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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 119, NO. 9 AUGUST 26, 1946

NEWS

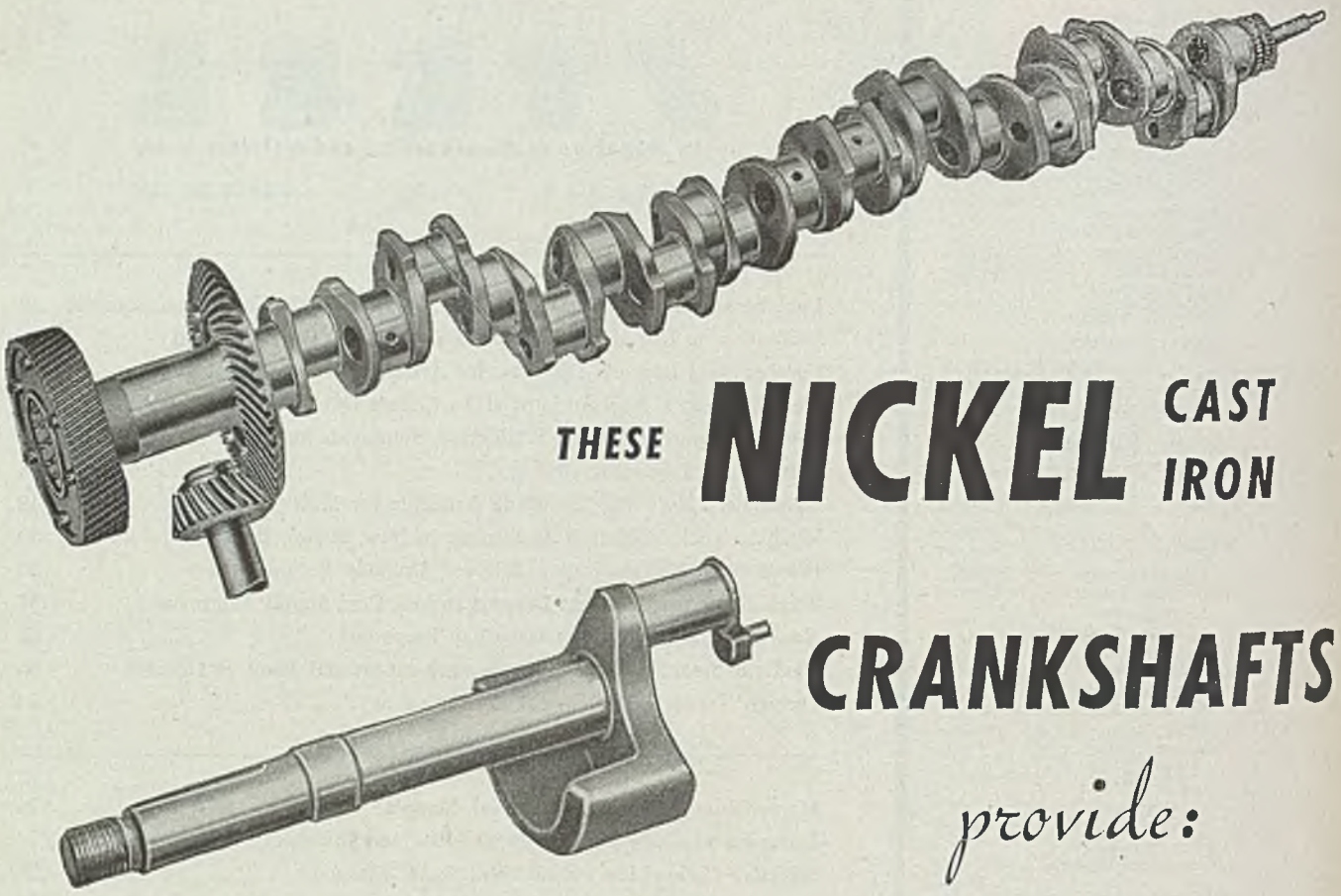
TECHNICAL

FEATURES

MARKETS

NEXT WEEK...

Methods of Controlling Distortion in Welded Structures
Economic Aspects of Tube Bending
Thread Ring Gage with Long Life
Effects of Grain-Growth Inhibitors in Fine-Grained Steels
Drying Stopper Rods in Recirculating Oven



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As the EDITOR VIEWS the NEWS

Try the Obvious

With the demand for rolled steel and castings exceeding supply by a substantial margin, it is ridiculous that steel mills and foundries should be confronted with so much difficulty in obtaining adequate supplies of ferrous scrap.

This statement does not imply that the scrap problem is a simple one. It is complicated by numerous factors, not the least of which is that scrap that can be collected and marketed easily really is scarce. However, there is scrap to be had and it would seem that now is the time for everybody concerned with scrap to ask himself whether or not every reasonable effort to bring it to market has been exhausted.

If one approaches the problem from this angle, he immediately runs into the price factor. Scrap drives have been held. Industry has poured money into committee work to stimulate scrap collections. Government agencies have devoted lavish attention to the problem. But nothing has been done to ascertain what the incentive of higher scrap prices will do.

OPA ceilings on scrap were imposed early in April, 1941. Non-railroad heavy melting steel at Pittsburgh was frozen at $20 per ton. At that time Old Range bessemer iron ore was pegged at $4.75; basic pig iron at Neville Island $23.50; coke, delivered Buffalo or Cleveland, $11.75; steel bars, Pittsburgh, 2.15c; and shapes, plates and hot rolled sheets, Pittsburgh, 2.10c. Today the comparable ore price is $5.45, that of pig iron $28, coke $14.55 and $14.75, bars 2.50c, shapes 2.35c, plates 2.50c and sheets 2.425c. In short, from early 1941 until now, the prices of ore, coke and pig iron—essential ingredients of steel—have advanced substantially under government sanction. Likewise, prices of finished steel have advanced moderately.

Meanwhile, nonrailroad heavy melting steel, Pittsburgh, remains unchanged at $20. Not only that, but as recently as early this month OPA declared that current ceiling prices for iron and steel scrap "are adequate and no increase will be granted in the foreseeable future."

Isn't this a bit silly? Doesn't it indicate that OPA is motivated by prejudice or obstinacy? On what grounds can OPA deny a slight increase in scrap in view of increases granted on all other materials entering into the production of rolled steel and castings?

Now that all other remedies have been exhausted, why not try the obvious one of price incentive? After all, do steelmakers and foundrymen want further demonstrations of the academic technic of OPA controls or do they want usable scrap?

STEEL
August 26, 1946

AN AMERICAN ASSET: Three entirely independent items in this issue point to an asset of American industry that often is overlooked or underrated. The new president of Westinghouse Electric International Co. says that after competition sets in, our "know how" on production will be in great demand throughout the world. The second item is Machine Tool Editor Guy Hubbard's discussion of the great expansion of specialized technical talent to be found in modern engineering departments of manufacturing establishments. The third is the description of numerous inquiries received by American iron and steel mill equipment builders from foreign countries.

These three indications point to the fact that since World War I, industry in the United States has made great progress not only in the development of more efficient production processes, but also in the wide dissemination of "know how" throughout large and small plants all over the country. Time was when railroads were reluctant to use alloy steels because they felt they were too "tricky" to be handled by blacksmiths in remote back shops and roundhouses. Today the ability to handle

(OVER)

steels and other materials of intricate analysis or composition is almost uniformly distributed geographically.

This is a tribute to the free interchange of ideas that prevails to a greater extent in America than in any other industrial nation. It is an advantage to be prized and nourished. —pp. 46, 64, 77

° ° °

RESPECTS CONTRACT: No matter how the present strike on the Great Lakes turns out, one thing already has happened that is distinctly encouraging.

The CIO National Maritime Union, which has contracts with only a few of the ship operators on the lakes, has attempted to halt all lake freight traffic. It appealed to other unions to assist it in this objective. Some of the strongest unions around the lakes have been reluctant to lend aid to the strike and the members of CIO steelmakers unions actually have helped unload cargoes—an act which certainly lends no assistance to the striking seamen.

To CIO-NMU protests against this action, the head of a CIO steelworkers' union replied that his union was prepared to go along with NMU up to a reasonable point, but that it would not go along to the extent of breaking its own contracts with steel companies. This is one gratifying incident where a union has acknowledged the validity of its agreement with the employers of its members. —p. 43

° ° °

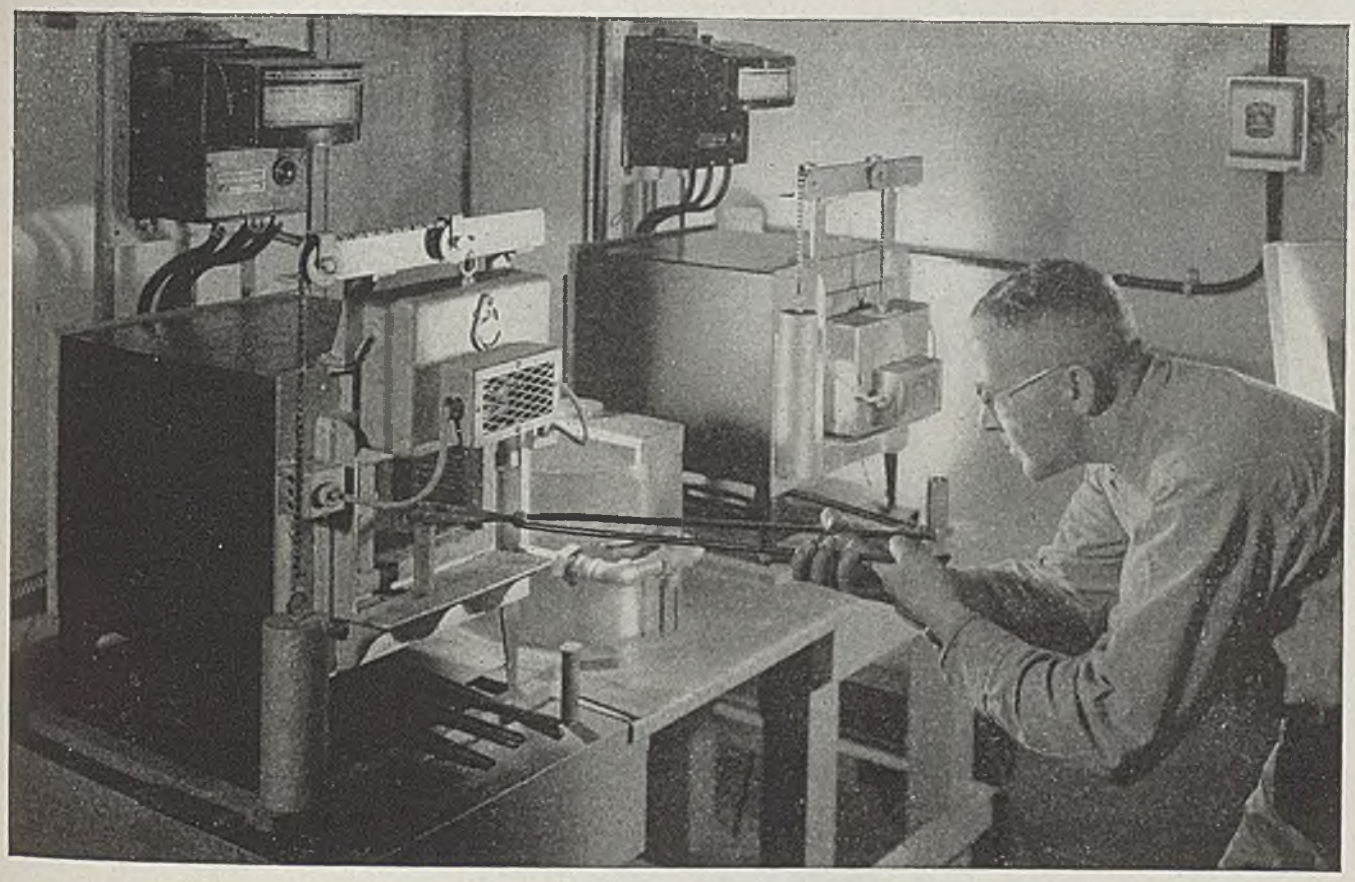
MORE REALISTIC GOAL: In his pre-election speech of last Feb. 9, Joseph Stalin announced three or more "five-year plans" which would increase the annual production of pig iron and steel ingots in Russia to 50 million and 60 million tons, respectively. It was inferred that this goal might be reached sometime in the sixties. Steelmakers throughout the world considered this as an ambitious but not impossible long-range program.

Now the Soviet News reports that the Soviet objective for 1950 is the production of 19.5 million tons of pig iron and 25.4 million tons of steel ingots. This is a modest target compared with that proposed by the Soviet leader in February. In fact, the announced goals for 1950 are only 14 per cent higher in the case of pig iron and 16 per cent higher in the case of steel ingots than actual production in 1940—Russia's last prewar year. —p. 57

SIGNS OF THE TIMES: Britain's labor government, committed to the nationalization of the British iron and steel industry, may present a bill to Parliament which would put nationalization into effect in the latter part of 1947. This move will be protested vigorously (p. 56) and even if nationalization is approved by Parliament, the actual transfer of properties from private ownership cannot be completed before the middle of 1948. . . . The millionth passenger car and the 500,000th truck built since Jan. 1 (p. 59) rolled off assembly lines last Monday. Even with assemblies mounting, it is doubtful whether total production of passenger cars and trucks in 1946 can exceed 3,500,000. . . . Californians are talking seriously about another transportation link across San Francisco bay. It will be either a bridge (p. 62) or a causeway with an opening for the passage of ships. Either plan will involve an expenditure of $100 million or more and will require a substantial tonnage of steel. . . . As if to corroborate other indicators of industrial activity (p. 132), electric power output in the week ended Aug. 17 touched a new postwar high of 4,422 million kilowatt hours. . . . Delay in proceeding with the $20 million research center announced by General Motors last year (p. 60) is attributed to sharply increased building costs. However, organization of personnel for the project continues. . . . William E. Knox, new president of Westinghouse Electric International Co., which has 213 distributors in 89 foreign countries (p. 64), believes this nation's booming foreign trade will continue from three to five years. In his opinion, American "know how" is our chief exportable product. . . . An interesting case study on one company's experience with hardenability testing in material control (p. 72) should be highly informative to other manufacturers contemplating this procedure in connection with the use of standard and alloy steels. . . . In spite of numerous local difficulties, coupled with increasing competition from other nations, Belgian and Luxemburgian iron and steel producers (p. 57) are making encouraging progress in their resumption of foreign trade. . . . Inquiries for iron and steel mill equipment received by American builders from foreign countries—chiefly the United Kingdom, France, Belgium, Italy, Sweden, Chile and Canada (p. 46)—run to a total that would increase foreign finishing capacity about 15 million tons annually. These inquiries are superimposed upon heavy bookings for domestic account.

E. C. Shane

EDITOR-IN-CHIEF



Ryerson Laboratory Adds Extra Value to Steel from Stock

Steel from Ryerson means more than just steel from stock. It means that every heat has met exacting Ryerson specifications—based on more than 103 years of experience in the steel industry. It means that chemical analysis and physical properties are "as advertised" because Ryerson never stocks "seconds" or off heats. And often, it means steel made more valuable to you by the work of the Ryerson laboratory.

Whether you specify, buy or fabricate steel the laboratory serves you. There's no need for hit or miss heat treating when the laboratory runs Jominy hardenability tests on every heat of alloy in Ryerson stocks. Furnishes the results at no charge as a guide to heat treatment.

The laboratory also prevents uncertainty when definite specifications must be met. If carbon steel plates must not exceed a certain hardness limit, or if bars must have specified tensile strength, laboratory tests select the exact steel you need from Ryerson stocks.

These and other trouble-saving laboratory services point up two important reasons why more steel users call Ryerson: Persistent Ryerson effort to provide more complete, more practical service on steel from stock plus constant vigilance in maintaining high quality.

Because of the steel shortage many sizes still are missing from Ryerson stocks, but your size or a workable alternate may be available. Contact the nearest Ryerson plant when you need steel.

Joseph T. Ryerson & Son, Inc., Steel-Service Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

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The making of steel comprises many elements and processes, among which the gathering of raw materials is of prime importance. The Inland map shows the many points from which we gather these raw materials in the Central States area.

The principal ingredient, iron ore, comes by Inland ore boats from the Mesabi and Cuyuna ranges in Minnesota and the Marquette and Menominee ranges in Michigan.

Port Inland furnishes limestone to serve as flux in the blast furnaces and open hearths. Because a ton of coke is required to make a ton of finished steel products, thousands of tons of coal arrive daily from Wheelwright, Kentucky.

Most significant, however, is the fact that Inland Steel owns the mines and quarries from which these raw materials are taken . . . a fact which makes it possible to control quality from the raw materials to the finished steel—ready for use. This complete control from mine to consumer means—that the steel you buy bearing the famous diamond trademark, is . . . INLAND ALL THE WAY!

As with all fabricating materials, the demand for Inland steel now exceeds the supply. However, we are building new mills and expanding facilities that, we sincerely hope, will improve our steel deliveries in the future and eventually enable us to offer you all of the Inland steel you may require.

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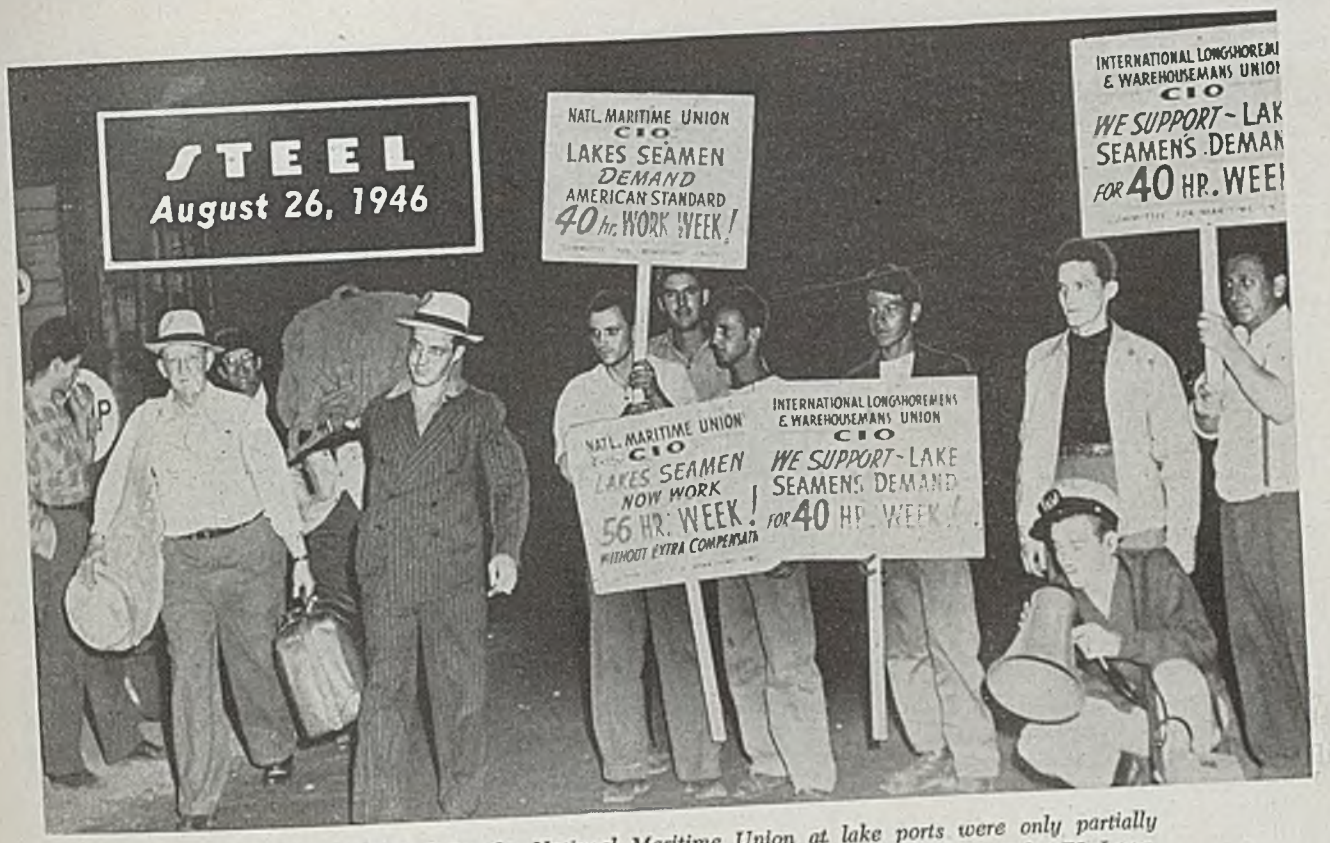


Picket lines established by the National Maritime Union at lake ports were only partially successful in slowing the flow of lake commerce. Both United Steelworkers and AFL-Longshoremen refused to honor the strike at terminals. NEA photo

Lake Strike Cuts Ore Shipments 10%; Chrysler Union To Reopen Contract

Shippers, industry watch situation anxiously. Full operation necessary to provide adequate stocks for winter

CLEVELAND

GREAT LAKES shipments of iron ore and coal were affected only slightly by the first week of the attempt by the National Maritime Union-CIO to tie up lake shipping. The NMU apparently was failing to win the support of other unions necessary to make the strike a success and at week's end only about 15 per cent of the ore, coal and grain fleet was immobilized.

Slightly more than 2,200,000 tons of iron ore were moved down the lakes in the first week of the strike; this is within about 10 per cent of normal.

Lake Erie coal shipping docks loaded 1,847,000 tons of bituminous coal into lake freighters for cargo and vessel fuel; this is considered a heavy loading week and is only slightly below the alltime record loading.

In addition to about two score bulk carriers immobilized, the strike has laid up about 40 tankers and package freighters, seriously affecting oil deliveries to lake ports and interrupting water delivery of new automobiles and general freight.

The NMU represents only a small fraction of the seamen manning Great Lakes vessels and has contracts with only a few of the shipping companies. Apparent strategy of attempting a strike in the face of its small representation on the lakes was to win support of other unions at loading and unloading terminals and possibly effect a tieup serious enough to permit the federal government to seize the shipping industry.

However, this strategy appeared doomed to failure when the United Steelworkers balked at violating their contracts by refusing to unload ships tied up at steel docks. The steelworkers' position was stated bluntly by William F. Donovan, Cleveland district director, as he said: "The Maritime Union has our full support up to the point where we would

(*Please turn to Page* 44)

Top CIO officials fail to sell union locals on 6-month moratorium on strike threats and wage increase demands

DETROIT

STRATEGY of Philip Murray and other CIO leaders in attempting to sell their membership on a six-month moratorium on strike threats and increased wage demands in favor of exerting consumer pressure on rising prices continues to backfire. After the failure of a Washington conference to agree on a policy, another explosion came last week with announcement by the Chrysler local of the UAW-CIO that it would reopen contract negotiations Oct. 16 for higher wages to meet increased living costs. On another front the Ford local of the automobile workers is making inflammatory demands on international officers to start negotiating with Ford for what it calls a "cost-of-living bonus."

Terms of the Chrysler contract provide that it may be reopened no earlier than

Oct. 16, in contrast with other automotive union contracts which have been frozen until next year on the question of wages. The Chrysler local has not indicated what increase it will ask for two months hence, but says this will depend on the trend in living costs. The move is calculated in some quarters as simply additional pressure on the government to restore and enforce price controls on basic commodities, since there is grave doubt that a strike of Chrysler workers would win much support after the general 18½-cent increase granted them earlier this year.

The Ford local is seeking to get around contract provisions freezing wages until next spring by the "cost of living bonus". Such a bonus would be computed on the basis of increased living costs since Jan. 5, would be retroactive to the date the 18-cent increase was granted and would be on a monthly basis. Thus, as described by the union local, if the cost of living should rise 10 per cent in the month of September, every worker would receive 10 per cent more for every hour worked in that month, the money to be paid him in his first pay in the month following.

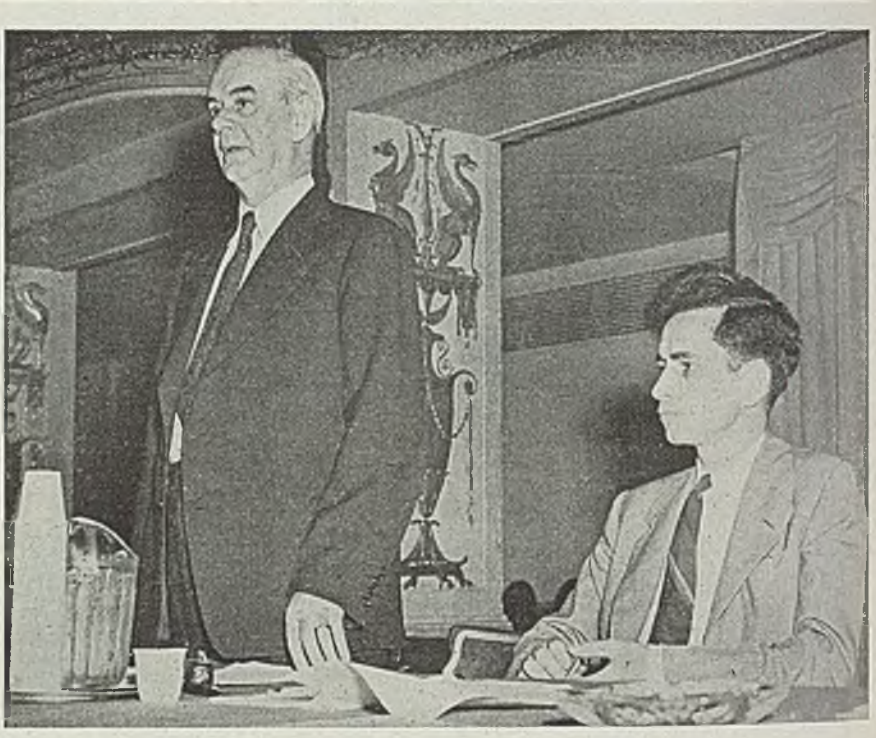
International officers of the UAW probably will exert every effort to avoid letting these ridiculous Ford demands come to a head. Whether they will be successful or not remains to be seen, if the action of the Chrysler local is any indication, they will not, since a militant local can readily take the play away from international officers who then are faced with the necessity of "authorizing" local actions.

Government Requests Lewis And Mine Owners To Meet

Seeking to return operation of more than 3000 mines to their owners, the federal government has invited John L. Lewis, president of the United Mine Workers-AFL, and soft coal operators to meet Sept. 10 to negotiate a contract under which the miners would work for the owners.

The government took over the mines May 22 after Mr. Lewis and the operators failed to work out a new contract following a 59-day strike. Since then, the miners have been digging coal under an agreement with J. A. Krug, secretary of the interior, which incorporates a large portion of the UMW demands.

Later, a further concession was made when Admiral Ben Moreell, federal coal mines administrator, agreed to recognize a union of foremen in coal mines of Jones & Laughlin Steel Corp. The operators have lost two attempts to block this action and the issue is now scheduled for a federal court hearing "on its merits"—that is, as to whether the National Labor Relations Act contemplated that foremen should be unionized with the men to whom they give orders.



Philip Murray's attempt to sell CIO membership on a 6-month moratorium on strike threats and wage increase demands at an emergency meeting in Washington was only partially successful. Even while he addressed the union membership, the CIO Maritime Union was attempting to tie up Great Lakes commerce and the United Automobile Workers were agitating for new wage negotiations. Photo shows Mr. Murray; seated is James B. Carey, CIO secretary-treasurer

Great Lakes Strike Cuts Ore Shipments 10 Per Cent

(*Concluded from Page* 43)

be forced to violate our contracts, but beyond that we cannot go." Donovan's statement followed a complaint by NMU officials to CIO President Philip Murray that the steelworkers are "hurting our cause" by unloading ships.

International Longshoremen's Association-AFL openly opposed the NMU strike and its leaders charged the NMU is "communistically controlled" and is trying to destroy the AFL. The AFL longshoremen continue to unload ships and ignore NMU picket lines.

The interruption to lake shipping appeared too trivial in its first week to justify intervention by the government.

