid for imported galvanized pipe.

The two present producers of sheets in Mexico are Hajalata y Lamina, S. A., and Herramientas Mexico, S. A. They obtain sheet bars from Altos Hornos. Their product ranges from 12-gage through 24-gage. Mexico has five sheet-galvanizing companies; four using the hot-dip process are the Galvanizadora Nacional, S. A. of Veracruz, Almonte, S. A. of Tampico, La Florida, S. A. of Monterrey, and Industrias Monterrey, S. A. of Monterrey. Tubo Galvanizado, S. A., Mexico City, has an electrogalvanizing plant.

In addition to Fundidora Monterrey and La Consolidada, which manufacture plain wire and sell part of the output to other companies that manufacture wire products, the Compania Nacional de Clavos, S. A., Mexico City, sells parts of its plain wire to other manufacturers. The country has three other wire drawers, Fabrica de Clavos de Tampico, S. A., Fabrica de Clavos "El Aguila," S. A., and Fabrica de Clavos "El Ancla" S. A.; these manufacture their plain wire into miscellaneous wire goods.

A number of other Mexican companies produce a general line of wire goods from plain wire purchased from other producers. One of them, the Industria Nacional de Alambre de Puas y Similares, is a new one with plant in Mexico City. It manufactures barbed wire from purchased galvanized wire. It is the only barbed wire manufacturer in operation in Mexico at this time. Both Fundidora Monterrey and the Compania Nacional de Clavos have machinery for making barbed wire but are unable to spare any wire at present for this use.

In addition to the steel foundries operated by La Consolidada and Fundidora Monterrey, another company has established a new steel casting department. This is the Constructora de Maquinaria, S. A., Mexico City. It has capacity of about 6000 metric tons of steel castings annually.

Prior to the war some thought was given to the possibility of constructing a completely integrated steel plant in southwestern Mexico, in the neighborhood of Yurecuaro, to be financed in whole or in part by Mexican government. This project, in view of the expansion at other locations, is dormant for the time being.

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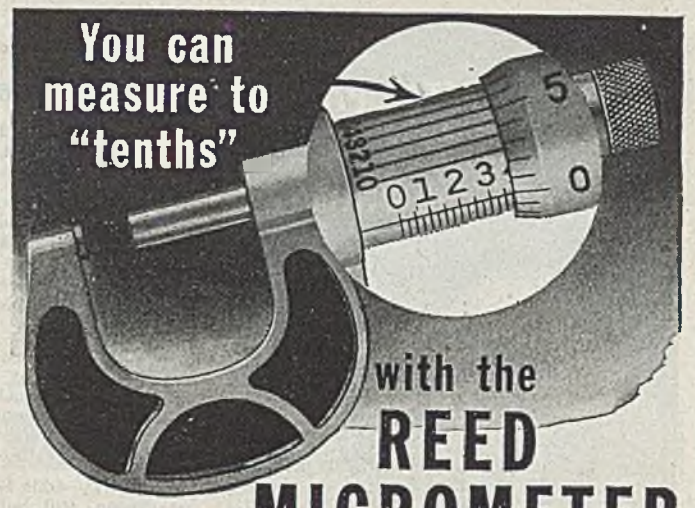

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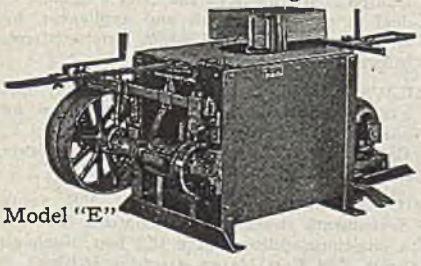

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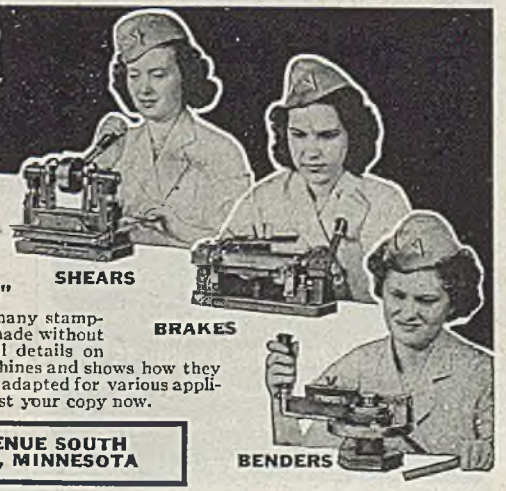

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CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—City Machine Co., 868 East Tallmadge avenue, will build an addition costing about $23,300, to mature at once.