Ship operators and the steel industry, however, were keeping an anxious eye on developments as it was frankly recognized that a shift in developments could easily precipitate a crisis.

Lake shipping got a late start this year due to strikes in the coal fields, the iron ore mines and the threatened railroad tieup and full operation to the end of the season is necessary to insure an adequate supply of iron ore.

Present schedules call for 61,500,000 tons of ore to be moved down the lakes this season. Shipments to Aug. 1 amounted to only 23,848,385, or 16,500,000 tons less than moved during the same period in 1945. If the season's goal is to be reached, 37,691,161 tons of ore must be shipped during the remainder of the season.

Taking into account that there are fewer ships available for the ore trade this year than last, and that great pressure exists for increased shipments of coal, the industry doubts that the fleet can average 10 million tons a month during August, September and October. Even if this is possible, it will leave more than 7,500,000 tons to be moved in November, which approximately equals the record tonnage to be moved in that month during the last eight years. Early freezing conditions could materially affect the November shipments.

Should the strike on the lakes seriously interrupt the ore shipments a shortage of ore next spring is likely, which in turn would affect steelmaking operations, increase the already severe pinch in steel supply to metalworking companies, and possibly cause another slowdown all along the industrial front.

Limitation on Use of Pig Iron For Housing Items Recommended

Malleable Iron Industry committee urges that Civilian Production Administration restrict pig iron allocations for housing to 25 per cent of foundry pig iron production in any one month or quarter of year

RECOMMENDATION that the Civilian Production Administration limit pig iron allocations for manufacture of housing items to 25 per cent of foundry pig iron production in any one month or quarter of year was made last week by the Malleable Iron Industry Advisory Committee at a meeting in Washington.

Many plants will be shut down in the fourth quarter if allocations of pig iron for housing items maintain the September rate, the committee warned.

John C. Houston Jr., deputy Civilian Production administrator, told the committee that it had been necessary to reduce August pig iron allocations for housing items to prevent a too serious impact on other industries. However, he expressed hope of increased pig iron output in the fourth quarter which he said would ease the very tight situation on malleable iron castings for producers of nonhousing articles and also permit full production of critical housing items.

Prior to reduction of August pig iron allocations for housing items, approximately 55 per cent of pig iron shipments to foundries had been allotted for housing items, according to reports. After revision, the percentage is somewhere between 25 and 55 it is said. Mr. Houston said his agency is reviewing September pig iron allocations and expects them to be somewhat along lines of the revised August allocations. No final decision regarding fourth quarter allocations will be made, he said, until he has more complete supply data.

Fourth quarter shipments of pig iron to foundries may be around 375,000 tons a month, but this is only approximate inasmuch as some furnaces may be down for relining that was postponed during the war. Also, low quality coke as a result of the coal strike is hampering production, it was reported.

The Malleable Iron committee reviewed the Office of Price Administration decision against a pig iron price increase now beyond the recent $2 raise. The committee was told that the government is studying the possibility of subsidizing pig iron production by marginal operation furnaces and the absorbing through subsidies of high freight rates in order to make it economically feasible to move pig iron more freely. The committee suggested both a price increase in pig iron and a subsidy. Recommended also was an immediate price increase on scrap.

Two further recommendations by the committee were that CPA study minimum metallurgical requirements of pig iron in the mixtures of various ferrous castings, looking to limitation on pig iron content in such mixes where this would preclude wasteful practices, and that the National Housing Agency act speedily on the committee's July recommendation to bar the use of cast iron soil pipe where some other material would serve the purpose.

WAA Seeks Operators for Government Blast Furnaces

Ten of the blast furnaces built by the government during the war period to increase pig iron supply and offset scrap shortages are in current production and the Office of Real Property Disposal, War Assets Administration, is attempting to secure operators for ten other government-owned furnaces that are susceptible to early production.

The ten furnaces in operation, having a combined capacity of 3,759,668 net tons of pig iron per year, are: Two at Braddock, Pa.; two at Granite City, Ill.; two at Geneva, Utah; and one each at Cleveland, Chicago, Duluth, and Youngstown, O.

The remaining ten blast furnaces, having a total annual capacity of 3,077,184 net tons of pig iron, which are not in operation are: Two furnaces, one not fully completed, having a total capacity of 854,000 net tons, located at Indiana Harbor, Ind., now under lease to Inland Steel Co.; one furnace of 399,850 net tons capacity at Daingerfield, Tex., under lease to Lone Star Steel Co.; one furnace of 274,000 net tons capacity at Houston, Tex., adjoining the plant of Sheffield Steel Corp.; one furnace of 280,000 net tons capacity at Gadsden, Ala., adjoining the plant of Republic Steel Corp.; one furnace of 383,334 tons at the Geneva Steel plant, Geneva, Utah; one furnace of Columbia Steel Co.; the incomplete furnace of 432,000 net tons capacity at Monessen, Pa., adjoining the plant of the Pittsburgh Steel Co.; the furnace of 127,000 net tons capacity at Chester, Pa., and the incomplete iron furnace at Rusk, Tex.

Present, Past and Pending

■ FABRICATED STRUCTURAL STEEL BOOKINGS INCREASE

NEW YORK—Estimated bookings of fabricated structural steel increased 2029 tons in July to 133,039, making the seven months total 1,100,405 tons, or 30 per cent above the average for the same periods in 1936-40. July shipments increased slightly to 130,980 tons while the tonnage available for fabrication within the next four months increased to 673,839 tons, American Institute of Steel Construction reported last week.

■ NATIONAL CAN ACQUIRES UNION PLATE & WIRE CO.

NEW YORK—National Can Corp. has purchased the entire capital stock of Union Plate & Wire Co., Attleboro, Mass., platers of precious metals. The company will be operated as a subsidiary of National Can.

■ RFC COPPER AND LEAD STOCKPILES DECLINE

WASHINGTON—RFC stockpiles of principal metals being drawn on by CPA for civilian purposes included the following at the end of July: Copper, 264,849 short tons and lead, 33,751 short tons, representing declines for the month; zinc, 543,434 short tons, tin, 54,220 long tons, representing increases.

■ $15 MILLION ELECTRICAL FIRM ORGANIZED IN MEXICO

PITTSBURGH—Industrial Electrica de Mexico, S. A., a $15 million company for production near Mexico City of electrical equipment, has been organized by Westinghouse Electric Corp. Limited production under long-term license agreement will begin by the end of this year and will be augmented by use of subassemblies furnished by Westinghouse until full scale operation is possible.

■ BRITAIN SEIZES GERMAN STEEL INDUSTRY IN ITS ZONE

LONDON —(by cable)—British Control Commission has taken over the German iron and steel industry in the British occupation zone. The "nationalization" order had three official purposes: To reduce the industry's capacity to peacetime level; to break concentration of economic power; to prepare the industry for reorganization.

Foreign Steel Interests Inquiring For Rolling Mill Equipment Here

Proposed programs indicate expansion of 15 million tons in annual finishing capacity abroad. Foreign loans seen encouraging modernization. Equipment builders heavily booked with orders from domestic steel companies

PITTSBURGH

SUBSTANTIAL inquiries for steel mill equipment from foreign countries are being received by American builders and indicate proposed expansion programs totaling about 15 million tons of foreign finishing capacity annually.

The proposed expansion programs are believed prompted in most cases by loans from the United States to the foreign governments. Industry officials point out that very little steel rolling equipment in Europe was destroyed during the war and that contemplated modernization programs are not necessary to carry out rehabilitation. However, loans, actual or in prospect, have encouraged the foreign countries to launch improvement programs which will increase capacity and which may result in a major competitive factor for the domestic steel industry.

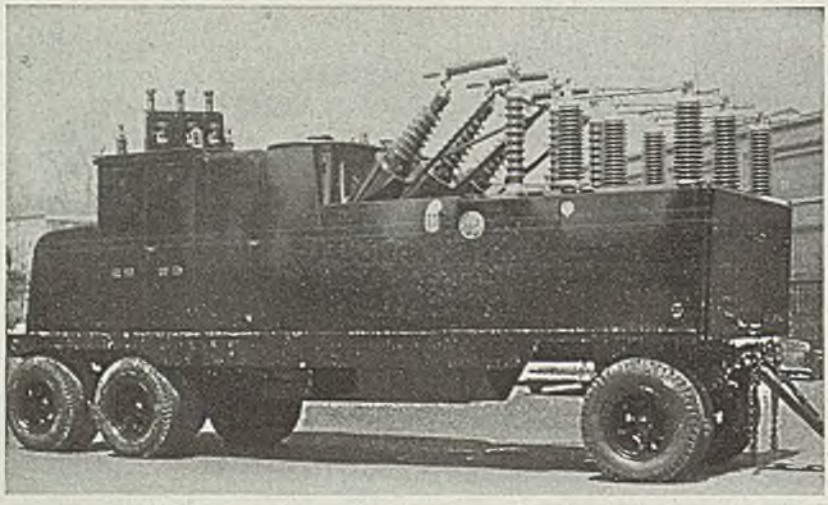
The foreign orders are expected to develop at a time when domestic equipment builders are booked ahead 12 to 17 months on a large number of installations for United States companies.

Largest foreign demand for steel rolling mill equipment is expected to develop from England. However, the program is being held up pending crystallization of the nationalization procedure in regard to type of compensation for steel plant facilities when taken over by the government.

The English industry plans to spend about 165 million pounds for new blast furnaces, open hearths and finishing mill facilities. Active inquiries from United Kingdom, amounting to about $30 million, include: A wide flange mill, to be located in northern England or Scotland; plus one hot mill and two cold-reduction mills in Wales. Total English steel expansion program eventually is expected to result in orders placed here amounting to well over $30 million, including electrical equipment, machine tools, annealing furnaces, and a host of auxiliary steel mill items. Recent reports from London indicate that priority will be given to imports of special steel mill equipment.

Other foreign finishing mill expansion programs include the following: France, one or two hot and cold-reduction mills; Belgium, blooming mill and strip mill; Italy, one strip mill; Sweden, hot and cold-reduction sheet and strip mill; Chile, hot and cold-reduction sheet and strip mill; Canada, new hot mill recently put in operation and cold-reduction sheet and tin plate mill on order.

Extent to which the domestic steel industry is preparing itself for future markets is indicated by the large number of expansion programs under way, particularly in sheet, strip and tin plate finishing capacity. Currently, sheet and strip capacity is about 1 million net tons above the July, 1941, level, while by July 1 next an additional 2.5 million tons of new capacty will be added. Also under way are a large number of comparatively small installations and improvements aimed at achieving greater efficiency and speeding up production schedules. The new types of rolling mill equipment are expected to provide finer finishes for flat-rolled products.



POWERHOUSE ON WHEELS: Product of General Electric Co., Schenectady, N. Y., this 2500-kva mobile unit substation is designed for use to relieve seasonal or temporary overloads, for emergency service and when rebuilding regular substations. The 22-ton unit measures 25 feet over-all and is 8 feet wide

Many Expansions Planned

The following list of expansion programs (not necessarily complete) gives an indication of the steel industry's finished steel modernization program. It will be noted that cold-reduction mill expansion is restricted to narrower widths. Apparently there is ample wide automotive sheet capacity.

A 4-high, 5-stand, 42-in. cold-reduction mill, will soon be in operation at Weirton Steel Co., Weirton, W. Va., built by United Engineering & Foundry Co., Pittsburgh.

By 1947, Jones & Laughlin Steel Corp., will have one of the fastest cold-reduction mills in operation at its Aliquippa Works. This will be a 42-in., 4-high, 5-stand tin mill built by Mesta Machine Co., Pittsburgh.

A long strike at Granite City Steel Co. has delayed installation of a 56-in., 4-high, 4-stand, cold-reduction mill, which was built by Mesta.

Cold-reduction mill for Great Lakes Steel Co., Detroit, should also be in operation soon.

Expansion at Bethlehem Steel Corp.'s Sparrows Point plant includes a new 68-in., 4-high, 10-stand hot strip mill, and rebuilding of the 56-in. cold-reduction mill.

Republic Steel Corp. has a 48-in. hot strip mill under construction for its Youngstown plant.

Cold Metal Products Co., Youngstown, has launched an expansion program which will increase its capacity from four to six Steckel 4-high reversing cold-reduction mills, and make possible the production of light-gage, cold-rolled alloy and stainless strip as thin as .001.

Acme Steel Co., Chicago, has ordered a 22-in., 5-stand tandem cold-reduction mill from United Engineering.

Expansion at Allegheny-Ludlum Steel Corp.'s Leechburg, Pa., plant includes a 28-in., 4-stand, 4-high cold-reduction mill.

Columbia Steel Co., Pittsburg, Calif., has under construction a 54-in., 4-high, 5-stand cold-reduction mill by United En-

gineering, which will produce 325,000 tons of sheets and tin plate annually; while production facilities will be installed at the Geneva, Utah, plant to supply Columbia Steel Co. with 386,000 tons of hot-rolled coils annually.

Carnegie-Illinois Steel Corp. recently awarded a contract to United Engineering for a 54-in., 4-high, 4-stand cold-reduction mill for installation at Gary, Ind.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., is reported to have under consideration a $24 million expansion program, involving a cold-reduction mill for sheets and tin plate.

National Tube Co. has ordered from United Engineering for its Lorain, O., expansion program, a 46-in. blooming mill, 35-in. reversible bar mill, and 26 and 20-in. continuous billet mills. Aetna Standard Engineering Co., Youngstown, has booked a 36-in. piercer and continuous rolling mill, followed by two sizing mills for heavy and light wall tubing for National Tube Co.'s expansion program at Gary, Ind.; and 42-in. piercer and continuous rolling mill followed by two sizing mills for standard pipe, for company's Lorain, O., plant.

Steel Advisory Group Authorized To Collect Data for Price Increase

Reconversion officials hint across-the-board rise of $1.50 a ton may be permitted under Barkley amendment. Taft amendment would have allowed about $4 a ton. Some steel products may be decontrolled

DATA to support a petition for a steel price increase under the new price control law will be compiled by the OPA General Steel Products Industry Advisory Committee and submitted to the price control agency when the latter completes its procedural regulation under which industries will be permitted to ask price relief under the Barkley amendment.

OPA authorized the committee to go ahead with the collection of its data at a recent meeting. The committee last week had not formally requested an increase in prices.

OPA is permitted 60 days to make a decision after a petition for price relief has been filed, indicating that price action is unlikely before late autumn.

Top reconversion officials are reported to believe that an across-the-board increase of $1.50 a ton on steel products will be allowed under the Barkley amendment. They estimate that under the defeated Taft amendment, the allowable increase would have averaged $4 a ton.

The committee also discussed with OPA officials the decontrol of some steel products, but action on decontrol is being held up pending completion of decontrol regulations. Items which may be decontrolled are those which are in fairly plentiful supply.

Institute Reports Capacity, Production, Shipments for June

Steel Products	Number of companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month: Production: Net Tons	Current Month: Production: Per cent of capacity	Current Month: Shipments (Net Tons): Total	Current Month: Shipments (Net Tons): To members of the industry for conversion into further finished products	To Date This Year: Production: Net Tons	To Date This Year: Production: Per cent of capacity	To Date This Year: Shipments (Net Tons): Total	To Date This Year: Shipments (Net Tons): To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	40	1	x x x x	x x x x	x x x	251,664	98,860	x x x x	x x x	1,482,341	685,925
Structural shapes (heavy)	12	2	9,421,550	296,643	40.7	274,071	x x x x	1,373,900	30.8	1,416,493	x x x x
Steel piling	4	3		18,605		10,950	x x x x	67,813		52,314	
Plates (sheared and universal)	27	4	17,080,770	317,960	22.6	303,941	20,024	1,732,530	20.4	1,736,861	117,208
Skelp	5	5	x x x x	x x x x	x x x	18,683	12,551	x x x x	x x x	152,033	71,908
Rails—Standard (over 60 lbs.)	4	6	3,657,000	139,752	46.4	122,416	x x x x	689,180	38.0	672,933	x x x x
—All other	5	7	392,000	12,542	38.9	10,720	x x x x	62,623	32.2	61,094	x x x x
Splice bars and tie plates	12	8	1,745,900	44,722	31.1	44,466	x x x x	261,070	30.1	279,473	x x x x
Track spikes	10	9	349,400	10,843	37.7	11,416	x x x x	60,600	35.0	62,371	
Hot Rolled Bars—Carbon	33	10	x x x x	548,861	x x x	422,696	50,849	2,866,526	x x x	2,363,298	292,350
—Reinforcing—New billet	15	11	x x x x	82,188	x x x	95,906	x x x x	402,712	x x x	438,731	x x x x
—Rerolled	12	12	x x x x	10,672	x x x	11,210	x x x x	60,841	x x x	62,247	x x x x
—Alloy	22	13	x x x x	143,374	x x x	114,337	9,318	695,079	x x x	578,982	57,109
—Total	39	14	22,009,660	785,095	43.4	644,149	60,167	4,025,158	36.9	3,443,258	349,459
Cold Finished Bars—Carbon	24	15	x x x x	94,718	x x x	97,463	x x x x	563,271	x x x	566,028	x x x x
—Alloy	23	16	x x x x	21,592	x x x	18,753	x x x x	99,908	x x x	87,899	x x x x
—Total	31	17	2,851,510	116,310	49.6	116,216	x x x x	663,179	46.9	653,927	x x x x
Tool steel bars	18	18	255,010	9,308	44.4	9,868	x x x x	51,590	40.8	51,343	x x x x
Pipe & Tubes—Butt weld	14	19	2,176,520	96,022	53.6	94,289	x x x x	586,094	54.3	576,310	x x x x
—Lap weld	9	20	730,200	19,272	32.1	19,334	x x x x	112,564	31.1	127,692	x x x x
—Electric weld	10	21	1,536,900	63,634	50.3	54,022	x x x x	324,440	42.5	269,954	x x x x
—Seamless	13	22	3,169,600	144,486	55.4	129,073	x x x x	912,231	58.0	812,191	x x x x
—Conduit (cap. & prod. incl. above)	6	23	x x x x	x x x x	x x x	6,160	x x x x	x x x x	x x x	38,105	x x x x
—Mech. tubing (cap. & prod. incl. above)	11	24	x x x x	x x x x	x x x	31,581	x x x x	x x x x	x x x	193,424	x x x x
Wire rods	25	25	7,293,670	380,497	63.4	88,605	29,951	1,917,938	53.0	456,724	163,593
Wire—Drawn	39	26	5,702,890	294,240	62.7	166,091	12,939	1,509,139	53.3	875,658	63,183
—Nails and staples	18	27	1,260,360	48,342	46.6	50,654	x x x x	254,628	40.7	257,147	x x x x
—Barbed and twisted	15	28	543,610	17,688	39.5	18,208	x x x x	98,398	36.5	97,385	x x x x
—Woven wire fence	15	29	1,121,860	28,421	30.8	28,753	x x x x	175,044	31.4	175,472	x x x x
—Bale ties	12	30	149,700	8,354	67.8	8,978	x x x x	* 37,416	50.4	40,293	x x x x
Black Plate—Ordinary	9	31	x x x x	x x x x	x x x	56,181	30	x x x x	x x x	353,833	819
—Chemically treated	8	32	465,000	9,909	25.9	8,770	x x x x	* 66,025	28.6	62,993	x x x x
Tin and Terne Plate—Hot dipped	9	33	3,758,850	165,189	53.4	172,765	x x x x	810,421	43.5	863,299	x x x x
—Electrolytic	9	34	2,231,850	70,480	38.4	74,208	x x x x	389,511	35.2	404,823	
Sheets—Hot rolled	30	35	19,353,320	1,095,467	68.8	469,178	25,265	5,900,201	61.4	2,595,343	* 162,926
—Cold rolled	13	36	7,127,460	437,409	74.6	315,959	x x x x	2,343,386	66.3	1,702,334	x x x x
—Galvanized	16	37	2,924,130	120,448	50.1	117,187	x x x x	647,621	44.6	650,232	
Strip—Hot rolled	25	38	7,180,030	187,759	31.8	107,581	19,332	1,018,399	28.6	644,245	* 101,909
—Cold rolled	34	39	3,067,450	109,534	41.8	107,986	x x x x	594,257	39.0	588,580	x x x x
Wheels (car, rolled steel)	5	40	315,400	15,977	61.6	14,209	x x x x	103,957	66.4	108,363	x x x x
Axles	6	41	398,170	10,894	33.3	7,751	x x x x	54,113	27.4	52,641	x x x x
All other	3	42	169,510	3,234	23.2	545	x x x x	21,010	25.0	2,506	x x x x
TOTAL STEEL PRODUCTS	140	43	x x x x	x x x x	x x x	3,966,628	279,119	x x x x	x x x	22,017,988	1,716,930
Effective steel finishing capacity	140	44	64,059,000	x x x x	x x x	x x x x	x x x x	x x x x	x x x	x x x x	x x x x
Percent of shipments to effective finishing capacity	140	45	x x x x	x x x x	x x x	70.0%	x x x x	x x x x	x x x	63.9 %	x x x x

Refrigerator Production Rising

Critical lack of materials and components held output in first half of 1946 to 837,000 units, or 55 per cent below 1940-41 level, but at end of first half production was 32 per cent below prewar average and was climbing steadily

EARLY in 1946, Civilian Production Administration set as its goal mechanical refrigerator output at prewar level by midyear. When midyear arrived, the record showed that while production was climbing steadily it was 32 per cent below prewar average. Strikes and materials shortages provide the explanation for the poor showing. For the balance of the year, the outlook is more promising, but output will continue to be held down by critical lack of materials and components.

Shipments of mechanical refrigerators in 1940-41 averaged 309,000 units monthly. When the war ended in August, 1945, manufacturers prepared to resume operations quickly. They achieved considerable success in this direction for by October shipments were 85,000 units, which rose to 115,000 in November and 125,000 in December.

Then followed a disappointing first quarter of 1946 with 123,000 units in January, only 67,000 in February and 98,000 in March—the direct result of widespread strikes in the steel and electrical industries. With ending of these strikes, refrigerator production rebounded sharply in second quarter to permit factory shipments of 143,000 units in April, 196,000 in May and 210,000 in June.

Thus in six months of this year, shipments of mechanical refrigerators totaled 837,000 units, or 55 per cent below the 1940-41 level.

Production Levels Vary

By midyear, manufacturers were reporting varying degrees of success in attaining projected schedules, reason being that strikes and materials shortages were not affecting all alike. One large producer stated that late in June it had hit an assembly rate of 1000 refrigerators a day, or about 50 per cent of prewar; another major company announced that in July it was at 93 per cent of capacity.

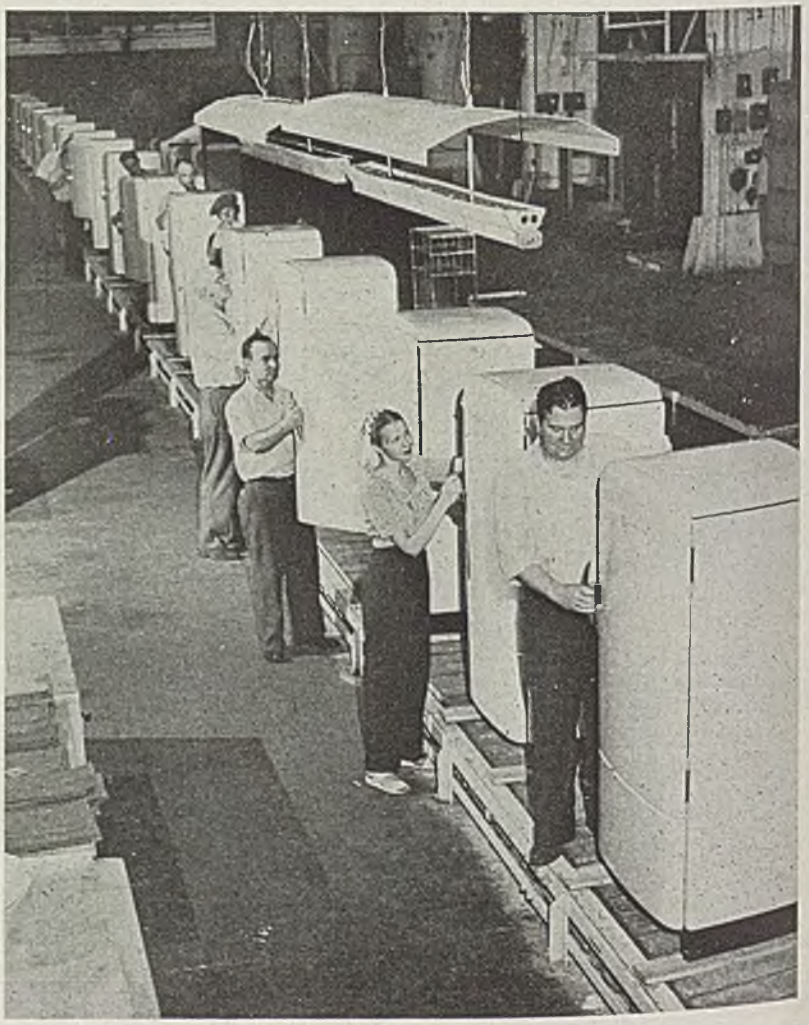
The industry's labor problem continues to be one of obtaining skilled and semi-skilled workers and the training of them for consumer production line jobs.

Like all electrical appliances whose manufacture was restricted during the war, mechanical refrigerators enjoyed tremendous sales prospects when V-J Day gave the go-ahead sign. Manufacturers accomplished their reconversion programs quickly to resume production of former models and to get new models engineered and tooled up. But before much headway was made, the rash of major strikes broke out and interrupted production and created materials shortages.

Most serious of shortages in steel items has been cold-rolled sheets used for refrigerator cabinets and tin plate used in condensers. However, as short as steel has been and still is, refrigerator output has been retarded more by other items and components than by enameling sheets.

Copper and copper products have constituted a major shortage for refrigerator parts and fractional horsepower motors. Motors have been desperately lacking and are likely to continue inadequate through most of 1947. Motor makers are swamped with orders and will require many months to catch up if the backlogs continue on the books as firm orders. Contributing to the motor shortage has been lack of copper wire for windings, copper for bearings, inadequate supply of gray iron castings for frames, strikes in motor manufacturing plants, and labor deficiency.

A tremendous demand for mechanical refrigerators exists. Some appraisal of the market was given recently by A. M. Sweeney, manager of sales and major



Assembly of mechanical refrigerators in the first half of 1946 was 55 per cent below the 1940-41 level because of an insufficiency of materials and components, but the outlook for the second half is more promising. NEA photo

appliances, General Electric Co., who estimates the probable 1947 volume as 7,805,000 units. This output, if attained, would represent an increase of 132 per cent over the annual average for 1940-41, and naturally constitutes pent-up as well as new demand. Curiously, the number of units built in 1941 had shown an increase of 123 per cent over 1935. This gives proof that the American household considers a mechanical refrigerator as essential equipment. If refrigerator production in 1947 hits the 7 million mark it would mean a consumption of around 700,000 tons of steel.

Some fear has been expressed that widespread strikes which affect earnings and dissipate savings, as well as higher prices on all manufactured goods, will cause serious shrinkage in demand for mechanical refrigerators, as well as other household appliances. Whether this is true is a moot question and one that cannot be argued with finality at this moment. For one thing, demand estimates are built up on known orders placed with dealers and under present conditions when deliveries are long deferred it is not known how much duplicate ordering exists.

A shred of light may be thrown on this subject by a survey which a local power company conducted recently in San Diego county, Calif. This tabulation revealed that 19.2 per cent of those who want to purchase mechanical refrigerators will buy first models; 80.2 per cent will wait. However, only 24.9 per cent of these prospective purchasers have registered with dealers; 75.1 per cent have not. In other words, three out of four potential buyers have not made their intentions known, which would tend to support the existence of a tremendous market ahead.

Among new developments in the mechanical refrigerator field is the dual-tempering model—that is, one containing a compartment in which limited amounts of foods may be quick-frozen and stored. While a number of these units have been announced, few have as yet been put into production.

Another development which involves mechanical refrigerators is that of merchandising complete all-electric kitchens. At least two companies are active in this field. One of these, the Edison General Electric Appliance Co. Inc., Chicago, recently allocated the first of these postwar units to 1000 war veterans.

Only a few new companies are entering the domestic mechanical refrigerator field, but 100 or more new concerns are expected to be producing quick freeze and cold storage units by early 1947.

Additional Plants May Be Made Available for Multiple Tenancy

WAA considers adding ten properties to its program under which surplus government-owned war plants too large for peacetime operations as single enterprises are being subdivided and sold or leased for use by small businesses

EXPANSION of the War Assets Administration's "multiple tenancy" program under which surplus government-owned war plants too large for peacetime operations as single enterprises are being subdivided and sold or leased for use by small businesses is being considered.

In addition to six large properties already included in the program, the WAA has under consideration for multiple tenancy use ten other plants.

The six properties already under the program are: Bechtel-McCone Aircraft Modification Plant, Birmingham; Consolidated Vultee Aircraft Corp., San Diego, Calif.; Aluminum Co. of America, forging plant, Cannonsburg, Pa.; Basic Magnesium Corp., Henderson, Nev.; Coosa River Ordnance Plant, Talladega, Ala.; and Illinois Ordnance Plant, near Carbondale, Ill.

The ten plants which WAA is considering for addition to the program are: Aluminum Co. of America, aluminum forging plant, New Castle, Pa.; Arkansas Ordnance, Jacksonville, Ark.; Boeing Aircraft Co., Renton, Wash.; Consolidated Vultee Aircraft Corp., New Orleans; Dow Magnesium Corp., Marysville, Mich.; Evansville Ordnance, Evansville, Ind.; Green River Ordnance, Dixon, Ill.; Oklahoma Ordnance, Pryor, Okla.; Rohr Aircraft Corp., Chula Vista, Calif.; and Sangamon Ordnance, Point Pleasant, W. Va.

Smaller Businesses Encouraged

WAA said its objectives in developing the multiple tenancy program are the fostering and development of new independent enterprises, the strengthening and preserving of the competitive position of small business concerns in an economy of free enterprise, the encouragement of employment opportunities, and the protection and salvage of government investment.

While the multiple tenancy idea is not new, WAA is pioneering in an undeveloped realty and industrial field, for experience garnered in multiple occupancy thus far has been confined to tenancy of multi-storied buildings in congested areas.

Contrastingly, all of the large surplus plants involved in WAA's plan consist of one-story structures spread over many acres of ground, much of which had been converted from farming land.

The Coosa River Ordnance Plant has been sold to the Coosa Valley Development Corp.

The Real Property Disposal Board of the WAA has approved leases of portions of the Basic Magnesium Corp. plant at Henderson, Nev., to six concerns, and sales or leases of portions of the huge Consolidated Vultee Aircraft Corp. plant at San Diego, Calif., have been made to seven firms.

To make the Bechtel-McCone Aircraft Modification Plant at Birmingham, the Aluminum Co. of America forging plant at Cannonsburg, Pa., and the Illinois Ordnance Plant near Carbondale, Ill., available for use by small businesses, the WAA has authorized its respective regional offices to negotiate leases or sales of available portions of the projects.

Plants Costing $400 Million Offered for Sale or Lease

Surplus war plants, including land, buildings and machinery, which cost the government over $400 million will be offered for sale or lease by Sept. 30, W. T. Kirby, deputy regional director in charge of real property disposal of the Chicago region of the War Assets Administration, has announced.

Of the 22 war plants to be offered, 13 have been approved and cutoff dates for disposal named. Included are the Republic Steel Corp. plant, South Chicago, acquired at a cost of $91 million to the government; the $66 million Des Moines ordnance plant, Des Moines; the $35 million Inland Steel Co. plant, East Chicago, Ind.; the $30 million Nash-Kelvinator Corp. plant, Kenosha, Wis.; the $26 million American Steel Foundries cast armor plant, East Chicago, Ind.; the $12 million Milwaukee ordnance plant, Milwaukee; and the $11 million General Motors Corp. aluminum forging plant, Anderson, Ind.

Bids on the Inland Steel plant were to be opened Aug. 23 and on the Republic Steel plant on Sept. 30. Much interest centers on these two because of reports that Henry J. Kaiser intends to bid on both.

Builders Note Decline in New Buying Interest

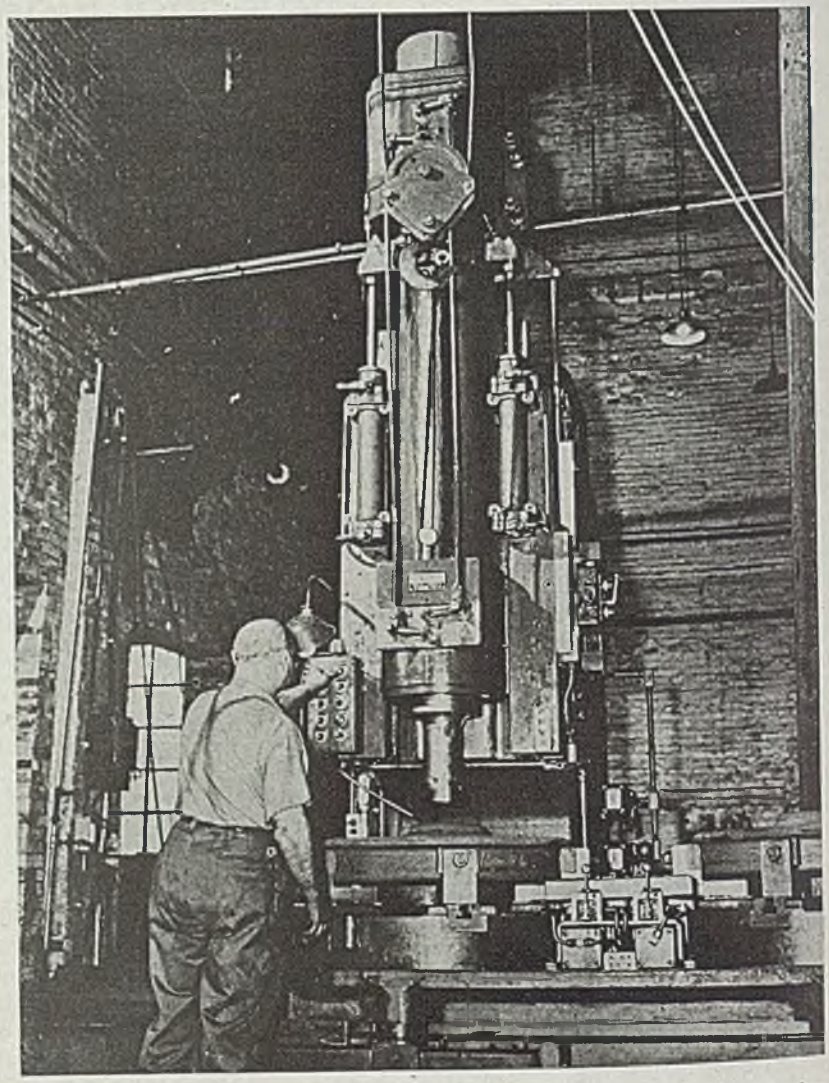
Machine tool companies making adjustments in operations. Some entering new lines of manufacturing

CLEVELAND

BUYERS note new demand for machine tools has leveled off well below the abnormal rate that prevailed during the war and immediate postwar periods. The decline in buying interest at midyear followed heavy ordering in the preceding months of retooling of plants for production of civilian goods. Some interests in the industry expect a still lower buying level will be established in the near future.

It was pointed out that many of the smaller machine shops and manufacturing plants which have been converted from war work or have been built since V-J Day have been equipped with machines obtained from the War Assets Administration's pool of surplus. This type of buying has accounted for about two-thirds of business transacted in some types of tools.

Although activity now is quiet compared with that of the past six or seven years, shipments during the first six months of the year were at a rate well above that for any period prior to 1940. Machine tool companies are making adjustments in their operations to meet the smaller demand according to their particular situations. Some companies did not expand their plants substantially and have no problem in keeping their facilities operating at an economical rate. Other companies, especially the larger ones which accounted for the bulk of the huge war expansion, have taken various steps in regard to the excess capacity. Some have relinquished their rights to the plants and equipment; others have broadened their field of operations to include the manufacture of allied products, such as various types of machinery, small tools, contract work, etc. or new lines entirely foreign to the machine tool industry.



SPEEDS FREIGHT CAR PRODUCTION: A new railway car wheel boring machine capable of boring 43 chilled tread or steel wheels an hour has been developed by Pullman-Standard Car Mfg. Co. The device, which can handle more than 10 times as many wheels per hour as any previous machine, has been installed in Pullman-Standard's Michigan City, Ind., and Bessemer, Ala., freight car plants

Inquiry Tending Upward In Cincinnati Area

Cincinnati—Inquiry for machine tools tends upward, indicative of more active domestic ordering expected in the fourth quarter. Deliveries against backlogs have been below original estimates, partly because of scarcity in electrical equipment.

Surplus Tools Offered for Sale at Leetsdale, Pa.

Pittsburgh — A large number and variety of machine tools, valued at 1.5 million dollars, were put up for sale by WAA last week at Leetsdale, Pa. Included are thread millers, turret and engine lathes, drill presses and grinders. Equipment will be made available to public Sept. 4. Sale of miscellaneous surplus goods valued at $15 million, and including many machine tools, was opened to the public last week at Wardwell, Ohio. Except for special purpose equipment, active sales were reported at both offerings. The Pittsburgh branch of WAA transacted 270 sales of machine tool sales during July, aggregating $536,744.

Scrapping of $75 Million Worth Of Surplus Machinery Authorized

Washington — Owning and disposal agencies have been authorized by the War Assets Administration to dispose of government-owned surplus unsalable machinery as scrap and salvage where it has been determined that no market exists for such machinery in its present form. This special machinery, approximating $75 million in acquisition cost, was especially designed for production of small arms munitions.

GOVERNMENT CONTROL DIGEST

Weekly summaries of orders and regulations issued by reconversion agencies. Symbols refer to designations of the orders and official releases. Official texts may be obtained from the respective agencies

OFFICE OF PRICE ADMINISTRATION

Scrap: Maximum prices of prepared iron and steel scrap established for all classes of buyers and sellers, effective Aug. 26. Previously, sales of prepared scrap to dealers were exempt from price control. Applicable maximum prices may be charged now for the various grades of scrap contained in mixed shipments, provided the required shipping notice is furnished and the various grades are physically segregated. (MPR-4)

Price Control Suspension: Price control has been withdrawn from 12 special type trailers, specified trailer parts, midget cars, steelbound skid platforms and rubber bands, effective Aug. 16.

Rental of machines, parts and industrial materials that have been exempted from price control and that are covered by supplementary order 129 has also been lifted from control. (SO-129; OPA-6706)

Consumer Durable Goods: Ceiling prices on 20 classes of consumer durable goods increased, effective Aug. 19, but retailers may not charge the higher prices until they receive shipments ticketed by manufacturers with the new prices. Average price increases at retail include gas kitchen stoves, 5 per cent; electric kitchen stoves, 9 per cent; washing machines, 7 per cent; vacuum cleaners, 7 per cent; all small electric appliances, 4 per cent; radios and electric phonographs, 3 per cent; and other items, 3 to 12 per cent, averaged out for each class of goods. (MPR Nos. 64, 86, 111, 116, 188, 213, 548, 576 and 599; OPA-6707)

Storage Batteries: Resellers of industrial electrical storage batteries given a percentage passon of the increases in their net invoiced costs, effective Aug. 19.

Resellers of lead acid storage batteries, cells and plates may increase their ceiling prices by the same percentage that their net invoiced costs have been raised as a result of higher maximum prices granted manufacturers on June 11. This relieves manufacturers and sellers of a former requirement to supply buyers with separate invoice statements of resultant increases in their maximum net prices. Manufacturers are authorized to revise their list prices for these products and resellers are permitted to sell off revised lists, subject to the same discounts, allowances, and other conditions in effect May 31, 1946. (MPR-136; OPA-T-4859 and 4861)

Liquid Commodities: Charges for transportation of liquid commodities, except milk, in tank trucks by contract motor carriers are suspended from price control. (MPR-566 and SR-11 to GMPR; OPA-T-4866)

Automotive Parts: Manufacturers' maximum quotations for automotive parts increased 15 per cent as of Aug. 24 over base date freeze prices, except as follows: Dump bodies and hoists, 24.5 per cent; general purpose antifriction bearings, 12 per cent; fan belts, 17.3 per cent; radiator hose, 26.8 per cent; engine and engine parts, 15.5 per cent. (MPR-452 and 453; OPA-T-4881)

Machines and Industrial Equipment: Brand-name sellers of machines, machine parts and industrial equipment who do not make the products sold under their brand names are no longer designated as manufacturers under the regulation covering these products, effective Aug. 20. Sellers who have other manufacturers make or process the machines and parts sold under their brand names and who actually serve as wholesalers or retailers may increase their prices the same percentage as their net invoiced costs are raised by their suppliers. (MPR-136; OPA-T-4890)

Plumbing Fixtures: Manufacturers ceiling prices for cast iron enameled plumbing fixtures increased 10 per cent, effective Aug. 21. (MPR-591; OPA-T-4905)

Cost-Plus Pricing: Manufacturers, converters and wholesalers selling products, priced on a cost-plus basis, which were made from materials bought during the period of no price control, may now base their prices on the ceiling prices of the basic goods at the time of delivery of the finished product, instead of the date of sale. (SO-171; OPA-T-4907)

Refrigerators: Retail prices of household mechanical refrigerators increased about 6 per cent, effective Aug. 21. Manufacturers were granted an increase of 3.5 per cent. (MPR-598; OPA-6715)

Exports: Export ceiling prices continue to be calculated on basis of domestic prices plus actual export expenses and a mark-up. However, exporters now may use an export mark-up based on their own individual average during any six-months or 12-months period between Jan. 1, 1939, and Dec. 31, 1940, instead of using the average in the trade. If an exporter made no sales between those dates, he is permitted to use his average mark-up during the nearest 12-months period before Jan. 1, 1939, in which he made sales.

Specific formulas are provided for determining ceiling prices on exports of iron and steel, bituminous coal, relaying rails, and certain other products. (Export Price Reg.; OPA-T-4888)

Construction: Amount of compensation paid by employers for employee insurance and pension benefits may be added to ceilings on construction services and sales of installed building material. (MPR-251; OPA-T-4775)

Slide Fasteners: Reconverting manufacturers of slide fasteners may use either a 3.6 per cent profit percentage or a profit percentage computed on the basis of their individual operating experience between 1936 and 1939. (MPR-188; OPA-6623)

Fountain Pens: Manufacturers of fountain pens and mechanical pencils may calculate wholesale and retail ceilings for new models, once their own ceilings are approved. (MPR-564; OPA-T-4780)

Fixed Capacitors: Manufacturers of fixed capacitors granted an additional interim increase of 10.2 per cent over their base date prices, effective Aug. 12. The action provides that the increase factor previously granted producers of these parts be increased from 16.4 per cent to 26.6 per cent. (MPR-136)

Aluminum Wire: Effective Aug. 12, maximum prices in effect June 29, 1946, may be increased as follows: Aluminum steel reinforced transmission line cable, 12 per cent; weatherproof aluminum wire, 17.5 per cent; insulated aluminum wire and cable, 18 per cent. (MPR-82; OPA-6675)

Wiring Devices: Manufacturers' ceilings for electrical wiring devices increased by from 10 per cent to 20 per cent, effective July 27. (MPR-136; OPA-T-4811)

Hardware: Increases ranging from 10 to 50 per cent over June 30, 1946, ceiling prices authorized July 26 for manufacturers and resellers of specified items of hardware, hinges and butt hinges. (MPR Nos. 591, 40 and 413; OPA-6630)

Suspension: Following products have been exempted from price control, effective Aug. 14: Cast metal lawn furniture; metal beach and lawn umbrellas; crystal radio receiving sets; commercial type scales; and approved therapeutic lamps. (SO-126, MPR-188; OPA-6685)

Carbon Products: Manufacturers' prices for carbon products increased 11 per cent, effective Aug. 13. The carbon products covered include: Carbon, graphite and metal graphite brushes and contacts and other items of the same composition for electrical and mechanical use except electrodes for electric furnaces and carbon or graphite anodes for electrolytic cells. (MPR-136; OPA-6658)

Lighting Fixtures: An interim increase of 10 per cent over base ceiling prices for lighting fixtures and parts has been granted to manufacturers. All types of nonportable lighting fixtures, both fluorescent and incandescent for industrial, commercial or residential use and all parts for these fixtures are covered by this action. (MPR-136; OPA-6660)

Metal Furniture: Manufacturers' maximum prices of metal household furniture increased 7 per cent, effective Aug. 12. Resellers absorb 5 per cent and pass on 9 per cent of the total increase of 14 per cent that has been permitted the industry. Resellers of commercial metal furniture, fixtures and equipment may pass on the first 10.5 per cent through dollarwise, as before, but any additional manufacturer price increase may be added to the reseller's base price on which he takes his customary markup. (MPR-188; OPA-T-4835 and 4855)

Switch Boxes and Covers: Maximum prices for boxes and covers for electrical outlets and switches have been raised 19 per cent, effective Aug. 17, at the manufacturers' level. Resellers may add the same percentage amounts to their ceiling prices as their net invoiced costs are raised. (MPR-136; OPA-T-4855)

Tools: OPA no longer requires wholesalers to invoice the following products on the basis of an original ceiling and an adjustment charge: Hand-cutting tools, heavy forged and mining tools, mechanical hand-service tools, farm and garden tools, trowels, shovels, spades and scoops. Retailers have been provided a simplified method of pricing, resulting in increases in ceiling prices of 2.2 per cent to 10 per cent. (MPR-614; OPA-6687)

Temperature Controls: Prices of electric temperature controls for automatic water heaters advanced 15 per cent, effective July 26. (MPR-591; OPA-T-4790)

CIVILIAN PRODUCTION ADMINISTRATION

Prefabricated Houses: Producers of "industrially-made" houses, sections or panels who have been approved by the National Housing Agency to participate in the Veterans' Emergency Program are eligible for "CC" preference ratings for production materials not covered by "HH" ratings, and in addition, for construction materials and maintenance, repair and operating supplies. "CC" ratings will be granted for capital equipment for the expansion of plant facilities in special cases. "CC" ratings may be granted for specialized equipment (except for site-preparation equipment) which is either needed for the erection of industrially-made houses, or which will be continually used for the erection of conventionally-built dwelling units under the veterans' housing program, and also for maintenance, repair and operating supplies needed for such equipment. Applications for "CC" ratings by producers of industrially-made houses, sections or panels should be made on form CPA-541-A. (PR-28; CPA-519)

Surplus Material: Urgency certificates will no longer be issued or renewed for surplus items listed in the War Assets Administration veterans' set-aside list, although all outstanding certificates will remain valid until their expiration dates. (PR-13; CPA-524)

WAR ASSETS ADMINISTRATION

Machinery: Owning and disposal agencies have been authorized to dispose of government-owned surplus unsalable machinery as scrap and salvage. This special machinery, approximating $75 million in acquisition cost, was specially designed for production of small arms munitions. They include, in part, 5-spindle continuously turning machines; various types of bomb manufacturing machines; 6-inch cannelure slotting machines; special purpose model B machine; model T-1, T-3 and T-5 cartridge machine; various types of shell lathes; primer inserting machines; supercharger bucket grinders; sliding head mills; impeller mills; swivel rotary mills; duplex spot face mills; planetary mills; muff mills. (Reg. 13; WAA-512)

Windows of Washington

Investigation of irregularities in disposal of billions of dollars worth of surplus war goods beginning to reveal anticipated scandals. Misuse of veteran's priorities to obtain scarce items one of leading complaints

IRREGULARITIES in disposal of surplus war goods are popping up with increasing frequency. Representative Slaughter's House War Surplus Committee has been doing some spade work lately, and is beginning to hit pay dirt, though its inquiry so far has barely scratched the surface. Sensational developments are expected when the committee really gets its teeth into the matter and takes up the broader aspects of the disposal program. So far it has been dealing with peanuts.

What Slaughter's committee wants to know is how brokers and so-called "go-betweens" have been able to get their hands on large quantities of war leftovers, such as bronze wire screen and nails, which, presumably, were destined for veterans and other priority buyers.

The committee recently sparred ineffectually with one smart broker who allegedly profited handsomely on a lot of bronze wire screen which he had acquired. The probers had the broker before them but got nowhere with him. He had a bad memory, his records were incomplete or inaccessible, and the upshot of the whole thing was that the fellow was cited for contempt of the House, which didn't seem to bother him too much. It takes a long time for such actions to develop into anything really inconvenient or annoying to the parties involved.

That scandal has been unearthed in disposal of the billions of dollars worth of surplus war goods and properties should occasion no particular surprise. After all, it would have been something approaching the miraculous were it otherwise considering the perversity of human nature and the sharpies who somehow or other are always around to take advantage of a good thing.

Numerous Complaints Unfounded

Surplus disposal authorities frankly admit of numerous irregularities, but they insist they have been making a diligent effort to keep their house and their noses clean, correcting abuses as quickly as they are scented. More than 1200 investigations of alleged questionable deals, favoritism in awarding goods, and criminal misconduct were initiated by the WAA Compliance Enforcement Division in second quarter of 1946. Numerous rumors, complaints and accusations seem to be the normal byproduct of such mass selling operations as are involved. WAA says, however, that in the majority of cases the charges have been proved unfounded, whatever faults that have been uncovered largely being attributable to misunderstanding of disposal procedure or of basic legislation.

In those instances where investigation has shown criminal or administrative misconduct, steps have been taken to correct abuses. Findings in administrative cases are referred to appropriate officials for disciplinary action or formulation of corrective procedure. Disclosures of criminality are handled more sternly. To date, according to WAA, there have been 30 arrests, eight of government employees, and 26 indictments for bribery, fraud and theft.

With respect to misuse of veterans' priority certifications, which seems to figure chiefly in most of the complaints most widely publicized, it is pointed out that the extreme scarcity of certain commodities, combined with the high priority enjoyed by veterans in purchasing, has resulted in widespread use of veterans as "fronts" by business concerns. It is not an easy matter to track down such cases. Where violations of this kind come to light, however, they are referred to the Department of Justice. Something like 374 such complaints have been handled by the WAA Compliance Enforcement Division, the majority of them being turned over to the Justice Department for prosecution.

Preferences Lead to Exploitations

In a statement explaining its position, WAA maintains experience has shown irregularities can be expected whenever a priority, preference or group privilege appears to offer an opportunity for exploitation. In June something like 15 cases were investigated in which county or municipal governments, exercising the priority given them by the Surplus Property Act, purchased automotive equipment ostensibly for their own use but actually for resale to private citizens, a flagrant distortion of the law. WAA doesn't say what it did about these cases, but it is apparent the boys down at City Hall are not averse to making an "honest" dollar when they can.

Illustrative of the difficulties encountered in seeing that surpluses are channeled into proper outlets, in a recent offering of a short supply item restricted to a definite trade level, over 75 per cent of the individuals or firms that submitted applications were found to have misrepresented their status and to be ineligible. Enforcement of the strict provisions of the law in such instances imposes a terrific responsibility on disposal agency employees, who, of course, are subject to the frailties and failures of others of the species Homo sapiens. Obviously, it would be virtually impossible to erect a system which would provide 100 per cent protection against slips of omission and commission on the part of all employees.

The new War Assets Administrator, Maj. Gen. Robert M. Littlejohn, knows he has a terrific job on his hands and seems determined to give an outstanding performance. He plans to tighten up disposal procedure all down the line, sparing no effort in tracking down abuses surrounding sales to brokers. His order of Aug. 2, which gives priority at WAA sales to the United Nations and other international units, which Representative Slaughter claims is in violation of the law and contrary to the policy of Congress, is to be reviewed, though Littlejohn's staff insists the legality of the order is beyond question.

Littlejohn is a tough, old-time Army officer accustomed to having his commands obeyed. Most observers of the Washington scene feel that if anyone can unsnarl WAA from the present tangle of red tape, legal restrictions, and governmental inertia which has engulfed surplus disposal, he can. By a year from now he hopes to have disposed of some $27 billion worth of war leftovers. Moving consumer goods items will be a relatively easy task for these are snapped up almost as quickly as they are put up for sale. But sale of industrial plants and such like is a horse of another color. You just don't move factories and heavy equipment at will when millions of dollars investment is required. As of June 30, industrial plant sites and shipyards with original cost of $992 million had been disposed of, sales netting the government something like 44 cents on the dollar. In the year ahead the government hopes to get rid of some $6,500,000,000 worth of plants and sites—a man-size job in any language.

Names Economic Advisers

Far more than casual interest for business attaches to the recent appointment by President Truman of the newly created Economic Advisory Council provided by the so-called Full Employment Act.

This council is headed by Edwin G.

President Truman congratulates members of the Council of Economic Advisers who were sworn in by Judge Bennett Champ Clark of the United States Court of Appeals. Left to right are: Leon H. Keyserling, Dr. Edwin G. Nourse, John Davidson Clark, President Truman and Judge Clark. NEA photo

Nourse, vice president of the Brookings Institution, and includes Leon H. Keyserling of New York, and John D. Clark of Wyoming. Mr. Nourse is much better known to the public than either of his colleagues. Mr. Keyserling has been prominent in housing activities and is understood to have strong New Deal convictions. Mr. Clark, on the other hand, once was connected with the Standard Oil Co. of Indiana, and is believed to lean toward the conservative side.

As for Chairman Nourse, he ranks high in the field of economics and is known as an advocate of the private enterprise system. It is said, however, he feels private enterprise must be adapted to the broad ends of national welfare, whatever that means. In an interview upon his appointment to the new post, he classed union executives among the "business leaders," and held that the job of making private enterprise work is primarily the responsibility of both labor and business with appropriate government aid. No one can quarrel very much with him on that. Both business and labor leaders are trustees of the public interest, he feels. As to whether everybody has a right to a job, Mr. Nourse puts it another way, that the government should provide conditions for useful employment. In his new post he may have the opportunity to determine if such an ideal state of affairs is possible.

On the whole the complexion of the council appears satisfactory to business, but the so-called liberals and leftwingers are understood to be not too enthusiastic over the appointments. Whether this lack of universal approval will prove a help or hindrance to the council in developing its program only time will tell. Maybe the council in time will come up with the answer to the problem of averting the ages-old curse of boom and bust which characterizes our economy.

Scrap Shortage Big Worry

Biggest headache for the Steel Division of the Civilian Production Administration at the moment concerns iron and steel scrap supply. About 25 open-hearth furnaces currently are down for lack of scrap and further shutdowns are threatened unless material begins flowing to the mills in larger volume very shortly. Some steelworks are said to have only a few days' inventory.

The seriousness of the situation has not been sufficiently impressed on industry to get the scrap drive going as it should, in the opinion of government officials who are striving desperately to find ways and means of stimulating interest. So far, however, they have been running into increasing discouragement with reports pouring in of dealer and producer hoarding of material in hope of later price increases.

How such hoarding can be discouraged in present circumstances is the $64 question. And even if it is corrected there is no certainty a large tonnage flow will result since nobody seems to know how large a quantity is being hoarded. Incidentally, in this connection government scrap statistics are wholly inadequate, running several months behind in their compilation. Possibly these figures are useful as a record of the past but certainly they mean little so far as current conditions are concerned.