ASHTABULA, O.—Hershberg Products Co. has been incorporated with $25,000 capital and 2000 shares of $50 par value to deal in metals, minerals and rubber, by Sam Hershberg, 1926 Walnut boulevard, and Theodore E. Warren, 4438 Main avenue, the latter acting as agent.

CLEVELAND—Cleveland Bronze Bearing Co. has been formed by Homer Meech, formerly associated with Buckeye Brass Co., and is located at 635 Caxton building. Additional equipment is being purchased for postwar expansion.

CLEVELAND—Ohio Foundry Co., 9812 Quincy avenue, will build a one-story foundry addition 30 x 60 feet, at 2469 East Seventy-first street, to cost about $8500.

CLEVELAND—Modern Tool & Die Co., 5389 Settlement road, is having plans made for a one-story 80 x 80-foot plant and boiler room, to be built as soon as priorities can be obtained.

CLEVELAND—New Era Mfg. & Development Co., 1439 West Ninth street, has been incorporated with $5000 capital and 200 shares no par value to develop steel, rubber and plastic devices, by Fred Herman and associates. New equipment is being purchased.

CLEVELAND—New York, Chicago & St. Louis railroad, J. R. Wallace, chief engineer, 1147 Midland building, will build a one-story 25 x 40-foot coach shop, costing about $40,000. Plans are near completion.

CLEVELAND—Chesapeake & Ohio railroad has received War Production Board authorization for construction of coaling and watering stations, cinder conveyor and coal receiving and cinder tracks, to cost about $275,432.

CLEVELAND—Flame Spraying Inc. has been incorporated with $500 capital and 500 shares no par value to manufacture metal and alloy products. Jules Eshner, 1180 Union Commerce building, is agent.

COLUMBUS, O.—Mauger Construction Co. has received War Production Board authorization for erection of coal preparation plant, mine bin, machine shop, railroad trackage, etc., in Muhlenberg county, Kentucky, to cost $416,000.

NEW BOSTON, O.—Wheeling Steel Corp., Wheeling, W. Va., has received War Production Board authorization for improvements to its bomb manufacturing plant at New Boston, including rehabilitation of existing building, new water well, etc., to cost about $5,350,000.

ORRVILLE, O.—Will-Burt Co., South Main street, has bought 3½ acres on which it plans to erect a one-story plant for stoker production when priorities are available.

WARREN, O.—Thomas Steel Co., Delaware avenue, will build a plant addition costing about $25,000, to mature at once.

WARREN, O.—American Welding & Mfg. Co., Dietz and Griswold roads, will build an addition and make plant alterations costing about $42,450.

NEW JERSEY

NEW BRUNSWICK, N. J.—Delco-Remy Division of General Motors Corp., Detroit, has bought a 27-acre site for erection of a storage battery manufacturing plant, according to O. V. Badgley, general manager of the division, to produce batteries for passenger cars, trucks, tractors and buses.

MICHIGAN

DETROIT—Mace Mfg. Co., 9270 Quincy avenue, has been incorporated with $4000 capital to deal in tools, dies, gages, jigs and machinery, by William Arrowsmith, 9272 Quincy avenue.

DETROIT—Square Tool, Die & Mfg. Co., 21526 Hoover street, has let contract to Winkler & Co., 15545 Mack avenue, for a plant addition.

ILLINOIS

ELGIN, ILL.—Johnson & Johnson, 4949 West Sixty-fifth street, Chicago, manufacturers of surgical equipment and supplies, plans a large plant here. Sessions Engineering Co., 1 North LaSalle street, Chicago, is engineer.

FARMER CITY, ILL.—City has let contract to Kuhne-Simmons Construction Co., Rantoul, Ill., at $30,200 for erection of utilities building for municipal electric light and water plant, part of a $50,000 expansion program, including new diesel engine.

MORRISON, ILL.—Liquid Carbonic Corp., 3100 South Kedzie avenue, Chicago, plans a plant here for manufacture of bottling and brewery machinery.

NORTH CAROLINA

WINSTON-SALEM, N. C.—A. G. Shore is interested in erection of a $350,000 cold storage and refrigeration plant with capacity for 150 carloads.

WISCONSIN

EAU CLAIRE, WIS.—U. S. Rubber Co. has let contract to George A. Fuller Co., 111 West Washington street, Chicago, for a six-story plant addition 135 x 200 feet, for manufacture of truck tires.

MILWAUKEE—Milwaukee Electronic Engineering Co. has been incorporated with 33 shares at $3 each to deal in electronic and other equipment, by Sidney M. Eisenberg, 53 West Wisconsin avenue, Milwaukee 3.

MILWAUKEE—Resistance Welding Engineers Inc. has been incorporated with 500 shares no par value to do industrial and product designing and general engineering, by Neelen & Bullinger, 408 Caswell block, Milwaukee 3.