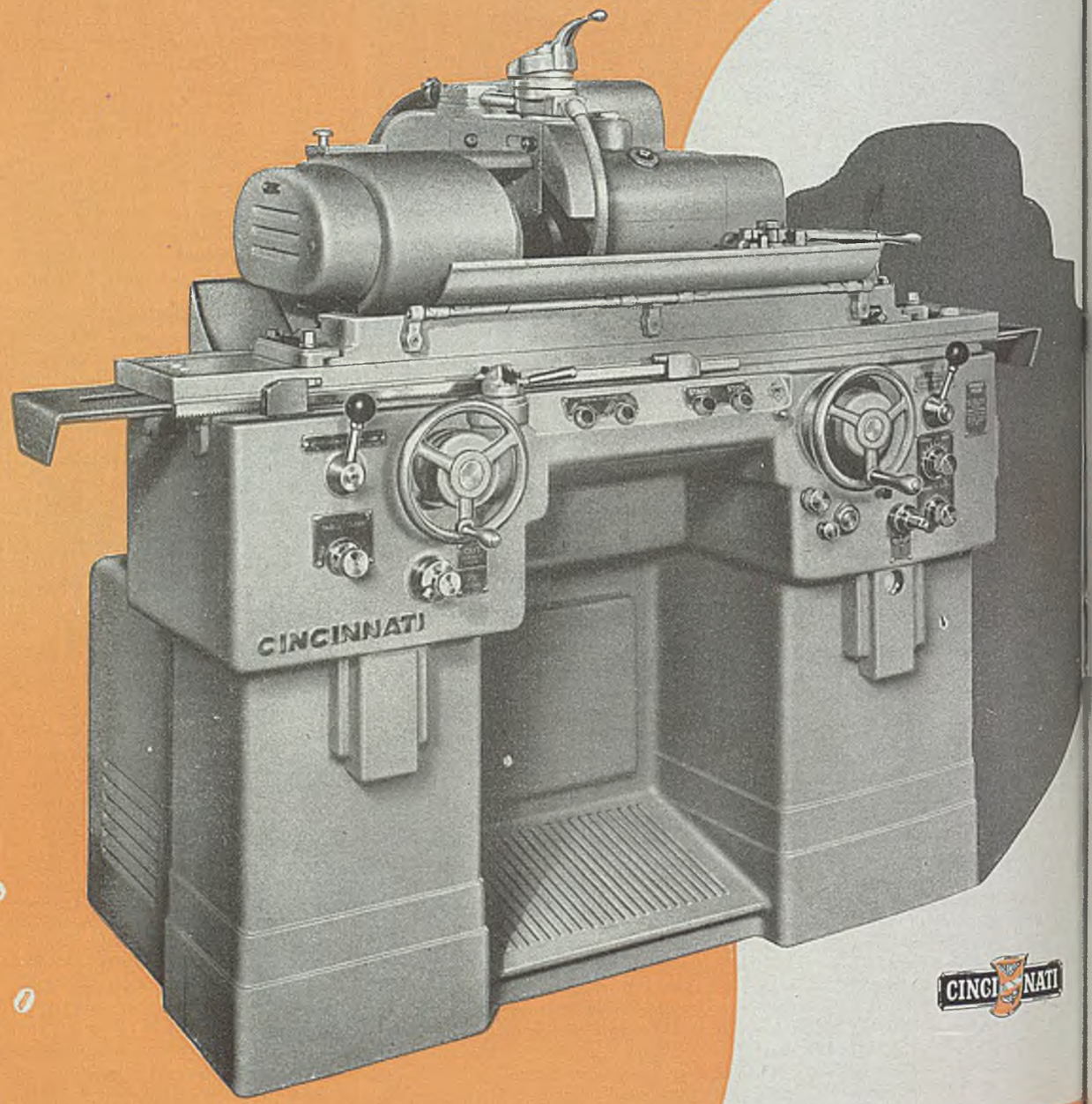
At the moment a hot-and-heavy debate is going on over the advisability of raising scrap prices. Some trade interests insist no amount of urging less than a price boost is going to pry scrap loose. Some weeks ago Office of Price Administration turned thumbs down on an increase, but the hope persists that the agency may change its mind. Until this hope is removed by affirmative action, say market observers, there seems little chance the hoarders will be inclined to release appreciable tonnage.

Scrap is one commodity on which prices have held stationary since the freeze went on at the beginning of the war. Why this material is made an exception when virtually every other conceivable commodity has been upped in price is a mystery. Scrap collection and preparation costs have risen sharply and it would seem only fair that compensatory increases be allowed to offset these advances. OPA, however, has been stubborn about the matter and has resisted every pressure for a change. Probably this is because the difference of opinion on the subject between scrap sellers and consumers is extremely wide. Consumers, meaning the steel mills and foundries, generally speaking, have opposed an increase, though lately it is understood they have come around to a somewhat more liberal view and would not too strongly oppose a moderate boost if such assured a better flow of material. Dealers and collectors, on the other hand, have been pressing OPA for a rise for months past, claiming various benefits would accrue, among them stimulation of peddler collections. Increased collection of peddler scrap would be of particular benefit to the foundries.

Important Sources Blocked

Chief hope for solving the supply problem rests on increasing the flow of production scrap, through heavier shipments from abroad of battlefield material, and by quickening of the shipbreaking program which presently seems to be bogging down as the Maritime Commission and the Navy haggle over arrangements and prices for the sale of vessels earmarked for wrecking.

Incidentally, an interesting story making the rounds is to the effect some scrap tonnage has been moving to certain steel mills on a barter basis lately, being exchanged by the scrap dealers for tonnages of new steel. Such trading, it appears, is legitimate so long as the scrap men dispose of the new steel at, or under official OPA ceiling prices. What they do, it is said, is sell the new steel at warehouse price levels, thus availing themselves of the permitted markup over mill prices. Some consumers are bartering with mills directly. The tonnages involved in such swaps are small.



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British Steel Nationalization Believed Unlikely Before 1948

Industry spokesmen continue to condemn socialization proposals and to voice hope they may be allowed to work out own development program. Holiday influences reflected in lowered mid-summer production. Coal shortage remains serious

By J. A. HORTON
Editorial Correspondent, STEEL

BIRMINGHAM, ENG.

ALTHOUGH demand for iron and steel is intense in Britain, holiday influences are certain to affect production this month. Apart from blast furnaces which for obvious reasons are not closed down, works have been idle in the first week of August.

Plants have been overhauled in many cases in readiness for a long spell of activity until the end of the year. Under these circumstances it seems unlikely that steel output this month will reach the record level attained in May of 13 million tons annually, which compared with an actual output of ten million tons for the year 1938. Exports, too, are likely to fall. In fact home demands are so urgent that the Ministry of Supply has decreed that allocations for oversea business must be smaller in the remaining period of the year.

The nationalization of the industry, one of the projects which the labor government is under a promise to carry out, is still some way off. Parliament may be presented with a bill to put it into effect in the latter part of next year, though the actual transfer could not possibly be completed before the middle of 1948. For the moment, the government is seeking a chairman for the National Steel Board and talks have taken place between Minister of Supply John Wilmot and Dr. H. J. van der Bijl, chairman of the South African Iron & Steel Industrial Corp. According to a statement made by him to the *Financial Times* newspaper he has accepted the task of reorganizing Britain's iron and steel industry on a nationalized basis though he has declined the chairmanship of the National Steel Board.

Leading industrialists continue to voice their condemnation of the proposals. The chairman of William Baird & Co. Ltd., one of the great shipbuilding companies, said recently that in the view of his directors no case could be made out for nationalization, which in view of the complexity of the industry and its export complications would be disastrous to the national economy.

"It is to be hoped," he said, "that the government may yet see its way to leave this industry free to develop without its nationalization, having regard to its splendid record of production in the war years and its own comprehensive plans for development and further modernization. These the industry would have no difficulty in financing if its continuance under free enterprise was assured."

Opponents of nationalization may derive new hopes from an announcement by the Minister of Supply of the formation of a steel control board charged exclusively to supervise development and reconstruction of the steel industry and to control production, distribution, and prices. The new board will not advise the government on public ownership plans. The British Iron & Steel Federation will co-operate under these conditions and be represented on the board, presumably with trade union representatives and an independent chairman. Names are to be announced later.

The coal outlook remains serious. Taking a long view, it may well be that extension of mechanization in the mines which has already been adopted with advantage in many of the coal fields, and the use of fuel oil instead of coal, will have favorable results, but these factors cannot affect the situation next winter which will be a critical period of British industry endeavoring to satisfy an intensified home demand and the need to export, without which Britain cannot live.

All the finished steel works are in such a position that there is reluctance to accept fresh commitments. Plate and sheet mills are booked up to the end of the year in some cases; rail mills are working to capacity; from the coal mines comes a bigger demand for steel for maintenance and in pursuance of the mechanization program. Makers of automobiles have made a big contribution to the export statistics at the expense of home customers. At the re-rolling works the scarcity of semifinished pers.sts.

Pig iron available for distribution barely covers home needs and none is available for export. Demand for light castings will provide work at the foundries for many months but productive capacity cannot be utilized fully because of the shortage of labor.

Output of merchant ship tonnage from Scottish shipyards in the first half of the year showed a considerable increase compared with the corresponding period of any of the years before the war with the exception of the first six months of 1930. This year up to the end of June 39 vessels totalling 176,300 tons were launched from the Clyde, while from yards on the east coast of Scotland output was 26 vessels of 37,700 tons gross. These figures do not include warship tonnage of which there is still a substantial amount building and fitting-out on the Clyde. At the beginning of the second half of the year, Clyde shipbuilders had commenced work on 129 vessels totaling 611,280 tons gross.

The last American-built locomotive destined for Russia on Lend Lease and other purchases is loaded aboard the specially built locomotive carrier ship, the "Klara Zetkin," at a San Francisco dock. This last shipment of three locomotives brings the total of engines sent to Russia to more than 1200. NEA photo

Belgium Increases Output Despite Strikes; Coal Supply Improves

Prices may be increased, jeopardizing some pending export business, but outlook for foreign shipments continues favorable. Czech output increasing month by month. France producing at about half of 1938 rate

DESPITE industrial strikes in Liege which, in June, caused a temporary setback in Belgian steel production, the output generally is increasing. Coal production is improving; for the first quarter of this year the average monthly output was 5,686,230 metric tons, compared with 7,730,480 tons in 1938. There are good deliveries of iron ore from France and Sweden. Manganese ore is coming from Brazil, and also from South Africa, Canada, India and Belgian Congo. Scrap is still scarce. It is stated that Belgian and Luxemburgian works together have 1,250,000 tons of orders on their books, of which from 60 to 70 per cent are for export. The demand continues brisk, chiefly from South America, but some works are temporarily out of the market. An inquiry from American firms has been reported to cover concrete bars, wire rods, galvanized and fencing wire. Negotiations are also said to have been taking place with the British Iron & Steel Corp. covering the purchase of 20,000 tons of Belgian rolled products. A small tonnage of wire rods has been sold to China for £30 15s. ($123.003 per ton fob Antwerp).

Price Competition Increasing

There are strong indications of a further increase of Belgian prices to be shortly made. Already at the present levels, Belgium and Luxemburg have lost some orders. Locomotives for India have gone to British firms; shapes and rails for Argentina and Brazil, amounting to about 60,000 tons, are said to have been captured by competing United States firms. Export quotations for Sweden have been raised following the revaluation of the Swedish crown, and steel bars for Sweden are now quoted at 4000 Belgian francs ($90.90) per ton fob Antwerp. For free markets, where no special agreement is in force, the current price ranges from 4500 francs ($104.55) to 4800 francs ($109.10).

Despite these difficulties, Belgian and Luxemburgian export is going ahead. The two countries have renewed their trade agreement and their exports of steel have reached their highest postwar level in May with 138,500 tons as against 71,800 tons in January. The combined output of the steelworks of both countries is now 65 per cent for pig iron as compared with the first quarter of 1938; for steel ingots the output is 81.6 per cent and for steel castings 67 per cent. For finished products the combined production exceeds 100 per cent of the output for the first quarter of 1938.

It is officially reported that in accordance with the protocol signed with Argentina on May 14, about 350,000 tons of Belgian and Luxemburgian steel products (including 100,000 tons of steel bars) will be exported to Argentina in one year. A trade agreement with France provides for exports of 180,000 tons of Belgian and Luxemburgian steel.

Czechoslovakia

Recently the Czech premier stated before the National Assembly that the iron and steel target for 1946 was pig iron: 1,400,000 tons; steel, 2,200,000 tons. Last returns show output for May as 81,207 tons of pig iron and 131,065 tons of steel. Production is increasing from month to month.

France

Present output of steel represents an annual production of 4,100,000 tons, with an upward trend. In Lorraine there were 13 blast furnaces in operation out of 46, according to April returns. More have been blown in since. Schreider's output of steel reached 125 per cent of 1938 production, but that is an isolated case.

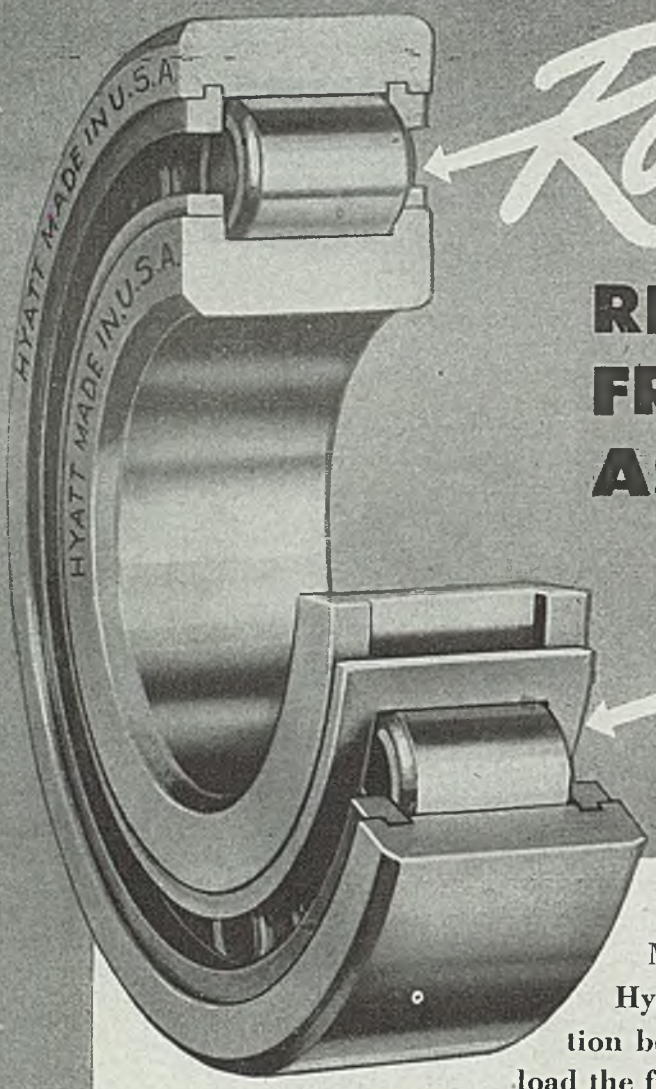
Total output of French pig iron for the first six months of the year amounted to 1,332,000 tons as against 3,177,000 tons in the first half of 1938. For steel the figures are 1,772,000 tons and 3,228,000 tons respectively. A new French syndicate of iron and steel merchants has been formed.

Italy

It is reported that present output of steel is 39.4 per cent of the output of 1938. The main obstacle to improvements is lack of coal supplies.

Russia

According to a report from *Soviet News* the goal for 1950 is: Pig iron, 19,500,000 tons; steel 25,400,000 tons.



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HYATT ROLLER BEARINGS

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

One-millionth passenger car produced since Jan. 1 rolled off assembly line last week while total truck production reached the 500,000-mark. Total vehicle output thus far this year is only about one-third of what had been hoped for

DETROIT

SOME PASSENGER car rolling off an assembly line last Monday earned for itself the distinction of being the one-millionth to be built since Jan. 1. No record is available to indicate what make or model it was, or how many light repairs it required before it could be shipped to a dealer. As a matter of fact, No. 1,000,000 probably hung its radiator grille in shame for it was five or six months overdue according to the original post-V-J Day planning of the automotive industry.

Probably on the same day truck No. 500,000 for the year also bounced into a distribution lot, bringing total vehicle production for the year to about one-third of what had been hoped for the full year.

History, of course, remains history, sour or sweet, and turning to the future for a more encouraging outlook, it is seen that weekly assemblies currently have lifted better than 10 per cent from the pace of the past two months and are now at the 90,000 level, even showing some possibility of touching 100,000. At best, however, it is unlikely the 1946 total will eclipse 3,500,000.

GM production in the week ended Aug. 17 shot up 15 per cent from the week previous, with car and truck assemblies totaling 33,952, compared with 28,603 for the week ended Aug. 10. Principal gains were registered by Buick and Chevrolet.

Production Schedule Uncertain

Apropos of assembly schedules, one disgruntled top executive of a leading manufacturer said the other evening, "I've just authorized the eleventh reduction in our projections to year-end, and it's going to be the last one. I told our boys that maybe they could complete the schedule by Thanksgiving, maybe it would take them until Christmas, but there would be no more changes." His inference of course was that work on the 1947 series would start the minute the 1946 program was completed, but it might take until Christmas to accomplish this.

Despite increased production in the second quarter, passenger car builders sustained a net loss of over $45 million during the first six months of the year. This loss of more than 3 per cent on every sales dollar, calculated after allowances for tax credits under excess profits tax carryback provisions, is approximately one-third of the loss recorded for the first quarter, when the figure was 10 per cent, and is about half the 6.7 per cent loss averaged in the sorrowful year of 1932.

A specific case — Packard — is somewhat at variance with the average, but has a number of interesting aspects. Even though assembly lines were able to work 49 days in the second quarter in comparison with 9 days in the first, net loss on factory production for the first half exceeded $2.5 million. Income tax credit under the carryback was estimated at approximately $2.2 million, and a further transfer of $420,000 to operations from a previously created reconversion reserve yielded net profit of $43,799, to which was added net profit from field sales subsidiaries of $705,719, making consolidated net profit of $749,518. This might be called a neat bit of bookkeeping "ledger-demain" but it may be more comforting to stockholders than that $2.5 million operating loss. Tax credits, in the opinion of George T. Christopher, president, have amounted to a prior loan to the government out of wartime earnings, so the return of a portion of them to cover the heavy costs of getting back into peacetime business is justifiable, but until the end of the year they can be only estimates, as a later profit from plant operations reduces the credit accordingly.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Tabulated by Ward's Automotive Reports

	1946	1941
January	121,861	524,073
February	83,841	509,332
March	140,777	533,878
April	248,318	489,856
May	247,620	545,321
June	214,511*	546,278
July	334,500*	468,897
Estimates for week ended:		
Aug. 3	79,385*	62,146
Aug. 10	77,825*	41,795
Aug. 17	88,560*	45,550
Aug. 24	90,000*	45,525

*Preliminary.

New Purchasing Department

Additional shifts in purchasing activities at Ford Motor Co. involve the establishment of a separate purchasing department at the Lincoln-Mercury Division in connection with the organization of this unit as an independent administrative entity of the company. Production purchasing for the Detroit Lincoln plant, and later on the new branch assembly plants at Metuchen, N. J., and Los Angeles, will be carried on at the division's purchasing department at 6200 West Warren Avenue, with George W. Walker (not to be confused with Designer George W. Walker) as director. He returns to the plant where he served as purchasing agent when the Lincoln Motor Co. was acquired by Ford in 1922. Thereupon he moved to the Highland Park plant and has remained with the company ever since. During the war he was co-ordinator of purchasing activities for many of the Ford contracts, including the Sperry gun director, tanks, armored cars, jeeps and universal carriers. After V-E Day, he became co-ordinator of purchasing activities on civilian trucks.

Assisting Mr. Walker are five buyers . . . Thomas Donohoe, veteran of 31 years with Ford, is buyer of rough castings and forgings.

Harry F. Roberts, who joined Ford in 1920, is buyer of ornamental hardware, die castings, textiles, rubber parts and tires.

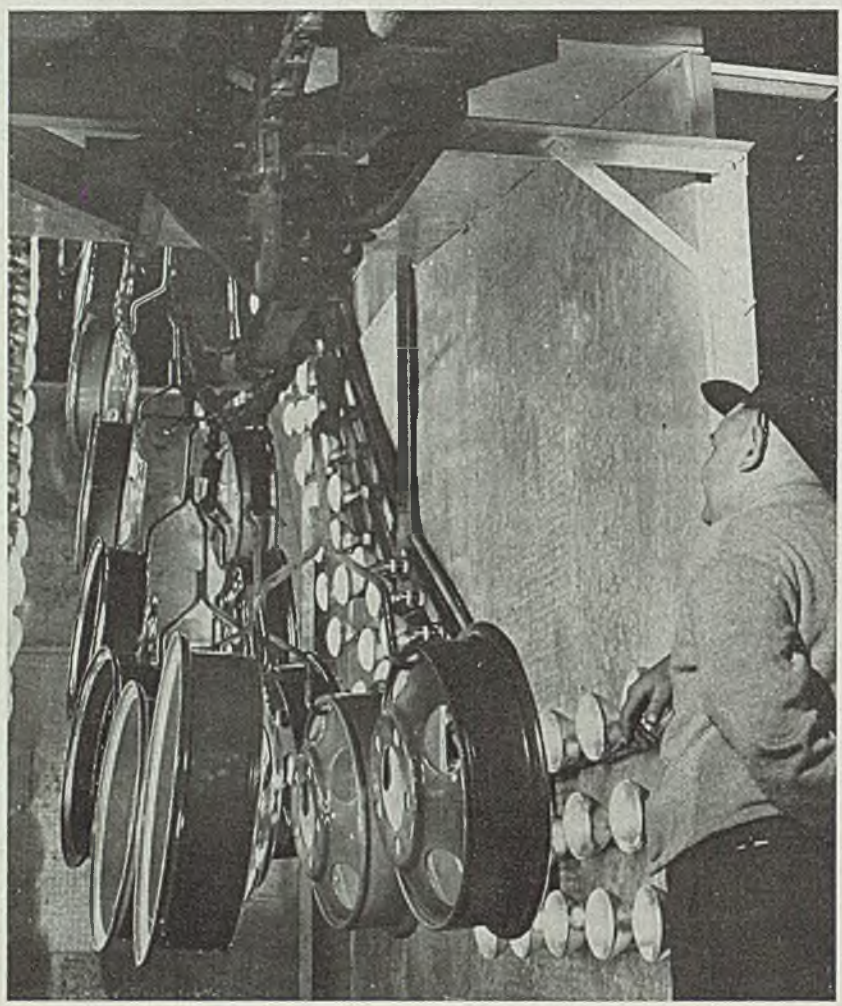
William A. Stewart, who started with Ford at Highland Park in 1917, is buyer for bodies, body fittings, moldings, door window assemblies, seat frame assemblies, speedometers, instruments and glass.

Chris P. Reinke, a 21-year veteran, is buyer for machined forgings and castings, bearings, assembled units for engines, body frames, bumpers and all screw machine parts.

Andrew J. Greening, formerly with Commercial Investment Trust, is Lincoln buyer for electrical equipment, carburetors, radiators and accessories.

Ford Paint Making Described

Interesting details have been released on Ford paint manufacturing operations, centered at the Highland Park plant, where more than 20,000 gallons of automobile body enamel will be manufactured under peak production. Four electrically heated cooking kettles operate



CUTS PAINT DRYING TIME: A battery of infra-red lights flanking the truck wheel conveyor at Studebaker Corp., South Bend, Ind., reduces the paint drying processes from one hour to 20 minutes. After passing between the lamps the wheels begin an ascent to second-floor drying ovens

day and night to process the synthetic resins which form the base of Ford enamels. Largest of the cookers has capacity of 1500 gallons, two hold 1000 and one 500 gallons. Resins of the glyceryl phthalate type—soybean oil modified — are cooked at temperatures ranging from 425 to 450 degrees F., time varying from 6 to 12 hours depending upon type.

When all properties of the batch are adjudged correct, it is poured from the cooker into thinning tanks where it is mixed with high-solvency naphthas. Next step is through filter presses where small particles of gummed oil and impurities are removed. The resin, now thinned and filtered, is pumped into large ball mills where concentrated color or dry pigment is added.

At the paint plant are 59 water-cooled ball mills, each 6 feet in diameter and 6 feet long and accommodating 12,000-20,000 pounds of ¾-in. steel balls. About 1000 pounds of paste or pigment is charged into each mill where it is tumbled for 24-100 hours depending upon the color. The grinding completed, the color paste is ready for the mixers—deep steel tanks with rotating blades into which the color paste and additional resin are pumped and mixed until the proper color balance and consistency is reached. In this so-called "tinting" stage, the skills of a crew of expert color matchers are required to bring the batch to the exact shade of the various master colors. As the mix goes on, frequent samples are taken and sprayed on small steel panels which are baked for an hour at 240 degrees, just as in body painting, and checked with master panels of the same color.

The synthetic enamel type of body finish, used by both Ford and Chrysler, contrasts with the Duco type of finish used by General Motors divisions. You can argue for hours with industry paint experts and never get much agreement on which type is best from the standpoints of beauty, durability, long life, etc. One well-known characteristic of the Ducos is their tendency to rub off appreciably in washing and polishing, leading some to believe the enamels to be superior in durability.

Improves Working Conditions

Expenditure of about $1000 each for the 900 employees in the cold heading department at the Ford Rouge plant is being made to transfer operations from the basement of the rolling mill to the armor plate building, erected during the war and recently purchased from the DPC. The funds of course do not go to the employees, but their working conditions should be improved considerably, since the new building is 1100 feet long with large windows the full length of both sides. Included in the program are remodeling of the building, installation of lunchroom and washroom facilities, construction of new conveyors and moving 800 headers and other equipment.

New Frazer Tractor Coming

A two-plow Frazer tractor, with a complete line of 34 tractor-drawn implements, soon will expand the present Graham-Paige farm equipment program under way at Willow Run. Field experimental tests on the tractor have been completed and it is planned to initiate production this fall, along with the line of hydraulically operated implements such as combine harvesters, corn pickers, grain elevators and hay balers, as well as 57 farm tools—plows, wagons, etc.

Technical Center Delayed

Delay in proceeding with construction of the $20 million technical center announced last year by General Motors Corp. is understood to be attributable to soaring building costs which, despite considerable paring of original plans for the project, made it appear expenditure of several times the original estimate would be required. Reported decision is to shelve the project until costs are more reasonable. However, organization of personnel for the new research and development center are proceeding, one of the first new groups being a process development section, in charge of Harold Johnson, formerly associated with the standards department, specializing in machine tools.

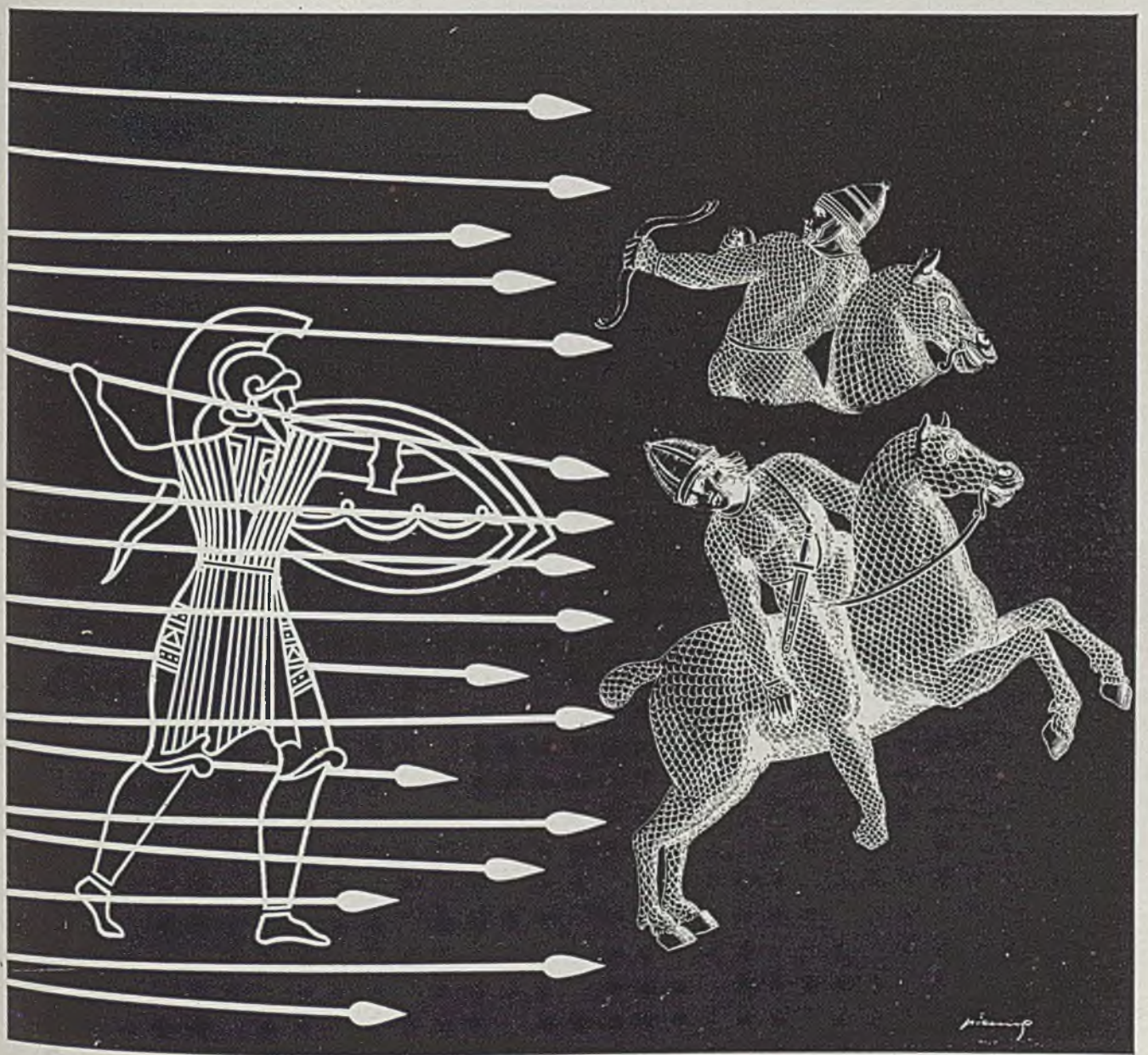
Nash-Kelvinator Buys Plant

Nash-Kelvinator Corp. has purchased the Ford Motor Co. of Canada plant in Toronto, Ont., for assembly of Nash automobiles and parts distribution.

THE MACEDONIAN SURPRISE PARTY

When the proud Persian hordes plunged headlong at Philip of Macedon's army, they were dumped into the minor leagues by an entirely new strategy, the phalanx: a solid wall of warriors sixteen ranks deep. Strength-in-depth withstood and defeated the impact of an over-confident enemy.

Molybdenum steels are economical means of getting the strength-in-depth called hardenability. With it, you're assured of dependable performance under severe service conditions. Practical facts are available to show you where molybdenum can go to work for you.



MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"
CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

Climax Molybdenum Company

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MOLY

New Crossing for Frisco Bay Proposed

Project, likely to be either causeway or over-water bridge, would cost $100 million, and require thousands of tons of steel. Army-Navy Bridge Board conducts hearings on various proposals and will make recommendations to Washington this autumn

SAN FRANCISCO

ANOTHER transportation link across the San Francisco Bay is believed likely, although its completion is certain to be a number of years away.

If present plans materialize, the structure is almost certain to be either an over-water bridge or a causeway. There now appears little chance of construction of an underwater tube between San Francisco and the East Bay shore.

Whatever is finally constructed, it will be as much of a "world wonder" as the present San Francsico-Oakland bridge, longest in the world. It is also almost certain to cost at least $100 million, and probably more. It also goes without saying that either a bridge or causeway will be the outlet for many thousand tons of steel.

The need for another bridge or its equivalent arises from the steady growth of the San Francisco area in population, both in numbers of people and in numbers of automobiles. When the present bridge was opened in 1936, its unprecedented six-lane, double-decker design was believed sufficient to take care of all traffic for many years to come. However, by 1941 it had become a bottleneck, being unable to handle the flow of autos at peak travel times. Today, congestion on the bridge at peak hours is greater than ever before.

In order to build a new over-water crossing, it is necessary to obtain approval of the Army and Navy, both as to form and location of the structure.

Bridge Board Holds Hearings

In San Francisco recently a joint Army-Navy Bridge Board heard witnesses propose various plans for the project, and took testimony both for and against the proposals. This board will consider the various plans and make its recommendations to the War and Navy Departments in Washington, probably next fall, and the final decision will be made by Washington officials.

Probably the most unique proposal advanced at the hearing, and one given at least an equal chance of approval, is for a huge causeway across the bay.

This project is planned like this:

The causeway would be an earthen fill, 2000 feet wide. It would be broken at the eastern end to provide a 2000 foot channel for passage of ships. The connections between the causeway at this gap would be made by underwater tubes.

In the center of the causeway would be a 400-foot paved strip wide enough for a minimum of 30 lanes of automobile traffic.

There also would be two 40-foot strips for railroad tracks and two 120-foot strips for rail sidings. On the outside of the causeway would be two 640-foot strips which could be developed commercially or turned into parkways.

Nine tubes would be constructed for the underwater portion, of which seven would be for auto traffic and two for rail tracks.

It is estimated that the cost of this causeway would be about $100 million. An equal amount, it is said, would be necessary to construct a ten-lane bridge over the water.

Kaiser Shipyard May Be Converted to Breaking

The U. S. Maritime Commission has ordered Henry J. Kaiser to discontinue ship repair activities at the Kaiser Richmond No. 3 yard, last of the four big Richmond facilities to go out of wartime service. It is proposed that the yard be used for scrapping surplus vessels.

At present the yard is employing about 3200 people, and if scrapping operations subsequently replace present repair activity not more than 500 persons would be employed. Mr. Kaiser joined by officials of communities affected by the order are protesting the action to the Maritime Commission.

California Employment Continues To Increase

Civilian employment in California, still showing steady increases, is expected to equal the wartime peak by the end of September.

The California State Reconstruction & Re-employment Commission estimated employment at 3,338,000 in June, a new high for 1946 to date. It is expected that the number will increase to 3,553,000 in September. Seasonal declines in food processing is expected to reduce the figure in October, but all other lines are expected to remain relatively high.

The number of unemployed in the state in June was estimated at somewhere between 410,000 to 460,000, or approximately the same number as in May.

Copper Supply at Alltime Low in Southern California

LOS ANGELES

Copper, both as building material and as the raw material for countless other manufacturing operations, is at an unprecedented low level of supply in Los Angeles.

Makers of fractional horsepower motors and magnetic equipment in general are hard hit. Although immediate causes of the depletion—a series of strikes now settled, which for some months shut down most copper mines—exist no more, inventories will remain low at least until late in 1947.

An official of the Phelps-Dodge Los Angeles office said:

"Another prime cause for the lack of copper lies in the unprecedented demand for it, both during the war years and the present period. Reductions in stocks brought about during wartime have never been equalized because the needs of reconversion in this area, as in the nation, have augmented not decreased the demand."

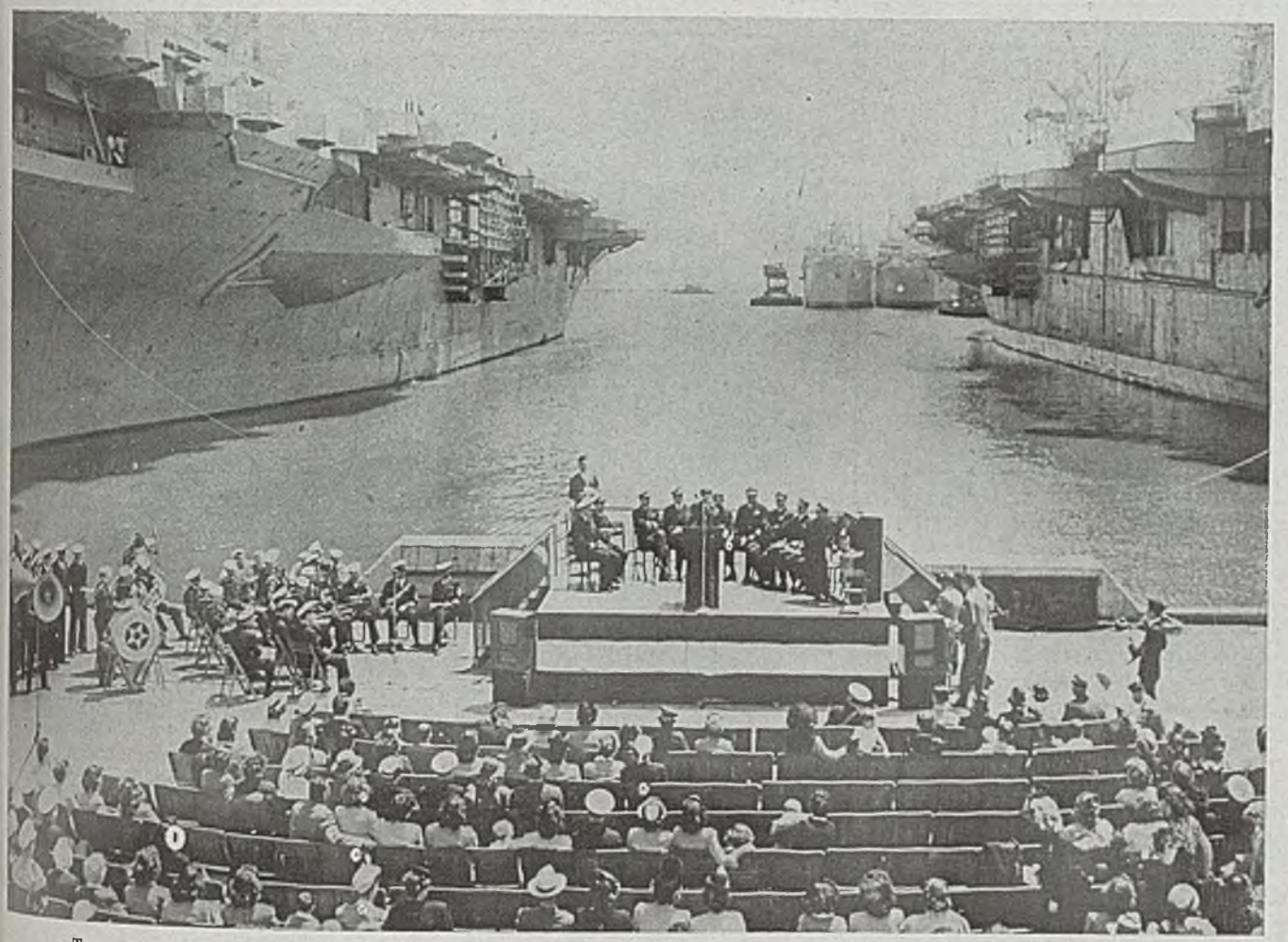
Still another hindrance to copper fabrication industries is the lack of machines due in turn to delays in making and delivering of such equipment, which is traceable to steel shortages.

Plans Projected for New Narrows Bridge at Tacoma

SPOKANE, WASH.

Members of the American Society of Civil Engineers, in a three-day national convention here, were told of the engineering studies following the collapse in 1940 of the Narrows bridge near Tacoma due to a high wind.

Failure of the suspension span spurred research which it is believed will result in safeguarding future structures of this type. The engineers outlined lessons learned from the catastrophe and as-



Two aircraft carriers, "USS Hornet," left, and "USS Intrepid," became part of the Inactive 19th Fleet in ceremonies at the Hunters Point, Calif., Navy Yard on the first anniversary of V-J Day. The ships were totally dehumidified before becoming a part of the "moth ball" fleet. NEA photo

serted that a safe bridge can be built at the Narrows by applying the aircraft engineers' principles of decreasing wind resistance.

Speakers were Charles E. Andrew, consulting engineer, Washington Toll Bridge Authority, Dexter Smith, the authority's designing engineer, and Prof. F. B. Farquharson, department of civil engineering, University of Washington.

The new structure will require about 17,000 tons of shapes, but parts of the original bridge, piers, anchorages and approaches, estimated at $3 million will be utilized. Mr. Andrew stated the new span will have four traffic lanes instead of two.

To offset wind pressure the new design calls for deep open trusses instead of plate girder stiffening members, open-trussed floor beams, a reduced frontal area broken into small pieces, a new streamlined line action and open steel grid slots between each traffic lane and at the curb.

Sheffield Steel Seeks To Buy U.S.-Owned Plant at Houston; Will Double Capacity

HOUSTON, TEX.

PROGRAM calling for nearly doubling the capacity of the Sheffield Steel Corp.'s plant at Houston is announced by R. L. Gray, president, Sheffield Steel of Texas, contingent upon acceptance by the War Assets Administration of the company's bid for acquisition of wartime units operated by Sheffield.

The nearly $6,000,000 expansion program, which is already partly under way, will be pushed to completion upon approval of the Sheffield bid for acquisition of a government-built open hearth and hot topping facilities, a blooming mill and a shell-forging plant. With approval of these bids, Mr. Gray said that Sheffield will rush to completion and expansion its wire mill and warehousing facilities which involve an expenditure of $2,400,000. Completion of the present wire mill construction program is expected within 90 days. The company also plans construction of two new open hearths and other finishing facilities costing $2,574,460. Additionally a new blast furnace and coke plant would be constructed under the projected plans.

The Houston plant is charging its furnaces with scrap metal almost exclusively now and is therefore running at something near 50 per cent of capacity. Two of its five furnaces are operating about full time, with a third operating intermittently as supplies permit. The scrap situation remains tight but has not yet forced a complete shutdown, though at times the scant receipts have threatened temporary suspensions.

During the war the Sheffield Houston plant used considerably more than a thousand tons daily of East Texas iron ore in its blast furnaces, an ore for which the plant was especially designed to use after extensive surveys of the deposits.

The company is known to regard the East Texas ore as of good quality. The East Texas ore is said to have a recovery of about 43 per cent for Sheffield.

The Houston plant is the only completely integrated steel mill in this area. Its products are marketed chiefly in Texas, with currently only a relatively small portion going to Louisiana.

Foreign Trade Outlook Good, Executive Says

President of Westinghouse Electric International asserts American "know how" is most needed exportable product

AMERICA'S booming foreign trade will maintain its present record pace for at least the next three to five years, after which it will rapidly recede to prewar proportions, William E. Knox, new president of Westinghouse Electric International Co., New York, predicted recently in that city.

This nation is now the world's primary source of industrial supply as a result of the war which eliminated Germany and Japan and to a large extent England as producers for world consumption, Mr. Knox asserted.

Our sellers' market in which price is of little importance will end quickly when industrial nations disrupted by the war get back into volume production, Mr. Knox said, and when that happens the heavy, standard types of industrial machines which have traditionally been manufactured at less cost in foreign countries whose workers' wages and standard of living are far beneath our own will again be supplied by these foreign industrial nations.

When competition for world markets will again be a source of concern for all countries with products to export, the United States will have three major products to export, Mr. Knox said. "We can sell the world consumer goods and other products of our technological superiority; we can sell material wealth—raw materials; and we can sell brains. And it's the last of these that is in greatest supply and simultaneously in greatest world demand," Mr. Knox asserted.

Export of "Know How" Undertaken

To make this "know how" available in the form of technical assistance contracts is a basic part of Westinghouse's foreign trade philosophy, Mr. Knox said and pointed out that the company has recently contracted with Mexico and China for this technical assistance. The Chinese plant, which will be devoted to the building of motors, will likely be erected near Shanghai and will employ approximately 3800 persons. Westinghouse will supply the interior design of the plant and will supervise installation of equipment and manufacture under a 20-year agreement. Compensation for the first ten years will be on a lump sum basis and for the second ten years on a royalty basis. Approximately $15 million of machine tools and other equipment for this Chinese plant may be purchased in this country, Mr. Knox indicated.

Future trade with the South American countries was thought by Mr. Knox to be a bright spot in American exports. These nations are now going through an industrial revolution, Mr. Knox said and predicted that it will lead to increased manufacturing, a generally higher standard of living and, in the long run, to a more lively business with the United States. Mr. Knox said approximately 30 per cent of his company's export trade is with Latin American countries.

Although the export activities of the company are obviously its most important operation, the company having an export backlog of between $55 million and $60 million, not including industrial merchandise, its import activities are not being neglected.

Illustrating the diversity of this trade, Mr. Knox said that printed silk from Italy, leather hand bags from Argentina, and $500,000 of chrome ore from South Africa have been received.

Westinghouse properties in war devasted countries were discussed by Mr. Knox who pointed out that the status of Westinghouse holdings in France, Italy and Japan would remain in doubt until peace pacts have been signed. The company had no properties in Germany, Mr. Knox added.

Currently Westinghouse has 213 distributors in 89 foreign countries, according to Mr. Knox.

FLYING HOUSEWARES: The first plane shipment of American-made housewares and kitchen utensils to Mexico was dispatched from Chicago Municipal Airport recently. On hand to supervise the loading were George C. Payne, regional manager of the U. S. Department of Commerce in Chicago; Alcgandro V. Martinez, center, Mexican Consul General in Chicago; and Lee B. Thomas, president, Ekco Products Co., Chicago, manufacturer of the merchandise

Continental Machines To Operate Iron Powder Plant

Construction of a plant to convert iron carbonate slate to pure iron powder is under way on the Mesabi Iron Range in Minnesota. Being financed by the state, the facility will be operated by Continental Machines Inc., Minneapolis, and will have an estimated capacity of 5 tons of iron powder per day.

Iron carbonate slate in the past has been a waste product overlying the iron ore formation and is present in great abundance, uniform in composition and easily accessible. As a result of a conversion process developed by the late Charles V. Firth, Mines Experiment Station, University of Minnesota, the slate is reduced to iron powder of controlled physical characteristics with a purity of over 99 per cent.

Continental Machines Inc. has named John R. Daesen president of a new division, Iron Inc., to operate the plant and market the product.

BRIEFS . . . .

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

Inland Steel Co., Chicago, has licensed Carnegie-Illinois Steel Corp, Pittsburgh, and other United States Steel Corp. subsidiaries to manufacture and sell Inland's Hi-Bond reinforcing bar for concrete construction.

—o—

The Coremakers Inc., formerly located at 1811 W. Carroll Ave., Chicago, has moved to 4435 W. Division St., Chicago 51.

—o—

Independent Pneumatic Tool Co., Chicago, has opened a branch sales office at 220 West Seventh St., St. Paul, which will be managed by Joseph A. Bell.

—o—

Pittsburgh Plate Glass Co., Pittsburgh, has developed a permanent transparent coating for glass which conducts electricity. The material is said to eliminate aircraft windshield icing and interior fogging.

—o—

Mathieson Alkali Works, New York, has entered the fire protection field with development of both high and low pressure carbon dioxide equipment.

—o—

Mabor Co., Rahway, N. J., has been organized to manufacture degreasing equipment, metal washing machines, driers and burners.

—o—

General Electric Co., Schenectady, N. Y., has announced that tests on silicone oil for airplanes will be conducted by a large aircraft company at the request of the safety bureau of the Civil Aeronautics Board. The oil is considered to be much less inflammable than petroleum oil.

—o—

Wallace Supplies Mfg. Co., Chicago, has organized Wallace Tube Co. as a wholly owned subsidiary for distribution of industrial tubing and fittings.

—o—

Reynolds Metals Co., Richmond, Va., has signed a co-operative agreement with Benson Mfg. Co., Kansas City, Mo., whereby Reynolds will furnish a continuous supply of aluminum for the manufacture of the latter company's aluminum beer barrels and will handle sales distribution of the barrels.

—o—

Dilley Mfg. Co., Cleveland, has moved to a larger plant at 1656 Ansel Rd., Cleveland 6.

—o—

B. F. Goodrich Chemical Co., Cleveland, has acquired the government-owned synthetic rubber plant in Louisville and will convert part of the facility to production of polyvinyl resins.

—o—

Heil Engineering Co., Cleveland, has been incorporated and renamed Heil Progress Equipment Corp.

—o—

Fonda Gage Co., Stamford, Conn., has appointed A. C. Wickman (Canada) Ltd., New Toronto, Ont., as sole Canadian representative for its line of gage blocks.

—o—

Cal-Therm Industries Inc., Chicago, has acquired Fred W. Gehrer Co., Chicago, manufacturer of metal spun specialties.

—o—

Pennsylvania Salt Mfg. Co., Philadelphia, has purchased the Kentucky Babb Fluorspar mine near Salem, Ky., from Kentucky Fluorspar Co., Marion, Ky.

—o—

Sentry Co., Foxboro, Mass., has appointed the following as district representatives: McQuiston & Gibson, Pittsburgh, for western Pennsylvania; Landes, Zachary & Peterson, Denver, for Utah, Wyoming, Colorado, New Mexico, Nebraska, Kansas except Kansas City, and Oklahoma; and Tenney Combustion Engineering, Dayton, O., for southwestern Ohio.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, has established three testing laboratories for industrial and marine products. The facilities include a "shock-test" laboratory, an electronic processing laboratory and a steam turbine auxiliary test floor.

—o—

Cheston L. Eshelman Co., Baltimore, has begun production of a low wing monoplane, named the "Winglet." Sheet metal work is being done by Wolfe & Mann Mfg. Co., Baltimore. The company has orders for more than 700 planes, it is said.

—o—

Island Equipment Corp., New York, has acquired an additional plant in Hollis, Long Island, adjacent to its No. 1 plant. The acquisition will enlarge the company's capacity for roller gravity equipment.

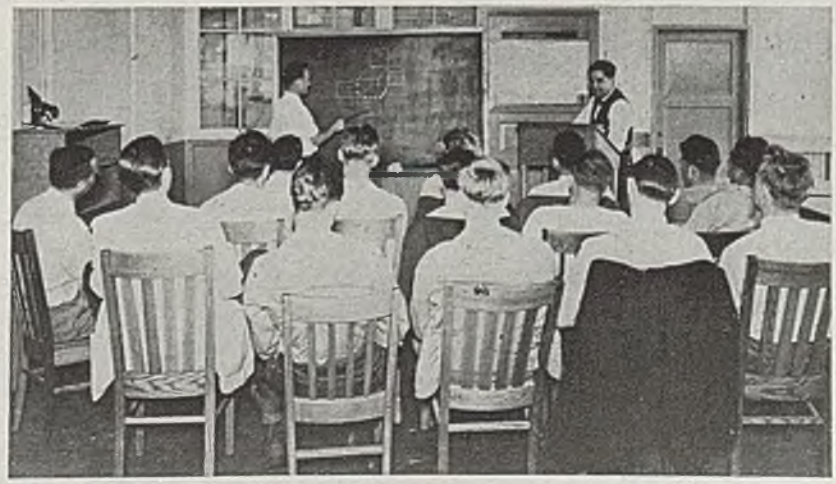
—o—

Hyster Co., Portland, Oreg., has begun operations in its new plant at Danville, Ill. The new plant, manufacturing lift trucks, is expected to be in full production by fall.

Electric Storage Battery Buys Stokes Rubber Co.

Electric Storage Battery Co., Philadelphia, has purchased the business and property of Joseph Stokes Rubber Co., Trenton, N. J., from Thermoid Co., Trenton, according to S. W. Rolph, executive vice president of Electric Storage Battery.

The rubber company which manufactures hard rubber and bakelite products for the storage battery, chemical, photographic and x-ray industries employs approximately 600 persons.



"ON THE JOB" TRAINING: School is in session at Heil Co., Milwaukee, for 20 veterans who have been selected for an extensive course of from 18 months to four years in preparation for supervisory positions. Training schedules include machine shop, engineering department and personnel work as well as classroom lectures

Men of Industry

HOWARD H. HILDRETH

ASA SHIVERICK

MAURICE D. BENNETT

Howard H. Hildreth has been named assistant secretary, Washington Steel Corp., Washington, Pa. He joined the company in December, 1945, and until recently has been supervising the construction of the new Sendzimir cold mill. He was released from the Army last year.

—o—

W. C. Stevens has organized his own company, Stevens Mfg., Mansfield, O., to engage in the design, manufacture and sale of electrical appliances and industrial thermostats. Mr. Stevens had been with Westinghouse Electric Corp., Pittsburgh, for 21 years, and was manager of thermostat sales at the time of his resignation.

—o—

Warren R. Purcell has been named manager of quality control, Lamp Division, Sylvania Electric Products Inc., Ipswich, Mass. Mr. Purcell has been with the company since 1943, and was supervisor of quality control of new products and of incandescent lamp life testing. In his new position, he will be responsible for approving the quality of lamps to be marketed by Sylvania Electric, and for the establishment of further improved quality controls.

—o—

E. C. Hawkins has been placed in charge of the Chicago branch office of John S. Barnes Corp., Rockford, Ill. The company's hydraulic sales in the Chicago area will be under the direct supervision of Mr. Hawkins, who had been manager of the eastern sales office at Newark, N. J.

—o—

Howard Oxsen had been promoted to manager of the Seattle branch house, Fairbanks, Morse & Co., Chicago, succeeding **John F. Marquitz** who will be assigned new duties elsewhere. Mr. Oxsen joined the company in San Francisco in 1917, in the repair parts department. He was diesel engine department manager of the San Francisco branch from 1938-45. During the last few months, he had been undergoing a period of training for his new assignment.

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Asa Shiverick has been appointed New York district sales manager of the clamshell and dragline bucket department, Wellman Engineering Co., Cleveland.

—o—

Warren H. Farr, vice president of the former Budd Wheel Co., has been appointed vice president in charge of manufacturing of the new Budd Co. Mr. Farr will have headquarters in Philadelphia. He will be in charge of manufacturing in the company's Detroit and Philadelphia automotive plants, and the railway car plant in Philadelphia. Mr. Farr joined Budd in 1927.

—o—

Birger G. Thele has been promoted to chief engineer, coal mines, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. For the last 6 years, Mr. Thele had been electrical engineer for the company's coal mines department. He joined TCI in 1922.

—o—

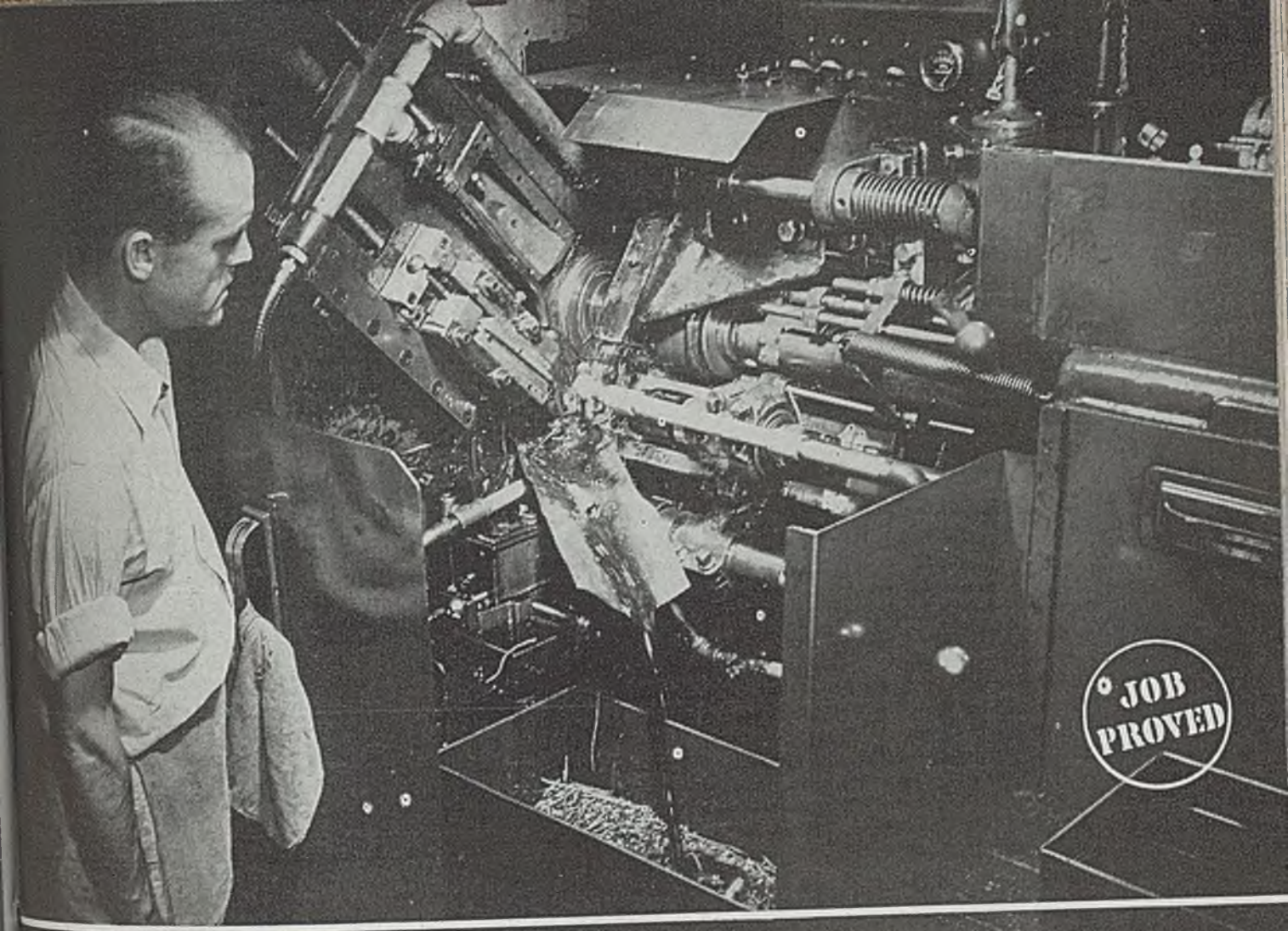
Robert H. McClintic has been named director of public relations, Koppers Co. Inc., Pittsburgh. His appointment follows the consolidation of all public relations and advertising activity of the company into a new unit to be called the public relations section. All advertising agencies serving the various divisions of the Koppers company are to work directly with the newly established section which will function as a staff section in the office of the president. **Gen. Brehon Somervell. Ralph Winslow**, who had been advertising manager for the last year, has been named assistant director of public relations. **Richard C. Carr** and **Norman L. Park** have been appointed to the public relations staff of the company. Mr. Carr was in charge of general advertising for Westinghouse Electric Corp., Pittsburgh, and Mr. Park was manager of public relations for Rustless Iron & Steel Corp., Baltimore.