MILWAUKEE—Polaris Products Inc. has been incorporated with 5000 shares at $10 each to deal in machinery, tools and appliances, by A. A. Zebrowski, 1006 South Barclay street, Milwaukee 4.

MILWAUKEE—National Foundry Supply Co. has been incorporated with 100 shares no par value to deal in foundry supplies, by F. Clinton McCarthy, 231 West Wisconsin avenue, Milwaukee.

MILWAUKEE—Gibbs Steel Co., 338 South Seventeenth street, will let contract soon for a one-story addition 84 x 132 feet. Fitzhugh Scott, 724 East Mason street, is architect.

MILWAUKEE—Badger Die Casting Co., 1570 South First street, has let contract to E. W. Burgess, 5920 West North avenue, for a one-story plant 100 x 100 feet.

MILWAUKEE—Heil Co., 445 West Oklahoma avenue, manufacturer of dump truck bodies, road machinery, etc., has let contract to Klug & Smith Co., 111 East Wisconsin avenue, for a one-story addition 88 x 400 feet at plant No. 3, for steel processing.

RACINE, WIS.—Thomas Tool & Machine Co. Inc. has been incorporated with 500 shares no par value to operate a machine shop and tool and die business, by Gerald T. Flynn, 510 Monument Square.

TWO RIVERS, WIS.—Paragon Electric Co. has let contract to Hamann Construction Co., Manitowoc, Wis., for a one-story plant addition.

MINNESOTA

ALBERT LEA, MINN.—Super-Structure Inc., manufacturer of laminated wood form rafters and prefabricated sectional buildings, is building a new plant 80 x 80 feet.

MINNEAPOLIS—Cornelius Co., manufacturer

$$\left(2\tfrac{7}{16} \times 7\right) \times \left(4\tfrac{7}{8} \times 3\tfrac{5}{16}\right) =$$

$$17\tfrac{1}{16} \times \left(\frac{39}{8} \times \frac{53}{16}\right) = 17\tfrac{1}{16} \times \frac{2067}{128}$$

$$17\tfrac{1}{16} \times 16\tfrac{19}{128} = \frac{273}{\cancel{16}\ 1} \times \frac{\cancel{2048}^{\ 16}}{\cancel{128}\ 1} = 273$$

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of air compressors, beverage dispensing and refrigeration equipment, has let contract to Pearson Bros. for one and two-story plant addition 200 x 240 feet.

MINNEAPOLIS—Northwestern Metal Products Co., 3232 East Fortieth street, has let contract to Ludwig Pavlo for a one-story plant addition 80 x 140 feet.

MINNEAPOLIS—B & B Foundry & Stove Works, 245 Twelfth avenue South, has let contract to Kraus-Anderson Inc. for a one-story foundry addition 30 x 40 feet.

ST. JAMES, MINN.—Tubular Micrometer Co., Howard James, manager, plans immediate construction of a one-story plant addition.

WINNEBAGO, MINN.—Fairmont Canning Co. has let contract to Harry Jacobson for a plant addition 112 x 240 feet.

IOWA

DES MOINES, IOWA—Jansen Machine Co., manufacturer of gears, has let contract to William Knudsen & Sons, Flynn building, for a one-story machine shop 48 x 100 feet.

CALIFORNIA

GLENDALE, CALIF.—Bone Engineering & Tool Co., 703 West Broadway, is erecting a shop building costing about $7400.

LOS ANGELES—Industrial Heaters Inc. has been incorporated with $50,000 capital by J. W. Bouldin and associates. Jacob J. Krutoff, 810 South Spring street, is agent.

LOS ANGELES—Young Oil Tool Co. has been incorporated with $75,000 capital by Clarence P. Young, Belleflower, Calif., and associates. Russell Hardy, 311 South Spring street, suite 608, is representative.

LOS ANGELES—Marvel Sheet Metal Works has been formed by Philip Schneider and Sidney Foint and have established their plant at 4201 Montclair street.

LOS ANGELES—Charles Pettit Co. has been formed by Charles Pettit and is conducting a metal fabricating business at 5857 Compton avenue.

LOS ANGELES—Eastern Machine Works has been formed by Titus Johnson and Lawrence O. Miller and is conducting its manufacturing operations at 8477 West Fourth street.

LOS ANGELES—Precision Propeller & Mfg. Co., formed by J. O. Lillard and A. V. Falcone, is conducting a metal and wood manufacturing business at 8128 South Central avenue.

LOS ANGELES—Knudson Mfg. Co. has been established by Lowell V. Knudson and is operating a tool and die business at 109 East Pico boulevard.

SAN GABRIEL, CALIF.—Duarte Machine Shop has been established at 1172 Longmont avenue by Melvin Klagues to conduct a business for the machining of parts.