—o—

Maurice D. Bennett has been appointed superintendent of research, Stamford Division, Yale & Towne Mfg. Co., New York, succeeding the late **Charles C. Leden. Fred K. Heyer** will have charge of general research on locks and hardware in the research department. Mr. Bennett joined Yale & Towne in 1927 as an instructor in the Stamford Division's apprentice school. Two years later, he was transferred to the bank lock department, and in 1937 he became chief research engineer in the company's research department. He advanced through various research positions, and in 1943 was appointed superintendent of the department making hydraulic actuating cylinders for war planes. Recently he had been superintendent of the radar department. Mr. Heyer began his industrial design career with Yale & Towne's blue print department from 1904-07. Following a six-year interlude as an engine designer for various companies, he returned to Yale & Towne in 1913 in the lock design department. In 1929, he was promoted to supervisor of research.

—o—

John P. Jones has been named assistant to **R. D. Becker**, manager, Housewares Division, Reynolds Metals Co., Richmond, Va. Mr. Jones will handle sales and merchandising problems, and will have headquarters in Louisville.



Tapping AND *Threading* S.A.E. 4140 STEEL

SUNICUT . . .

Makes possible fast production of fine threads

Here's an operation where Sunicut helped produce fine-finish threads on tough steel at relatively high speed.

Type of Machine: New Britain Gridley automatic screw machine, 2" capacity, No. 61, six spindles.

Metal: S.A.E. 4140 bar stock.
Operation: Forming, drilling, tapping, and threading.
Speed: 85 SFPM

SUNICUT is a free-flowing, transparent, correctly balanced sulphur, lard, and mineral oil combination. It has been "Job-Proved" in hundreds of shops. For additional proof of what Sunicut can do for you, test it in your own shop under your own operating conditions!

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INDUSTRIAL PRODUCTS

Until recently, he had been in charge of housewares sales for the company in the Philadelphia area, which includes upper New York state, eastern Pennsylvania, the District of Columbia, Delaware, Maryland and New Jersey. This territory will be taken over by **John Schwartzel.** Prior to joining the Reynolds organization, Mr. Jones spent three years in the Army.

—o—

Hugo Hiemke has joined the Pacific Coast Division, A. O. Smith Corp., Milwaukee, as assistant director of the company's service and development laboratory in Los Angeles. He will work on technical problems arising in the company's west coast plant and in the plants of two subsidiary concerns, Sawyer Electrical Mfg. Co., and Smith Meter Co., both in Los Angeles. For the last year, Mr. Hiemke had been research supervisor for the war metallurgical committee of the National Research Council.

—o—

W. H. Marsh has been named general manager of the new Hydraulics Division, Rockwell Mfg. Co., Pittsburgh. The division is an outgrowth of the gun pointing program Mr. Marsh directed during the war. He joined the company in 1934, in the Pittsburgh Equitable Meter Division.

—o—

Ralph Redmond has been appointed treasurer, Redmond Co. Inc., Owosso, Mich., in addition to his regular duties as vice president in charge of purchases. Mr. Redmond started with the company in 1925. He became office manager and purchasing agent in 1933. He was appointed vice president in 1944.

—o—

A. D. Andriola has been appointed chief research engineer to head the recently announced engineering research program of De Laval Steam Turbine Co., Trenton, N. J. He will work directly with **C. R. Waller,** vice president in charge of De Laval engineering. The new engineering research program is chiefly identified with the development of turbines, compressors, pumps and marine and aircraft units. Since 1941, Mr. Andriola had been assistant to the vice president in charge of engineering, Cramp Shipbuilding Co., Philadelphia.

—o—

Randall D. Stone has been placed in charge of the new San Francisco branch office, Oil Well Supply Co., Dallas, Tex. He had been San Joaquin Valley district manager, with offices at Bakersfield, Calif. **H. L. Freeman,** export representative of the company, also will make his headquarters at the San Francisco office.

—o—

Liquid Conditioning Corp., New York, has elected the following oficers: **S. B. Appl baum,** president; **H. L. Tizer,** vice president and treasurer; **Norman L. Brice,** secretary and chief engineer; **S. S. Sulzycki,** assistant secretary and controller.

—o—

Theodore A. Cohen has announced the formation of his own company, Taco Engineering Co., Chicago. The company is a consulting, designing and manufacturing organization, specializing in electronic and electro-mechanical automatic control equipment. Mr. Cohen was founder and vice president-chief engineer of Wheelco Instruments Co., Chicago.

—o—

Floor Machinery Manufacturers Association, Rome, N. Y., elected the following officers at its recent meeting in Chicago: President, **Fred C. Hild,** president of Hild Floor Machine Co., Chicago; vice president, **Lloyd Hale,** president of G. H. Tennant Co., Minneapolis; and secretary, **R. A. Ponselle,** president of Ponsell Floor Machine Co., New York. As president of the association, Mr. Hild succeeds **Gordon E. Kent,** president of Kent Co. Inc., Rome, N. Y., who presided from 1934 until this year.

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E. A. Throckmorton, president, Container Testing Laboratories, New York, Chicago and San Francisco, has been elected chairman of Packaging Institute's standing committee on trade standards and practices responsible for the packaging industry's newly initiated standardization program.

—o—

Dr. A. W. Schlechten has been appointed professor of metallurgy, Missouri School of Mines and Metallurgy, Rolla, Mo., effective Sept. 1. He will succeed **Professor H. R. Hanley.**

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J. H. Stewart of Barton, Vt., has been appointed New England representative for the company's high pressure hydraulic pumps and valves, Simplex Engineering Co., Zanesville, O.

—o—

Jack A. McConnell has been appointed sales representative in the Columbus, O., territory, Automatic Transportation Co., Chicago. He will handle company sales in the city of Columbus and the surrounding territory for the office of **Arthur M. Batsner,** Automatic representative for all of southern Ohio, with headquarters in Cincinnati. Mr. McConnell was employment and personnel manager for Delco Products Division, Dayton, O., General Motors Corp., Detroit. He served in the Navy during the war.

—o—

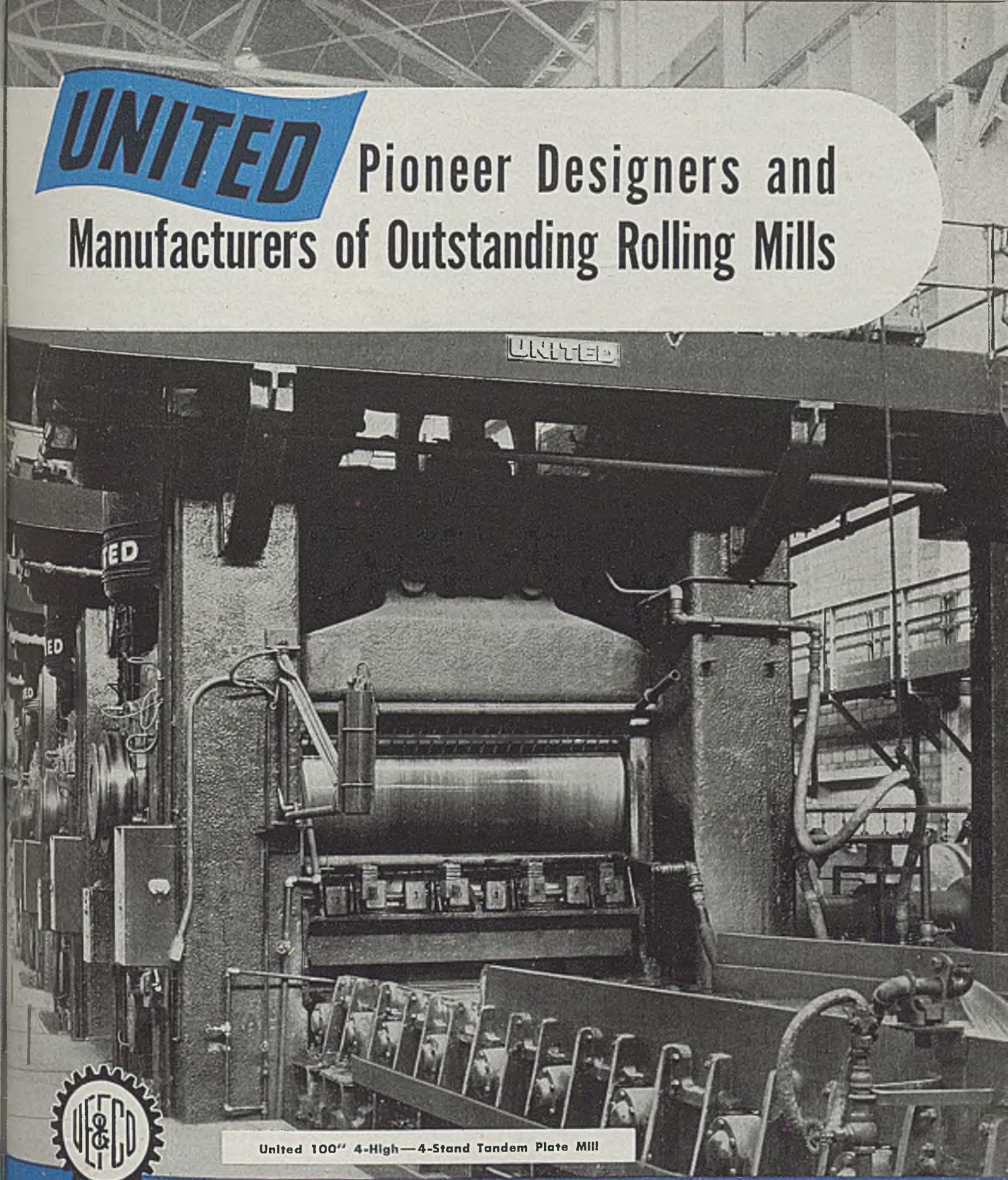
Gus Gran has been appointed assistant sales manager, and **Ben F. Welte,** assistant chief engineer, Colonial Broach Co., Detroit. Mr. Gran, who has been with the company for the last 13 years, was assistant chief engineer, while Mr.

RALPH REDMOND

THEODORE A. COHEN

JACK A. McCONNELL

UNITED Pioneer Designers and Manufacturers of Outstanding Rolling Mills



United 100" 4-High—4-Stand Tandem Plate Mill

UNITED ENGINEERING and FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at Pittsburgh · Vandergrift · New Castle · Youngstown · Canton

Subsidiary: Adamson United Company, Akron, Ohio

Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England

Dominion Engineering Works, Ltd., Montreal, P. Q. Canada

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment

Welte, who joined Colonial in 1932, had been research engineer during the last several years.

—o—

Oliver R. Grace and **Edward Burling Jr.** have been elected to the board of directors of J. H. Williams & Co., Buffalo.

—o—

Henry H. Thomas, recently released from the Army, has been appointed to the research and development staff, Pemco Corp., Baltimore.

—o—

A. F. Hasty has been appointed sales manager, Simplex Machine Tools Division, Stokerunit Corp., Milwaukee.

—o—

Robert L. Spencer has been appointed patent attorney for Crosley Corp., Cincinnati. He replaces **Alden D. Redfield** who has accepted a position as patent counsel with Aviation Corp., New York, parent organization of Crosley Corp. Mr. Redfield has been with Crosley for 6½ years. Mr. Spencer was recently released from the Navy.

—o—

C. H. Pell has been named director of purchases, Ward LaFrance Truck Division, Elmira, N. Y., Great American Industries Inc., New York. Mr. Pell had been purchasing agent, Kaiser-Frazer Corp., Willow Run, Mich.

—o—

R. F. Wehrlin has been elected president, Avion Instrument Co., New York. He had been in charge of engineering at Carl L. Norden Inc., New York. Mr. Wehrlin had been assistant to **Mr. Norden**, the bombsight inventor, since 1936 on development and design of the Norden bombsight and related devices.

—o—

Maurice W. Reid, superintendent of the machine and tool section, Bridgeport, Conn., works, General Electric Co., Schenectady, N. Y., has been named assistant general works manager of the Bridgeport plant. He is succeeded in his former position by **Gordon F. Kelley.**

—o—

R. E. Thomas has been appointed purchasing agent, Dumore Co., Racine, Wis., succeeding G. K. Tollaksen who has resigned to enter business. Mr. Thomas has been with Dumore for two years, and was chief accountant. Prior to joining the company, he was secretary-treasurer, Indianapolis Brass & Aluminum Foundry Inc., Indianapolis.

—o—

Three new Canadian representatives have been appointed to the sales staff of Ekco Products Co. (Canada) Ltd., wholly owned subsidiary of Ekco Products Co., Chicago. **Peter R. R. Williamson**, recently released from the Canadian Army, will serve as housewares sales representative in Montreal, covering the Province of Quebec, Prince Edward Island, Nova Scotia and New Brunswick. **John Roblin**, who has been with Ekco in Chicago since 1937, will be Ontario houseware sales representative in Toronto. He had previously worked in sales and sales promotion for the company. **Jack Lock** will be houseware sales representative for Manitoba, Saskatchewan and Alberta. The three men will work with W. B. Eakin, recently named general manager for Ekco's Canadian subsidiary. Mr. Eakin will maintain an office in Montreal.

—o—

Ralph R. Newquist has been elected vice president in charge of sales, Roots-Connersville Blower Corp., Connersville, Ind., one of the Dresser Industries. Mr. Newquist had been successively employed by Reliance Electric & Engineering Co., Cleveland; Louis Allis Co., Milwaukee; and Allis-Chalmers Mfg. Co., Milwaukee.

—o—

R. S. Dean is leaving government service to re-enter private business after 17 years with the Bureau of Mines, in which he rose from chief engineer, Metallurgical Division, to assistant director.

—o—

Dr. Roger Adams, head of the department of chemistry, University of Illinois, has been awarded the Priestly Medal by the American Chemical Society, New York. Dr. Adams, who is chairman of the society's board of directors, was cited for distinguished services to chemistry. The presentation will be made in Chicago on Sept. 11, at the society's 110th national meeting.

—o—

Herbert C. Petzing has been appointed manager, Cleveland branch office, Ahlberg Bearing Co., Chicago. He replaces **Max Palmer**, who recently started a bearing distributor business for himself under the name of Palmer Bearing Co. Mr. Palmer will handle Ahlberg bearings. Mr. Petzing has been with the Ahlberg company for 25 years, having served as Columbus, O., and Buffalo branch manager, and assistant manager of replacement sales in the Chicago office.

—o—

Robert C. Meyers has been appointed assistant manager, Market Development Division, sales department, Carnegie-Illinois Steel Corp., Pittsburgh, a subsidiary of United States Steel Corp., New York. Mr. Meyers, recently from the Navy, joined the sales promotion bureau of Carnegie-Illinois in 1939. The bureau, which became the Market Development Division several years ago, develops opportunities for new uses for steel, in addition to expanding many of the older and better known uses of the product.

—o—

Robert A. Lees has been named manager of the Los Angeles plant, now being constructed, of American Anode Inc., Akron. The plant is expected to be in operation late this fall, and will manufacture latex compounds and mixes for all purposes, for sale in the area west of the Rocky Mountains. Mr. Lees joined American Anode Inc. as a chemist in 1929. He has been production manager since 1935.

—o—

Michel Biscayart has been appointed regional manager of the Foreign Division, Norton Co., Worcester, Mass. He will have charge of the distribution of all Norton products in the Netherlands, Belgium, Switzerland, Portugal and Spain. Mr. Biscayart was formerly assistant general manager of Compagnie des Meules Norton, the Norton branch factory in France, and will continue to make his headquarters in that country.

—o—

Elmer J. Klebba has been appointed traffic manager, Pontiac Motor Division, Pontiac, Mich., General Motors Corp., Detroit, succeeding **E. B. Rogers**, resigned. Mr. Klebba joined Pontiac in 1933, and had been assistant traffic manager for the last 6 years.

—o—

D. E. McGuire, assistant to the general works manager for Great Lakes Steel Corp., Ecorse, Mich., has been appointed chief engineer. He left the Trumbull Steel Co., Warren, O., in 1929 to join Great Lakes Steel as assistant chief draftsman when its Ecorse plant was still in the blueprint stage.

—o—

Irwin McNiece has been named assistant district superintendent of service and erection, Los Angeles district, Allis-Chalmers Mfg. Co., Milwaukee. During the last 3½ years, Mr. McNiece has been working on Allis-Chalmers marine programs in Seattle, Tacoma and Portland shipyards. He joined the company in 1912, and spent 19 of his years with the company as Allis-Chalmers representative with the Honolulu Iron Works.

—o—

Walter E. Belcher, manager, Dallas, Tex., district, New York Belting & Packing Co., Passaic, N. J., has retired after 51 years with the company. He has been succeeded by **J. E. Conaway**, who will have supervision over company sales in Texas, Louisiana, Mississippi, Arkansas, New Mexico, southeast Kansas, Oklahoma and western Tennessee. Mr.

DOUGLAS C. LYNCH

Appointed assistant general manager, Westinghouse Electric International Co., New York, noted in STEEL, Aug. 19 issue, p. 95.

ARTHUR C. WILBY

Elected vice president, United States Steel Corp. of Delaware, New York, noted in STEEL, Aug. 19 issue, p. 94.

B. A. CHAPMAN

Assistant to the vice president in charge of manufacturing, Nash-Kelvinator Corp., Detroit, noted in STEEL, Aug. 19 issue, p. 95.

Belcher was appointed to the Dallas managership in 1921. Mr. Conaway had been an assistant to Mr. Belcher. **George G. Deverall,** recently released from the Army, has been appointed sales representative of New York Belting & Packing Co. in New England, New York, New Jersey and eastern Pennsylvania. He will make his sales headquarters at the company's plant in Passaic, N. J., where he had been employed for 15 years previous to his military service,

—o—

M. D. Burns has been appointed general manufacturing manager, Radio Tube Division, Sylvania Electric Products Inc., Ipswich, Mass. He will direct the company's radio tube manufacturing operations in Pennsylvania at Emporium, Brookville, Montoursville, Mill Hall, Johnstown, and Altoona, and at Huntington, W. Va. Mr. Burns joined the company in 1921, and served progressively as a supervisor of quality, supervisor of factory engineering, plant superintendent and plant manager. In December, 1945, he visited English radio tube plants during a study of vacuum tube manufacturing in Great Britain.

—o—

Frank W. Lorig has been appointed division engineer, Cyclone Fence Division, American Steel & Wire Co., Cleveland, subsidiary of United States Steel Corp., New York. **Charles F. Negele** has been named division engineer of appropriations and properties of the company, succeeding Mr. Lorig. Mr. Lorig's first experience with American Steel & Wire was in 1915, when he was hired as a draftsman in the construction engineer's office. From February, 1942, to April, 1945, he was company engineer on a government project in Duluth. Since that time he held the position which he now relinquishes. Although Cyclone Fence Division's main office is in Waukegan, Ill., Mr. Lorig will remain in Cleveland on the general engineering staff. Mr. Negele joined American Steel & Wire in 1934, as a draftsman in the engineering department. Since April, 1945, he had been assistant division engineer of appropriations and properties.

—o—

W. C. Dandeno has been appointed sales engineer, Detroit territory, McInnes Steel Co., Corry, Pa.

OBITUARIES . . .

Stanley Motch, 69, vice president and treasurer, Motch & Merryweather Machinery Co., Cleveland, since it was organized, died Aug. 20 at his home in Shaker Heights, O. With his brother, **E. R. Motch,** and the late **George E. Merryweather,** he organized the machinery company 42 years ago. His brother is head of the firm.

—o—

Bryant Harmon Blood, retired consulting mechanical engineer, and from 1917-24 general manager, Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn., died in Stamford, Conn., Aug. 18.

—o—

R. H. Hodges, sales manager, Baltimore Division, Revere Copper & Brass Inc., New York, died recently at his home in Baltimore. Mr. Hodges began his business career in 1907 with Baltimore Copper Smelting & Rolling Co., and when that concern became a part of Revere 18 years ago, he was assistant sales manager. He had been sales manager of the Baltimore Division of Revere since 1931.

—o—

Seymour M. Jenkins, 54, for the last 12 years an insulating brick salesman in the New York territory for Building Materials Divisions, Armstrong Cork Co., Lancaster, Pa., died recently in New York. Mr. Jenkins had been with the division since 1928.

—o—

Alfred N. Hammerston, 66, president, Hammerston Engineering Co., and Power Turbo Blower Co., both of New York, died in Wurtsboro, N. Y., Aug. 16, while on a business trip. He established the engineering companies which he headed in 1907.

—o—

Louis F. Blume, 63, retired engineer, General Electric Co., Schenectady, N. Y., and recipient of the Coffin Award for transformer development, died recently in Pittsfield, Mass.

—o—

Robert B. Crawford, 45, vice president, Atlas Foundry Co., Detroit, and the eldest of three sons of the founder of the company, died in Detroit recently. He was at one time president of the Detroit Foundrymen's Association.

—o—

John W. Mabbs, 87, president and treasurer, Mabbs Hydraulic Packing Co., Chicago, and designer and inventor of early high-speed elevators, died recently.

—o—

Rudolph L. Sager, 47, supervisor of commercial scheduling of appliances, General Electric Co., Schenectady, N. Y., died at his home in Trumbull, Conn., Aug. 15.

—o—

Louis Bruch, 81, who retired a number of years ago as vice president, American Radiator Co., Chicago, died recently in Evanston, Ill.

In quenching and tempering gears, bolts and studs, several factors are important, principally hardness and depth of penetration. Here the author relates how hardenability testing successfully fits into one company's use of standard and alloy steels

HARDENABILITY TESTING In Material Control

By E. H. SNYDER
Chief Metallurgist
Austin-Western Co.
Aurora, Ill.

ANY procedure involving heating and cooling a metal for changing its properties is considered a heat treatment. This includes normalizing and various types of anneals as well as quench and temper treatments. However, for obtaining the best combination of strength, wear resistance, fatigue strength and toughness in such parts as gears, bolts, studs, torsion shafts, etc., quench and tempering are usually the final heat treatment, and these are the heat treatments we have in mind for this discussion.

There may be tensile test or impact test or other specifications on parts being made, but for routine testing of heat treated parts hardness limits are commonly specified by the designing engineers. These hardness limits are usually expressed in brinell or rockwell C. The latter is always used for high hardness ranges, and even down between 200 and 300 brinell the rockwell is usually much more convenient and rapid, and leaves less of an imprint on the surface. Conversion charts are not 100 per cent consistent and reliable but these discrepancies are small. One point more or less is not a serious error. The serious errors are of the order of 10 points rockwell or 100 points brinell—errors, for example, which come from mixed steels and failure to quench or temper.

There is some question on how much hardness is needed for any particular part. It is probably 50 per cent true to say that no one knows very accurately. Hardness specified is likely to be the result of balancing material and machining costs, importance of weight, experience with similar parts and failures which occurred. There also is a question on what steel to specify. Here again, material and fabrication costs and previous experience enter the picture. Two other factors become increasingly important as size of the part and specified hardness increase—attainable hardness and hardness penetration.

A hardness of 150 brinell may be obtained easily with all except the lowest carbon steel, frequently as rolled or annealed. As hardness is raised up past 200, 300, and 400 brinell, and 60 rockwell C, heat treatments become necessary, carbon must be raised to obtain the desired hardness, and alloys added or increased to obtain adequate penetration of hardness in larger sections. All metallurgists and heat-treaters who followed developments of the past generation know that as size increases more alloy must be added if deep hardening is to be obtained. Even relatively shallow hardening of larger parts becomes difficult or impractical unless alloy is added. For many applications where fatigue is the usual cause of failure, moderately deep hardening is adequate, as these failures normally start from the surface, and it is then only necessary to be sure that the surface layer is heat treated to appropriate properties. Out of some hundreds of failures from fatigue tests and from actual service, the author witnessed only one failure which started below the surface.

All failures, however, are not fatigue failures. Under exceptional loads, torque shafts do actually twist off with a single application of torque. Bolts, tie rods, studs, etc., do break in a single application of exceptional tensile or shear stress. When these failures occur with no indication of ductility—no elongation, permanent stretch, etc.—there may be grounds for believing that the material was brittle, or was low in impact properties. This type failure does occur, but so also does the type in which a single excessive force causes a ductile flow before rupture. With this type failure, deeper hardening and higher hardness

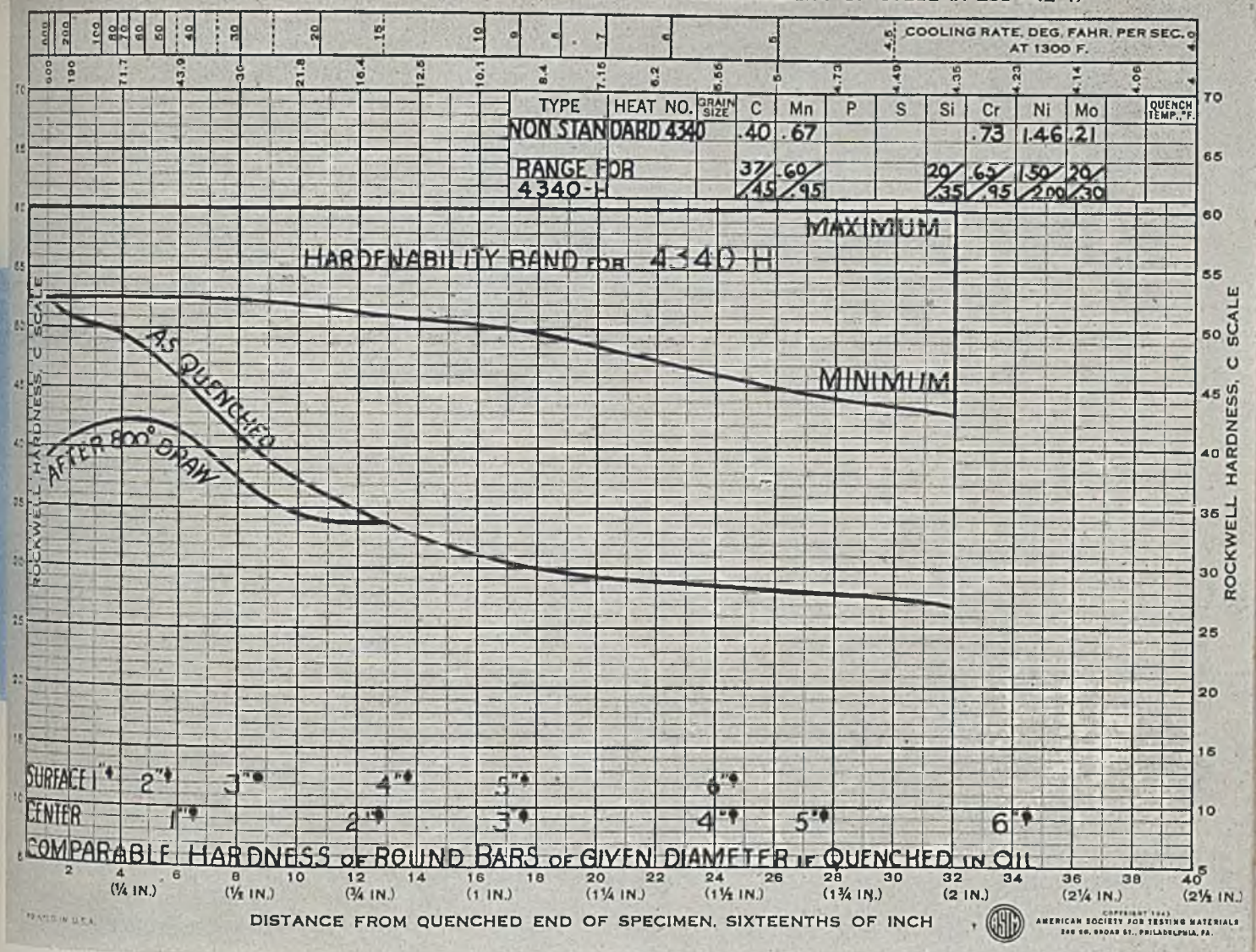


Chart showing Jominy hardenability of a lot of steel purchased for 4350 with the AISI hardenability band for 4340-H steel. Curve for Jominy bar tempered at 800° F also is shown

as well as larger size sections are beneficial. Larger sections increase weight, material costs and machining costs. It is, therefore, an economic advantage to use the smallest sections and highest hardness to avoid any brittle type failures.