SANTA MONICA, CALIF.—Parts Fabrication Co. has been organized by Willard E. Cline and associates and has established operations at 1553-A Ninth street.

SOUTH GATE, CALIF.—South Gate Iron Works has been organized by Fred Ansorge and Julius Geier and has established its plant at 8513½ Long Beach boulevard.

TEMPLE CITY, CALIF.—Sheet Metal Equipment Co. has been organized by Arthur Thomas and has established operations at 1705 East Longden avenue, Temple City, a suburb of Los Angeles.

TORRANCE, CALIF.—Engine Craft has been organized by Andrew R. and Ethel R. Morrison and is conducting a motor rebuilding business at 1975 Carson street.

VERNON, CALIF.—Axelson Mfg. Co., manufacturer of pumps, has building permit for craneway at 6101 South Boyle avenue, to cost about $4600.

VERNON, CALIF.—Norris Stamping Co., has permit for a factory building at 5215 South Boyle avenue, 151 x 762 feet, to cost about $325,000.

WHITTIER, CALIF.—Modern Machine Co. has been organized by Ralph Robbins and associates to conduct a machine shop business at 560 West Washington boulevard.

OREGON

ALBANY, OREG.—Linn county will receive bids at Albany May 15 for a steel bridge over Santiam river, requiring about 40 tons of steel shapes.

EUGENE, OREG.—International Crossarm Co. has awarded joint contract to A. D. Ford & Son, Portland, Oreg., and William F. Ramsey, Eugene, for a plant on a ten-acre site, including main plant 200 x 400 feet, three dry kilns, creosoting plant and other structures.

MEDFORD, OREG.—City plans to double its existing disposal plant by expenditure of $175,000. Plans are by Carl Green, engineer, Portland, Oreg.

PASCO, WASH.—W. C. Smith Co., Portland, Oreg., has been awarded the contract at $208,200 for a Navy hangar at Pasco.

PORTLAND, OREG.—Air Reduction Sales Co., Northwest Tenth and Glisan streets, has let contract to S. P. Lanner for construction of a $20,000 plant addition.

WASHINGTON

SEATTLE—Lyle Branchflower, Fifteenth and Shilshole streets, will build an ice manufacturing addition to his fish processing plant. S. Ivarsson is designing engineer.

SEATTLE—Northwest Tractor & Equipment Co. plans frame repair shop 38 x 98 feet at 5800 East Marginal Way.

SEATTLE—Arc-Weld Mfg. Co. plans plant addition 40 x 60 feet at present plant, 3469 Third avenue West.

SEATTLE—Ford Motor Co., Dearborn, Mich., whose local plants were taken over by the Army several years ago, has bought 12 acres in the Seattle industrial area on which it plans to erect a parts distributing depot to serve the northwest states and Alaska, to cost about $800,000.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Allied Chemical & Dye Corp., New York, $100,000 to provide equipment at Frankford, Pa.

American Radiator & Standard Sanitary Corp., Pittsburgh, $30,000 increase in contract to provide additional equipment at a plant in Louisville, Ky., making overall commitment $650,000.

Tycoon Tackle Inc., Miami, Fla., $175,000 increase in contract to provide additional equipment at a plant in Miami, making overall commitment $1 million.

Consolidated Vultee Aircraft Corp., Allentown, Pa., $300,000 increase in contract to provide additional equipment at a plant in Allentown, making overall commitment $6,250,000.

North American Rayon Corp., New York, $380,000 to provide equipment at a plant at Elizabethton, Tenn., for production of tire-type viscose rayon yarn.

Electromatic Typewriters Inc., Rochester, N. Y., $50,000 increase in contract to provide additional equipment at a plant in Rochester, making overall commitment $250,000.

Bell Aircraft Corp., Buffalo, N. Y., $90,000 increase in contract to provide additional plant facilities at Burlington, Vt., making overall commitment $2,600,000.

General Electric Co., Schenectady, N. Y., $200,000 increase in contract to provide additional equipment at a plant at Cleveland, making overall commitment $4,325,000.

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1—3 ton Crane 27' span, 230 V. DC
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2—100 ton Ladles
2—Southwark Blowing Engines
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1—Pig Casting Machine
1—Scale Car
1—Otis 14"x14" Skip Hoist Engine
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2—230 V. DC Allis-Chalmers Engine Generators, 250 KW.
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EXECUTIVE ENGINEER, INTERESTED IN position as Chief Engineer or Director of Plant Engineering, age forty, graduate Mechanical Engineer, has had supervisory positions past fifteen years, Iron and Steel Foundries, Steel Mills, Fabricating Shops. Twelve years as Plant Engineer. Will consider west coast location. Address Box 895, STEEL, Penton Bldg., Cleveland 13, O.

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Positions Wanted

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