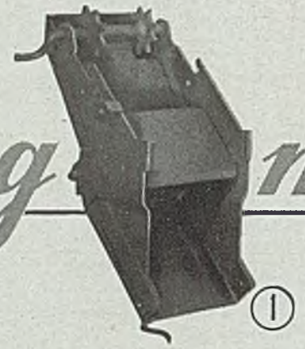
If machining can be accomplished mainly before heat treatment, medium carbon alloy steels can be safely used at hardness levels of 388 to 444 brinell, and there is seldom any justification for a hardness level below 331-375 brinell. If major machining operations must be performed after heat treatment, there is more justification for lower hardness levels.

Both 4140 and 4340 have been widely used for some years for our axles, tie rods, torsion shafts, etc.—usually in the 388 to 444 or 331 to 375 brinell ranges mentioned above. Except for grinding, most machining operations are performed before heat treatment. Parts range from under 1 in. up to near 3 in. diameter. Forty-three forty was commonly used for the larger sizes and higher hardness and 4140 for the others. During the war use of lower alloys steels was urged or forced upon most manufacturers, unless they were manufacturing high priority material.

The 9400 series steels were mostly widely pushed at first. These included nickel, chromium and molybdenum as alloying elements, the same as the well known and well thought of 4300 series, except the percentage of alloys was much lower. Also, the silicon and manganese were raised above the level of most prewar steels. Some found the 9400 series steels a suitable substitute for the steels formerly used. Others experienced a great deal of trouble, particularly if they were heat treating relatively large parts to relatively high hardness levels. Under such circumstances, heats of steel which approached the lower limits on one or two alloying elements usually gave low or totally inadequate hardness.

Jominy hardenability testing was developed before the war, but experience with low hardenability, low alloy steels caused many manufacturers to reach for this new technique. In our own plant, Jominy hardenability testing was adopted about a year after the start of the war. This testing procedure gives quick and reliable comparisons of the heat treating qualities of each lot of steel regardless of the size purchased, or the nature of the parts for which it is to be used. SAE hardenability chart form 2 is used as the basis for determining the expected attainable hardness of various size sections from the Jominy hardenability curve. The distance on the Jominy bar having quenching rates equivalent to the surface and centers of round oil quenched bars is ordinarily put on the hardenability charts. At first these curves were put on ordinary co-ordinate paper, but more (*Please turn to Page* 120)

Stamping machine parts



By COLIN CARMICHAEL
Associate Editor
Machine Design

With the designer becoming cost conscious in a highly competitive market, he has turned to stampings as a means of reducing costs and increasing production. These data also presented before New England members of Pressed Metal Institute

METAL stampings industry belongs to one of several groups that lately have enormously complicated the life of the machine designer. Until stampers and others such as the powder metal producers, plastics molders and die casters developed techniques and procedures to their present advanced stage, the alternative methods of making something usually narrowed down to a very simple choice. The designer would proportion the part so that it would satisfactorily perform its function on the machine, avoiding abrupt changes of section or sharp corners which he knew were detrimental, regardless of the method employed to make the part. Then he could very quickly determine—on the basis of general shape as well as strength requirements—whether to make the part a casting or a forging or whether to machine it out of bar stock. The choice of material was equally simple. If a casting, cast iron or brass; if a forging, mild steel; if bar stock, brass or mild steel. Patternmakers, molders, blacksmiths and machinists were a highly ingenious group of people that could make almost anything, and the designer did not have to be particularly conscious of the problems of the people in the shop. Perhaps his design was a bit more expensive to make than it could have been, but in those days quantities were not so large, labor was less expensive, and the prime purpose of design was to get something that would work and keep on working.

Today all that has changed. Machines are now being made for mass consumption in highly competitive markets, labor costs have skyrocketed and the designer no longer sits in an ivory tower designing according to his personal whims. Now more than ever before he has become acutely conscious of costs and of the methods of production.

With the advent of high-speed automatic machines for turning out small machined parts, machining costs were greatly reduced and a great variety of parts could be made from bar stock provided reasonable attention was paid to ease of manufacture. However, it was recognized that for larger parts which initially were forgings or castings the partial machining required was a major expense and a production bottleneck whose elimination could spell the difference between profit and loss.

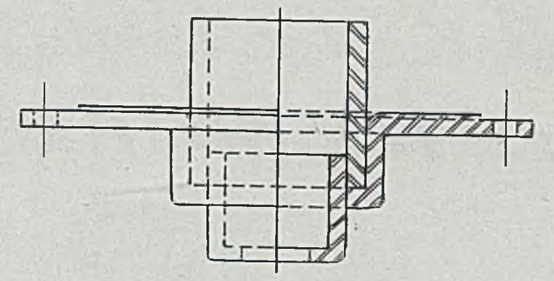
Into this picture a number of processes—some old, some relatively new—fitted perfectly. These include: Die castings, permanent mold castings, precision (investment) castings; sintered powder metal parts and stampings. The thing that these processes have in common is the fact that little or no machining is necessary before they can be assembled into the machine. For this reason they are to some extent competitive but, by the same token, they complement each other and make possible the present-day high production of many types of machines including automobiles, refrigerators, portable tools, vacuum cleaners, airplanes, kitchen mixers, etc.

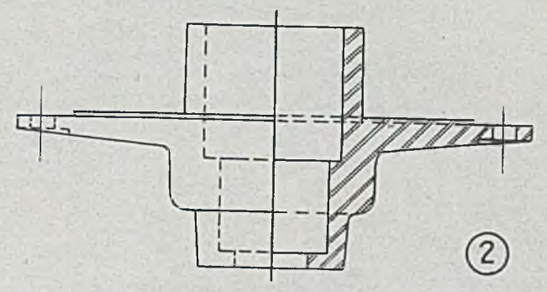
It is believed that many of the new uses for stampings will involve the combining of one or more stampings with each other or with parts made by other processes. Such built-up parts, assembled by welding, brazing, press fit or other means played a big part in the development of the Ordnance Department's program for getting weapons, vehicles and ammunition into mass production, and this experience will be valuable in creating new designs to utilize stampings. Typical of these parts was the top roller for half-tracks, originally a steel casting weighing 42 lb and requiring 60 min of machining. Redesigned as an assembly of sheet metal parts weighing 25 lb, and requiring only 20 min of machining, the roller was reduced in cost from $15 to $6.50.

Here then is the problem facing the designer as he prepares to specify the material and manufacturing method for a new part:

Which of these methods is best suited from the standpoint of strength, stiffness, weight, corrosion resistance, ease of manufacture or availability, appearance and cost? To see what the designer's problems are, let us consider for a moment each of these necessary requirements in turn.

Strength, of course, means primarily resistance to failure. But what constitutes failure? (*Please turn to Page* 94)





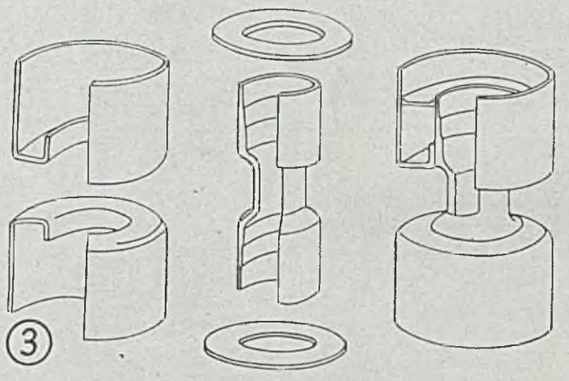
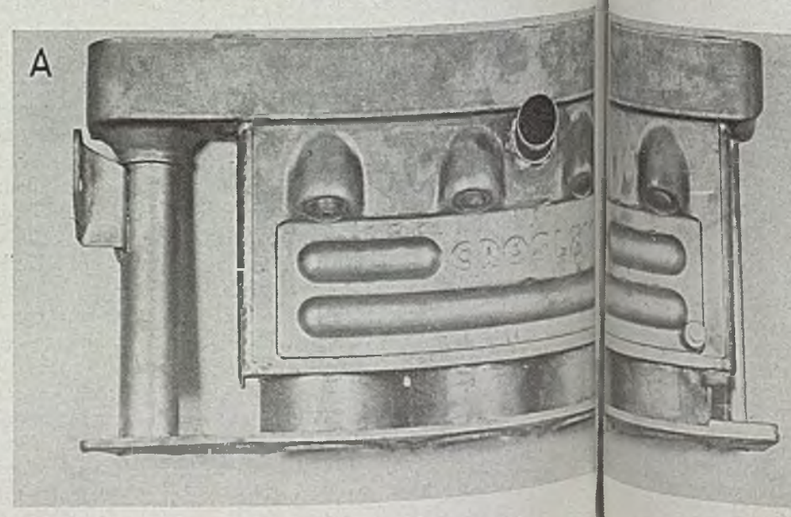


Fig. 1—This part for 50-caliber machine gun is assembled from 14 stampings

Fig. 2—(Upper view)—Assembly of brazed stampings, sized and coined. (Lower view)—Design for hub machined from forging

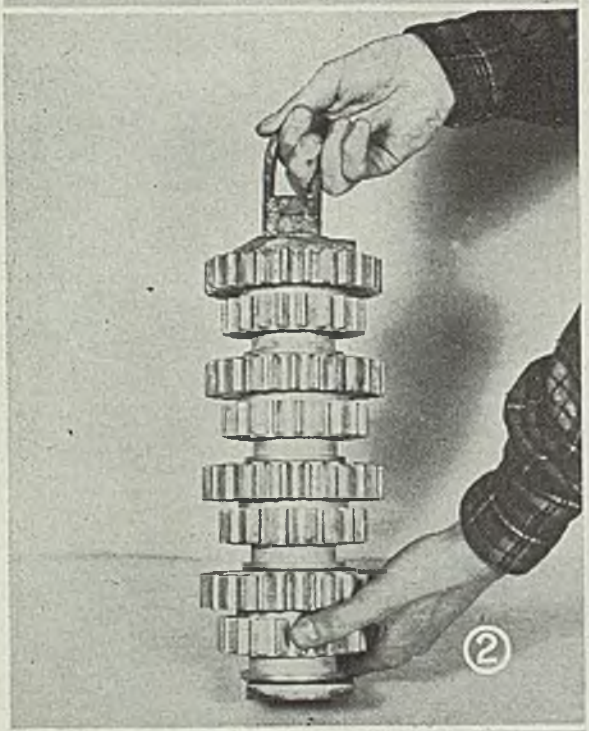
Fig. 3—Stampings for this welded roller on a half-track required only 25 lb of steel compared to 42 lb that were needed previously

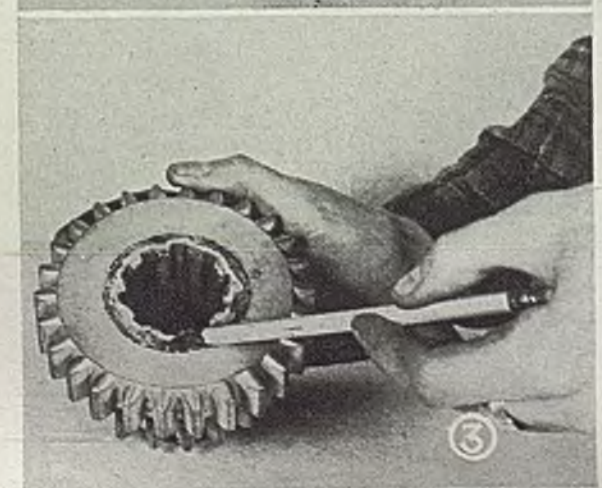
Fig. 4—Cylinder block assembly, A and B, showing brazed stamping construction. This part weighs 14.8-lb prior to machining. Only ½-lb of metal is removed during machining. Maximum wall thickness at any point separating chamber from cooling water is 0.125-in.



Selective Carburizing
BY THE "MILL SCALE" METHOD

By ROBERT B. SEGER*
Lindberg Engineering Co.
Chicago





PREVENTION of carbon penetration of low carbon steels during carburizing is being done by several methods, some of which work exceedingly well and others of which only reasonably well. Curiously enough, a method that is at least 20 years old works as well as the best method. The method, one which proved its worth in the carburizing of bores of gears, consists of stacking gears on an ordinary hot rolled steel bolt to which a washer larger than the bore is welded, the purpose of the washer being to keep the mill scale which is placed in the lower gear from falling out. Note Fig. 1.

One of the available sources of mill scale are those plants which perform any type of forging. It is produced during the heating of the material to be forged, depending of course, upon the atmospheres used. The oxides (often undesirable) are usually released by the hammer blows. In the application illustrated it was necessary to fill the bore of the bottom gear only to approximately 1 in. in depth.

Fig. 2 shows the completed assembly, with another washer placed on the top gear and drawn relatively tight by the nut which has an eye on its end for ease in handling. It is necessary to fasten the gears together only tightly enough to prevent the mill scale from seeping out of the bore of the bottom gear. With the assembly completed, the gears are ready for either pack or gas carburizing.

Apparently the reaction which takes place during carburizing is as follows: The parts are surrounded by carbon monoxide gas and during heating at elevated temperatures, carbon has a great affinity for oxygen. It is evident that the carbon monoxide combines with the oxygen present in the mill scale compound to form carbon dioxide which is a strong decarburizing agent. Not only does the mill scale prevent carburization, but it has a tendency to decarburize the parent metal.

The area affected by the combination of mill scale and carbon monoxide gases can be seen in Fig. 3. This combination formed carbon dioxide and probably caused decarburization rather than permitted carburization.

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*From "Heat Treating Hints".

Fig. 1—Ordinary hot rolled steel bolt with washer welded on end to cover gear bore

Fig. 2—Gears assembled for carburizing. Bottom gear is filled to depth of 1 in. with mi.l scale

Fig. 3—Pencil points to area affected by combinaton of mill scale and carbon monoxide gases. Resulting combination formed carbon dioxide and probably caused decarburization

Seen and Heard in the MACHINERY FIELD

By Guy Hubbard Machine Tool Editor

FEELING MILLIONTHS: Adaptability of human beings to meet new conditions seems almost unlimited. When steam railroads originally were projected, experts predicted that crew and passengers would become insensible if speed greatly exceeded that of a trotting horse. Pioneer engineers and firemen stood on open decks so that the rush of air would keep them awake. Today we fly on airliners at 400 miles per hour. We may doze but the pilots certainly keep awake.

When I first worked in the shop, many of the older workmen claimed that they could "feel" to thousandths or less with inside and outside calipers. I know that some of them actually could—but I am not convinced that it was as effective as working with micrometers. However, when the microinch was "invented", I was sure that something new had been added which was beyond the abilities of mechanics with the supersensitive fingers. Apparently I was wrong about that.

During the course of a visit to an aircraft parts plant, I was taken into the Superfinishing department, where finish fineness is held to limits of three or four microinches. Surface analysers are available for absolute checks, but to my amazement I found operators giving the work preliminary personal inspection by brushing a thumb nail or fingernail along the surface.

Ability to interpret the minute "phonograph needle" effect (vibrations through the nail) spells to them the difference between work of passing grade and that not so good. We live and learn!

ENGINEERING DELUXE: Last week I spent a full and revealing day in and around the engineering department of a machine tool company with whose activities I have been well acquainted for more than 30 years. Although the company itself is bigger than it was when I first became acquainted with it, the engineering department has—in proportion—grown much more than has the company as a whole. There are—I believe—between 60 and 70 people in the department.

Having heard some grumbling recently on the part of a few older machine tool men regarding the apparently top-heavy condition of engineering in their industry, I set about analysing the situation in a general way in an effort to figure out what has been going on, and why. My conclusion is that engineering hasn't gotten out of line—it simply has kept pace with its own constantly growing complications.

I have in mind a plant which in 1915 was employing 1000 men. Its more than ordinarily populous drafting room, which was not dignified by the name "engineering department", was in a rather unattractive spot next to the pattern shop. There were two chief draftsmen—one on machines, the other on tools. The machine design man had two "teams" working under him, each consisting of layout man, two detailers and one tracer.

There were five men working on tools and attachments on customers' orders. They did their own detailing and tracing. In addition, one boy worked on shop tools, primarily jigs and fixtures. He was very much under thumb of the foreman of the tool room. There was one blueprint boy. Incidentally, the drafting room as a whole was under jurisdiction of the general foreman of the plant and was not looked upon as a part of the office setup. In other words, the draftsmen were of the "flannel shirt" rather than of the "white collar" class.

Specialists Who Were Not There

More than 90 per cent of the machines were belt driven and the others were merely motorized versions of the same. There were no electrical engineers in the drafting room—that activity being one of the rather minor functions of the plant electrician. There were no hydraulic engineers for the simple reason that there were no hydraulics. There were a few pneumatic chucks but no one made that sort of thing his business.

Ordinary cast iron and soft steel straight spur gearing was the rule. No one specialized on gearing. The machines were 100 per cent plain bearing. Hence there were no ball and roller bearing specialists on the payroll. Gray iron castings and low carbon machinery steel were the principal construction materials. No one worried much about strength of materials, although the head patternmaker and the boss foundryman sometimes were called into consultation. The head blacksmith was the metallurgist but probably he did not realize that.

I could go on and on regarding the various specialists who were not on the drafting room payroll in those days. They weren't there because the simple machines of those days didn't call for their services. The principal product of the company at that time sold for about $1200. The comparable machine today sells for $7500.

This $7500 machine is better looking more powerful, more productive, more accurate, and heavier to just about the same extent that its price is higher than that old model. It is infinitely more complicated, not by choice but of necessity. It is the sort of complication which demands not one set of drawings but several sets. It is the sort of complication that requires several varieties of thorough engineering analysis—not the old fashioned rule-of-thumb, empirical "designing" in vogue during years "Before Carbide."

Where once there was just a "set of drawings" used all along the line, there now are pattern drawings; forge shop drawings; drawings for roughing; drawings for finish machining; special drawings for outside contractors; drawings for heat treaters; electrical diagrams and drawings for prefabricated "wiring harnesses"; hydraulic layouts; lubrication system layouts; coolant system layouts; compressed air layouts; tooling layouts; and others of lesser importance. If all these layouts were superimposed the resulting tangle of lines would be beyond human understanding. Some of the individual layouts are enough to overstrain the mentality of those of us of the "tee-square and triangles" era.

And so—let me repeat—my conclusion is that modern machine tool engineering departments are not over staffed or top heavy. I will admit, however, that I had that old Rip Van Winkle feeling when I found myself in the midst of all those vertical boards and drafting machines, and computing machines and continuous blueprinters and fluorescent lights and air conditioning. Puzzling though it all was for me, I am all for it—especially the air conditioning.

HEAT TREATING Aluminum

This is the second and concluding article devoted to a nontechnical explanation of the physical metallurgy involved during heat treatment. Three articles to follow will cover recommended heat treatments and factors to be observed

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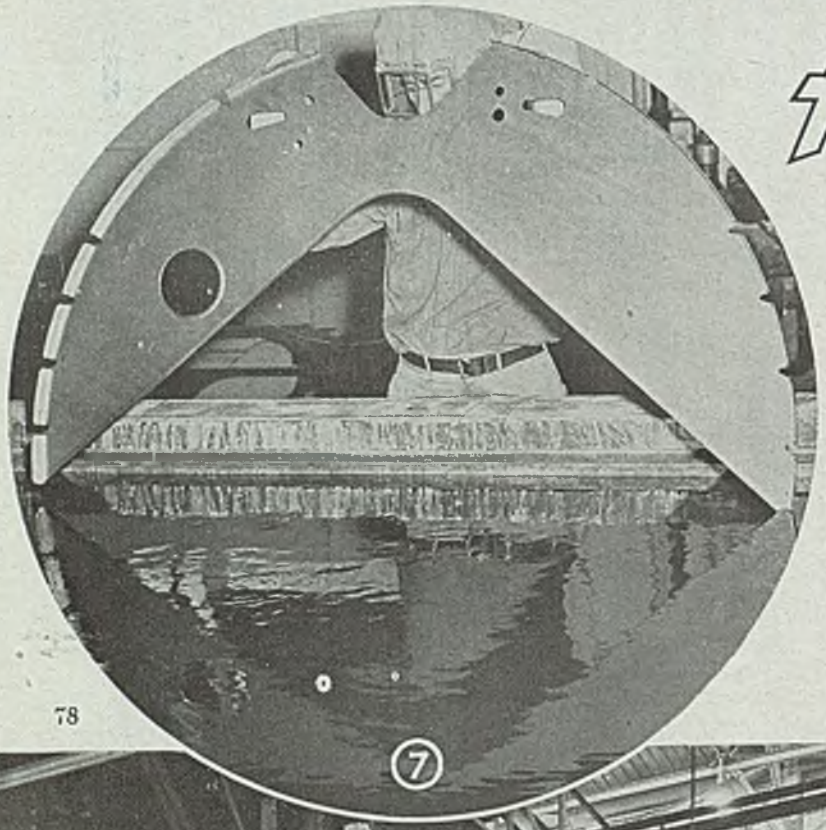


Fig. 7—Proper use of face masks and safety clothing avoids burns from splashed molten salts during heat treating in nitrate baths. Boeing Aircraft Co. photo

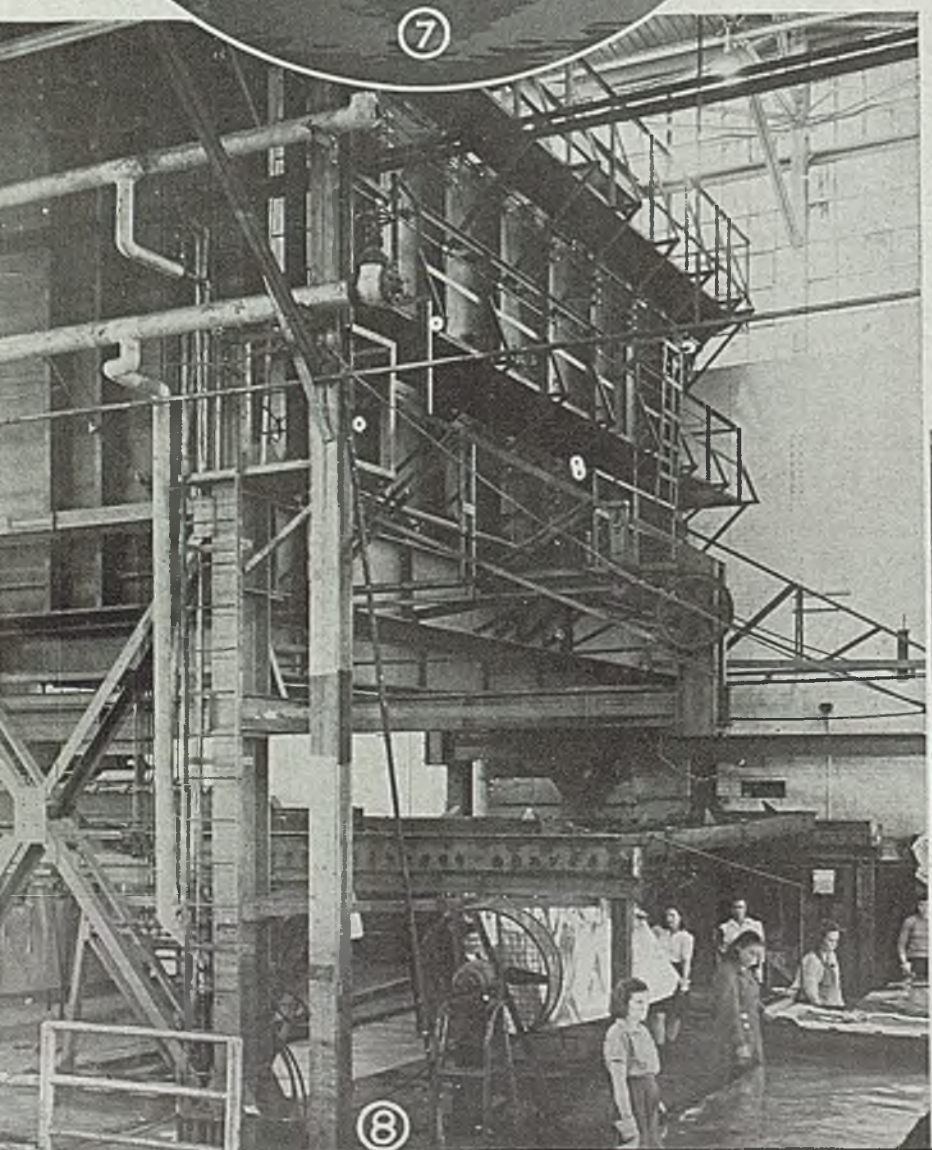
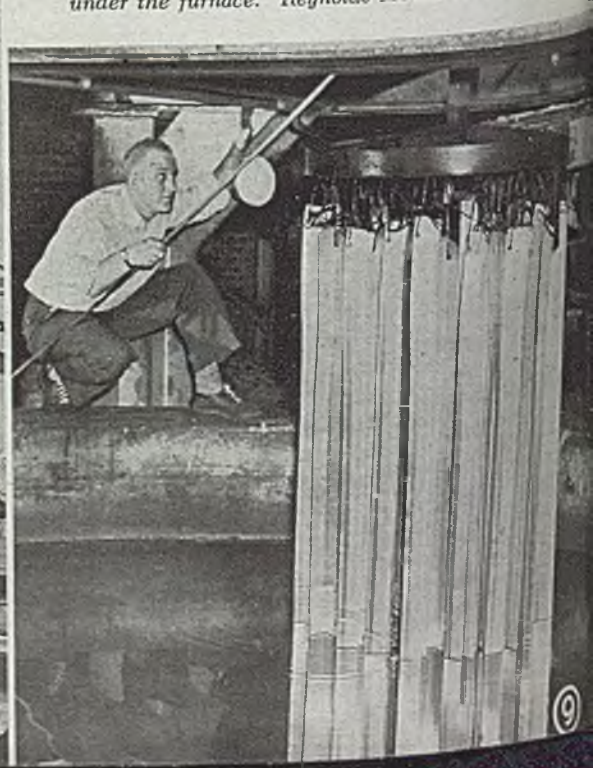


Fig. 8—Elevator electric furnace with water quench for heat treating aluminum alloy sheets used at Reynolds plant. View shows sheets being unloaded from rack

Fig. 9—Extruded aluminum sections 50 ft in length are here completely quenched within the 10 sec time limit. Parts are heated in a vertical type furnace with quench tank located under the furnace. Reynolds Metals Co. photo



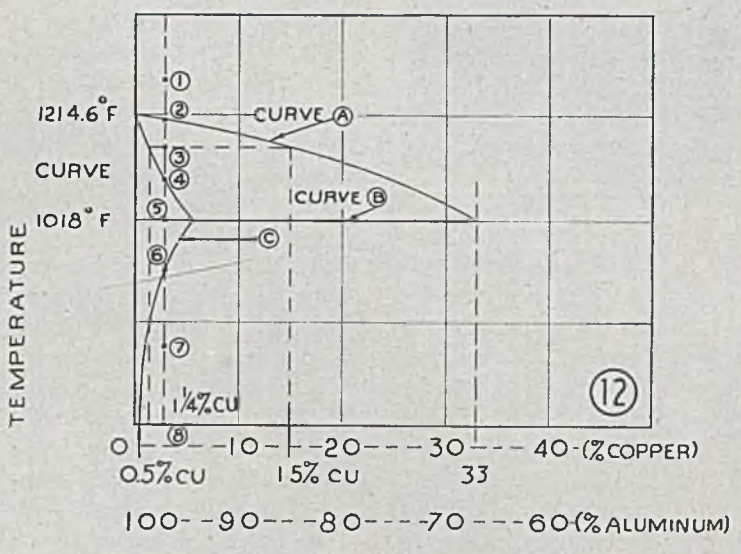
ALUMINUM alloys may be strengthened by causing certain constituents to precipitate out (as explained under precipitation) inside the grains along the crystal boundaries or in the slip planes between crystals in such a manner as to lock or key the crystals. This condition hinders slippage and so produces a "harder" and stronger material.

Also resistance to slippage can be increased by controlling the material that is precipitated between the crystals so that it acts like a "sharp grit" instead of like a "ball bearing". It is evident that a material that tends to aid free movement of one crystal on another will produce a softer, weaker alloy, whereas a precipitate that tends to prevent such movement will in turn produce a harder and stronger structure.

Let's examine Fig. 12 to see why particular temperature ranges are required and to find out about the "aging" treatment—either natural or artificial—that is necessary to develop maximum strength in the aluminum alloys.

The vertical scale in Fig. 12 represents temperature, starting with room temperature at the bottom and going up above the melting point of the aluminum alloys. Since the alloys we are going to look at have aluminum and copper as the principal constituents, we can make the horizontal or base scale a double scale. Going from left to right, the upper scale measures per cent of copper from zero to 40 per cent. Disregarding other constituents, we can say that remainder at any point is aluminum. So we can put in anothe scale immediately below the copper one reading 100-90-80-70-60 per cent aluminum for the same points designated as 0-10-20-30-40 per cent copper respectively.

For our purpose, we have selected an alloy containing about 3 per cent copper (97 per cent aluminum) at room temperature, represented by Point 8 on the chart. Now let's see what happens when we heat and cool this alloy.



First the temperature of the material will be raised along the vertical dotted line to Point 1—say 1300° F. At this temperature all the material is molten and the copper has dissolved in the aluminum.

Now the material is allowed to cool to 1190° F—Point 2 lying on Curve A. This curve represents the temperature at which the molten metal starts to solidify. The first crystals that start to form here will be almost pure aluminum. These crystals will serve as the nuclei or central points around which the grains will form by solidification of other crystals as cooling continues.

Solid Solution: Now we will allow the material to cool to 1160° F—Point 3—and hold it at this temperature while we see what is happening here. Since solidification began at Point 2, the material is now partly solidified and partly molten. Because the aluminum has been crystallizing out of solution with very little copper, the content of the still molten material is increasing.

Since the information in the chart we are studying was obtained from tests upon a whole series of alloys with different compositions as indicated by the two horizontal scales, it is possible to tell exactly how much copper is contained in the aluminum-copper alloy that is solidifying out of solution and also to tell (*Please turn to Page* 127)

Fig. 10—Rack of aluminum parts being prepared for heat treating at Bell Aircraft Corp., Buffalo

Fig. 11—Workmen use long handled hooks to place aluminum parts into molten salt bath. Water quench tank is located immediately adjacent so that heated parts can be quenched quickly. Republic Aviation Corp. photo

Fig. 12—Portion of equilibrium or constitutional diagram for copper-aluminum alloys

Applications of LIME FERRITIC ELECTRODES

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This second of two articles discusses properties of lime-ferritic electrode deposits through typical case histories. New electrode found to extend field of weldable steels to include those heretofore classified as "difficult to weld"

PERHAPS the best way to understand the properties of lime-ferritic electrode deposits is through a discussion of typical application case histories. High carbon and alloy wrought steel experiences will be reviewed first in this discussion.

Spring steel wear plates with a carbon content between 0.90 and 1.10 per cent are used for side bearing wear plates on freight car truck bolsters. Two sets of plates ⅜ x 6 x 8 in., are welded as shown in Fig. 9. One set of welds is made in the downhand position and the other in the horizontal position. E6012 and other mild steel electrodes had to be abandoned because of cracking. Type 18-8 molybdenum stainless steel weld metal proved satisfactory although expensive. Finally HTS electrodes were chosen with good results. The estimated saving is one dollar per car, which is worthwhile when it is remembered that thousands of freight cars are built during each year.

While preheating may be eliminated with a steel of greater carbon content when using the lime-ferritic type, some jobs still require preheating. Outside of underbead cracking thought to be caused by hydrogen, the problem of martensitic heat affected zones remains. Using a 300° F preheat brake drums of alloy steel were successfully welded to manganese vanadium spiders with HTS electrodes. The steels involved had the analysis given below:

	Drum	Spider
Carbon	0.43—0.48	0.25—0.30
Manganese	0.75—1.00	1.25—1.50
Silicon	0.20—0.35	0.35—0.50
Nickel	0.40—0.70	.....
Chromium	0.40—0.80	.....
Molybdenum	0.15—0.25	.....
Vanadium	.....	0.08—0.13

Maintenance departments are called upon to repair parts made of a wide variety of analyses. Maintenance welders in one large steel mill are making good use of lime-ferritic type electrodes. Using preheats up to 600-800° F, they weld steels containing as much as 0.90 carbon. With medium carbon steels analyzing 0.45 carbon or less, no preheat is used. Sections 1 in. thick or under are welded completely with lime-ferritic electrodes. Thicker sections are "buttered" with HTS weld metal and the same electrodes are used for the root beads. Balance of the weld is made with E6020 electrodes.

Fig. 4 shows a motor-driven power shovel. Its high carbon lip is of steels varying in composition from SAE 1045 to 1095. Lime ferritic electrodes, without preheat, are used in joining lip to a low carbon shovel body. The welds are intermittent to facilitate burning the lip loose when a new blade is required.

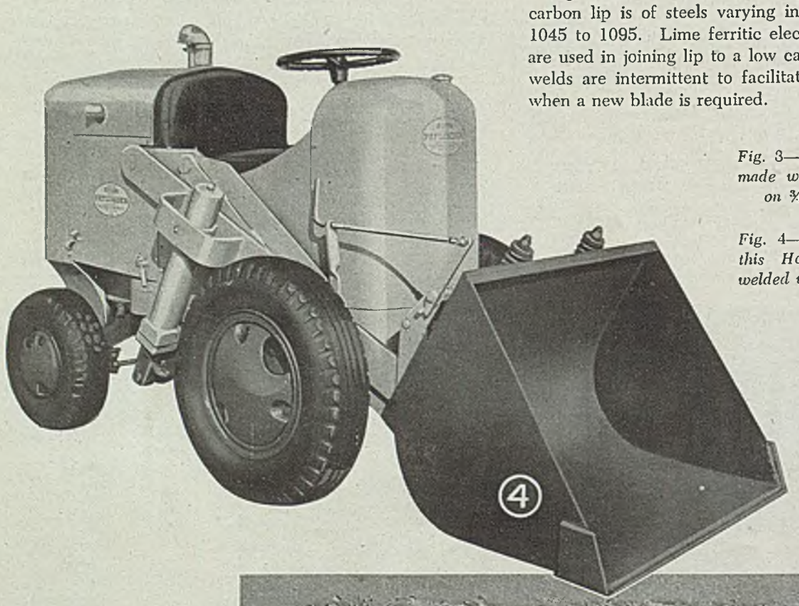


Fig. 3—Microsection of butt weld made with lime-ferritic electrodes on ¾-in. high sulphur steel

Fig. 4—High carbon steel lip of this Hough power shovel was welded with lime-ferritic electrodes

Fig. 5—A porous and cracked weld resulting from use of E6012 electrode on high sulphur steel

Fig. 6—Sound weld with HTS electrode on identical steel shown in Fig. 5

One shop encountered considerable trouble with root bead cracking in spite of a 400° F preheat maintained during the fabrication of NE 8742 shafting to mild steel plate in making a single-throw crankshaft. The 3 in. NE 8742 shaft had the following analysis:

Carbon	0.40—0.45
Manganese	0.75—1.00
Silicon	0.20—0.35
Nickel	0.40—0.60
Chromium	0.40—0.60
Molybdenum	0.20—0.30

The mild steel parts were 1¼ in. thick. Lime-ferritic weld metal completely eliminated cracking.

Frequently cold-rolled steel proves troublesome during welding. After many weld failures, one company tried lime-ferritic electrodes to join cold-rolled steel bosses and studs to mild steel. The results were very satisfactory.

Ordinarily the mild steel side of stainless-clad plates is not believed to be difficult to weld. Yet, a number of field reports state that the mild steel backing of stainless-clad plates caused the weld metal to boil. Some fabricators decided to weld both the stainless and the mild steel sides with stainless steel electrodes. While such a practice was successful, it was more costly. Lime-ferritic electrodes overcame the boiling and were less expensive.

Sulphur always was "poison" to weld metal. In addition to a violent boiling in the weld pool that makes it difficult for the welder to control his deposit, sulphur produces unsightly porosity and cracked welds. Poor experiences with free machining steels in welded fabrication forced manufacturers to choose between poor weldability and less desirable machinability. With the recent introduction of lime-ferritic electrodes, the happy marriage of good weldability and machinability took place.

Before lime-ferritic electrodes became available, common practice dictated the selection of a "cold" electrode such as E6012. With the least pick-up of parent metal, the effects of sulphur could be held within bounds at times, but not always. Fig. 5 illustrates the porous and cracked weld metal encountered with an E6012 electrode on SAE X1315 steel. Fig. 6 shows a sound weld made on the same plate with HTS. In both instances, ¾-in. sulphur bearing free-machining steel was joined with a horizontal fillet weld using 3/16-in. diameter electrodes.

Next a butt weld was prepared to provide a plate for x-ray examination and all weld metal specimens for physical property evaluation. Fig. 3 shows a cross-section of the finished weld which proved to be x-ray clean. The plates were ¾-in. thick. Welds were made with 5/32, 3/16 and 7/32-in. electrodes. Seven layers were deposited with 12 beads. A backing strip of the same sulphur containing material was employed. The uneven contour at the root of the bead was caused by removing the backup bar prior to making the micrograph.

Both the fillet welds and the butt weld were made by a large midwestern machinery and equipment fabricator. The opening paragraph of their metallurgical department report is quoted below leaving out company names.

"With the increased desire for the use of low carbon, high sulphur, free-machining steels, there were many inquiries as to their weldability. In the past, these steels were classified as being unsatisfactory for welding with ordinary mild steel electrodes in that deposited metal was always extremely porous and oftentimes cracked down the center of the bead. However, with the introduction of a newly developed electrode, namely the lime-ferritic type, we wish to announce the subject steels now can be satisfactorily welded."

Highlights from the technical data in this report follow. In Table VII are shown the chemistry of the electrode core wire, the sulphur bearing free-machining steel and the weld metal deposited on this steel. The weld deposit contains 0.042 per cent sulphur, proving that the slag produced by the coating effectively reduces the sulphur in the weld deposit to a safe value.

Physical properties of weld deposit illustrated in Fig. 6 demonstrates quality of a butt weld between two high sulphur plates as compared with a mild steel weld deposit joining mild steel plates. For comparison, physical

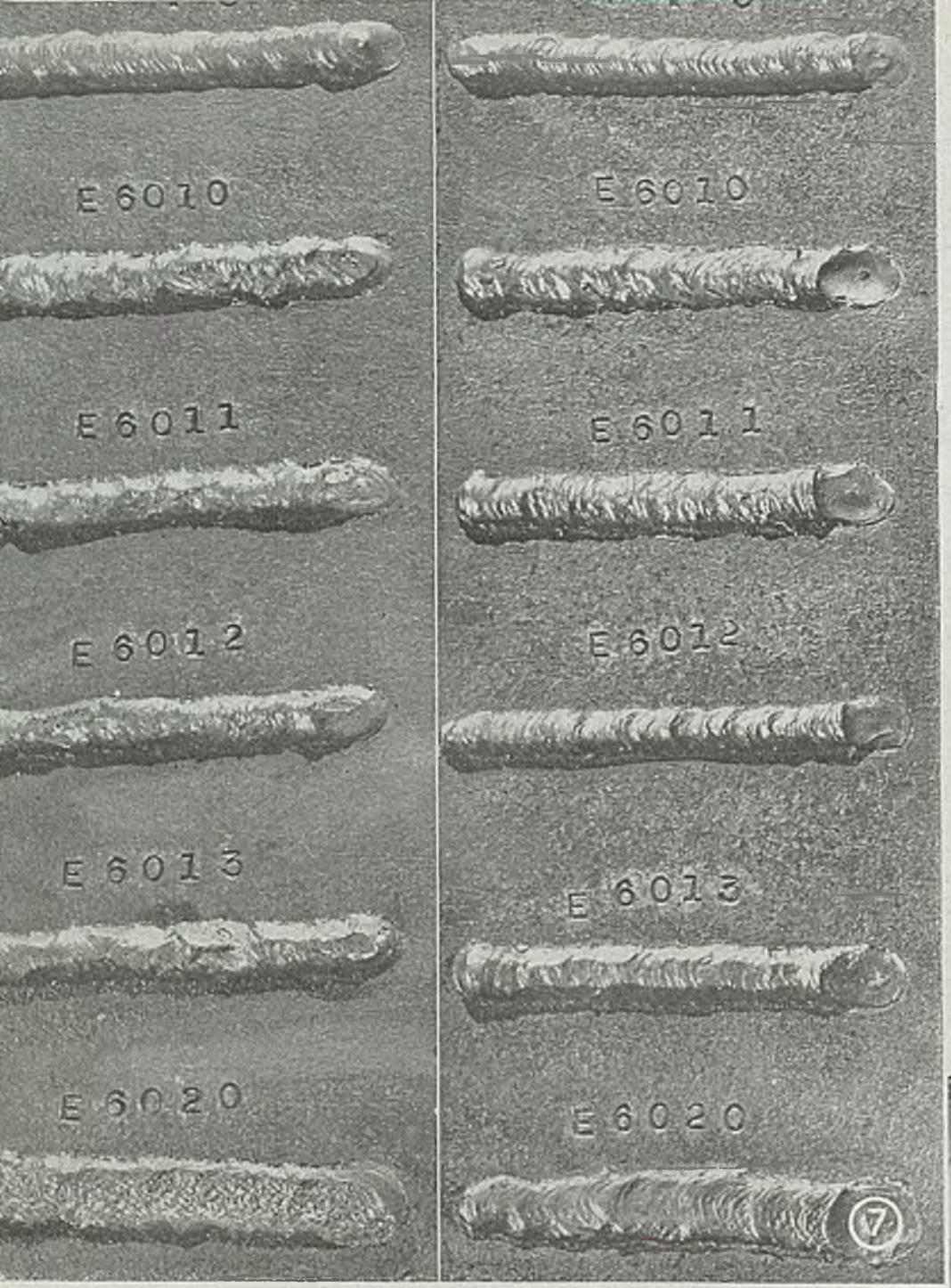
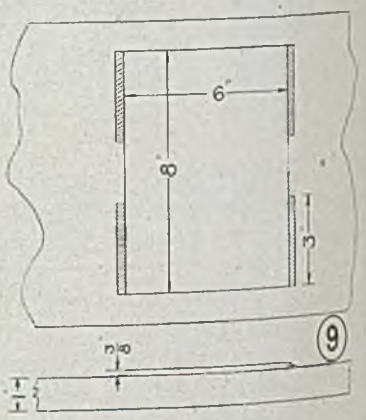
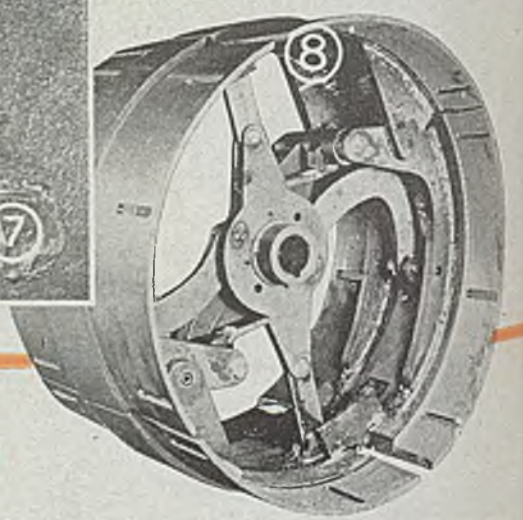


Fig. 7—Beads on high sulphur steel on left as compared with mild steel on right show that all welds except the lime-ferritic suffer from effects of sulphur

Fig. 8—Lime-ferritic electrodes were used to fabricate this tire building drum of high sulphur free-machining steel

Fig. 9—Spring steel wear plates with a carbon content between 0.90 and 1.10 per cent are welded to freight car truck bolsters with lime-ferritic electrodes as shown in diagram. One set of welds is made in downhand position and other in horizontal position





properties of the sulphur bearing plate are also given in Table VIII. Of importance is the high impact strength reported for the lime-ferritic electrodes. A series of tests to be reported later shows high impact strength as a regular attribute of lime ferritic weld deposits.

There are a number of grades of sulphur bearing steels in common use as shown in Table IX. The low carbon grades are those with 0.25 per cent carbon or less. These may be welded with HTS without preheating, whereas the higher carbon type may require welding with type AWL where it is necessary to match physical properties. In the highest carbon types containing 0.40 per cent or more carbon, preheating is necessary.

With the higher carbon sulphur bearing steels, preheat temperatures of 400° F minimum will permit satisfactory welds. In the intermediate range of 0.25 to 0.40 per cent carbon, the use of preheat will depend upon section thickness and carbon content. One-half inch material will require no preheat, while greater thicknesses should be preheated to temperatures no less than 300° F but certainly to 400° F or more when the section exceeds 1 in. in thickness.

Type AWL electrodes have a lime-ferritic base coating depositing weld metal of the manganese-molybdenum type. Table X lists the chemical analysis of the deposit and Table XI shows typical physical properties.

TABLE VII

CHEMICAL PROPERTIES OF LIME-FERRITIC WELD METAL DEPOSITED ON SULPHUR BEARING STEEL

	Electrode Core Wire	Sulphur Bearing Steel	Weld Deposit
Carbon	0.11	0.21	0.11
Manganese	0.50	1.30	0.68
Sulphur	0.027	0.279	0.042

TABLE VIII

PHYSICAL PROPERTIES OF LIME-FERRITIC WELD DEPOSIT ON SULPHUR BEARING STEEL COMPARED WITH MILD STEEL WELD METAL AND SULPHUR BEARING PLATE

	Lime-Ferritic Weld Deposit on Sulphur Bearing Steel	Mild Steel Weld Deposit on Mild Steel	Sulphur Bearing Free Machining Steel
Yield Strength, psi	63,400	59,950	37 000
Ultimate Strength, psi	74,100	68,650	62,400
Elongation in 2", %	21.5	25.5	33.0
Reduction of Area, %	36.0	49.0	58.0
Charpy Impact Strength, ft./lbs.	48.0	27.1	31.5

TABLE IX

SULPHUR BEARING FREE-MACHINING STEEL TYPES

SAE No.	C.	Mn.	P.	S.
1112	0.08-0 16	0.60-0.90	0.09 0.13	0.10 -0.20
X1112	0 08-0.16	0.60-0 90	0.09 0.13	0.20 -0.30
1115	0.10-0.20	0.70-1.00	0.045 Max.	0 075-0.150
1120	0.15-0.25	0.60-0.90	0.045 Max.	0.075-0.150
X1314	0.10-0.20	1.00-1.30	0.045 Max.	0 075-0.150
X1315	0.10-0.20	1.30-1.60	0.045 Max.	0.075-0.150
X1330	0.25-0.35	1.35-1.65	0.045 Max.	0.075-0.150
X1335	0 30-0.40	1.35-1.65	0.045 Max.	0.075-0.150
X1340	0.35-0.45	1.35-1.65	0.045 Max.	0.075-0.150

TABLE X

CHEMICAL ANALYSIS OF TYPE AWL WELD DEPOSITS

Carbon	0.10-0.16
Manganese	1.65-1.95
Phosphorus	0 035 Max.
Sulphur	0 035 Max.
Silicon	0.20-0 50
Molybdenum	0.30-0.40

TABLE XI

PHYSICAL PROPERTIES OF WELD DEPOSIT FROM $\frac{1}{4}$" x 14" TYPE AWL ELECTRODES AS WELDED

Yield Strength, psi	80,000
Ultimate Strength, psi	102,500
Elongation, % in 2"	22.3
Reduction of Area, %	58.9

TABLE XII

PHYSICAL PROPERTIES OF TYPE I NICKEL STEEL CASTINGS

(Stress-Relieved Four Hours at 1150° F.)

Ultimate Strength, psi	75,000
Yield Strength, psi	48,000
Elongation, % in 2"	24
Reduction of Area, %	50

TABLE XIII

TYPE 8015Q WELD METAL PROPERTIES AFTER STRESS RELIEVING FOR FOUR HOURS AT 1150° F.

Ultimate Strength, psi	95,000
Yield Strength, psi	83,500
Elongation, % in 2"	25.0
Reduction of Area, %	78.1

TABLE XIV

CHEMICAL ANALYSIS, PHYSICAL PROPERTIES AND HEAT TREATMENT SELECTED FOR MINOR AND MAIOR REPAIRS OF CARBON STEEL CASTINGS

Type of Repair	None	Minor	Maior
Material or Electrode Type	Casting	7015B	2115
CHEMISTRY			
Carbon	0.25	0.10	0.12
Manganese	0.72	0.52	0 68
Phosphorus	0.010	0.019	0.017
Sulphur	0.026	0.031	0.030
Silicon	0.42	0.22	0.22
Ch omium	.....	.....	0.90
Molybdenum	.....	0.40	0.45
PHYSICAL PROPERTIES			
	Heat Treated	As Welded	Heat Treated
Yield Strength, psi	46,500	63,000	51,500
Tensile Strength, psi	76,700	73,400	76,000
Elongation, % in 2"	21.5	25.5	31.0
Reduction of Area, %	31.5	45.5	64.6
HEAT TREATMENT			
Normalize at °F.	1650	None	1650
Hold, hours	2	....	2
Cool in	Air	....	Air
Temper at °F	....	....	1150
Hold, hours	....	....	2
Cool in	....	....	Air

TABLE XV

CHEMICAL ANALYSES, PHYSICAL PROPERTIES AND HEAT TREATMENT FOR CAST AXLE HOUSINGS

	Casting	Weld Deposit
CHEMISTRY		
Carbon	.29	.12
Manganese	1.02	1.65
Chromium	.52	...
Molybdenum	....	.41
PHYSICL PROPERTIES		
Ultimate Strength, psi	111,000	106,500
Yield Strength, psi	89,000	97,500
Elongaiion, % in 2"	18	17
Reduction of Area, %	43	42
HEAT TREATMENT		
Heat to °F.	1600	1600
Hold, hours per inch thickness	1	1
Quench	Water	Water
Temper at °F.	1150	1150
Hold, hours per inch thickness	1½	1½

Higher carbon and manganese along with molybdenum furnish the high strength while the lime coating makes the electrode suitable for sulphur bearing steels. Type AWL was applied to heat treated free-machining steels with one steel producer outlining the following rules for welding 0.40 per cent carbon heat treated free-machining steels:

1. Electric welding is almost a necessity, first to limit the extremely heated zone to the smallest possible extent and second because gas welding will almost invariably be porous in high sulphur steels.

2. It is recommended the current be somewhat lower than average . . . use lowest amperage consistent with good welding.

3. Preheat is definitely desirable. A temperature of 400°-450° F is recommended. This is also desirable for any of the 0.40 to 0.50 carbon steels.

4. Preheat for bessemer screw stock, like other low carbon steels, is not necessary.

5. Keep penetration at a minimum. The deeper the penetration, the more pick-up of parent metal and consequently the more dilution of the weld metal.

6. Cool normally in air. . . .

Mechanical molds and other equipment used in the rubber industry call for appreciable machining. Sulphur bearing steels and welded fabrication proved to be a worthwhile combination. Fig. 8 shows a tire building drum welded with lime-ferritic electrodes. Where treated designs were changed, it was found practical to blank out unneeded portions by filling the old design with weld metal.

Another attribute of lime-ferritic weld deposits that at-

tracted rubber industry was ability of weld metal to take polish like that of original mold material. In one instance, a polish comparable to that of No. 8 on stainless steel was applied to both the base metal of the mold and the weld metal. Hot water bottles were processed in these molds. The report stated that this was the first time a highly finished article had been processed in a welded mold without disclosing the location of the weld patch on the surface of the molded rubber product.

Cribs for wet mixing machines were designed and built of high sulphur free-machining steel. The designer did not suspect welding troubles might be encountered. Both E6012 and E6013 electrodes were tried without success. The manufacturer was faced with scrapping valuable material on which considerable work had been expended. When lime-ferritic electrodes did the job, his feeling of relief was most understandable.

Another job requiring the production of a restricted box section of 1 in. plate welded to a 3 in. base of high sulphur steel was fabricated by block welding with the new electrode type.

Free machining hot platens for presses were successfully built with this electrode type where other deposits had cracked and leaked steam. Plate thicknesses of 2 in. and more were involved.

Resistance welding machine parts requiring considerable machine work to attain the high quality finish required for equipment of this type were welded with lime ferritic electrodes. The manufacturer was well pleased with the overall machining operation which did not reveal the weld location.

Present day foundry practice shows the results of considerable research work on melting practice, foundry sands and pouring methods. As a result of this intensive work, carbon and alloy steel castings are exhibiting excellent strength and ductility properties. Heat treatment is widely employed to refine grain structures and to achieve higher strengths, both tensile and impact, along with remarkably good elongation and reduction of area values. Both x-ray and radium examination shows the high order of soundness developed in modern steel castings. And quite appropriately, lime-ferritic electrodes are being selected for casting fabrication and repair. Typical applications will demonstrate how these electrodes are being used.

One large foundry specializes in castings for railroads including steam and diesel engine frames and trucks. Nickel steel castings conform to the following chemistry:

Carbon	0.19—0.23
Manganese	0.70—0.80
Phosphorus	0.04 Max.
Sulphur	0.04 Max.
Silicon	0.60—0 70
Nickel	2.20—2.30

Physical properties following a 4 hour stress relieving at 1150° F are given in Table XII. The typical values shown in this table demonstrate the outstanding quality of these nickel alloy castings.

Repair work is done in the vertical and overhead positions as well as the common flat position. Size and number of castings involved prohibit positioning each casting to permit downhand welding. Furthermore, the extent of each repair is usually too small to warrant the use of welding positioners. Of course the metallurgical requirements are strict necessitating the deposition of x-ray clean weld metal designed to match the chemical analysis and physical properties of the casting. Type 8015Q proved to be quite suitable for this application.

A typical analysis of weld metal from this nickel alloy lime-ferritic electrode is as follows:

Carbon	0.09
Manganese	0.80
Phosphorus	0.019
Sulphur	0.018
Silicon	0.15
Nickel	2.09
Molybdenum	0.45

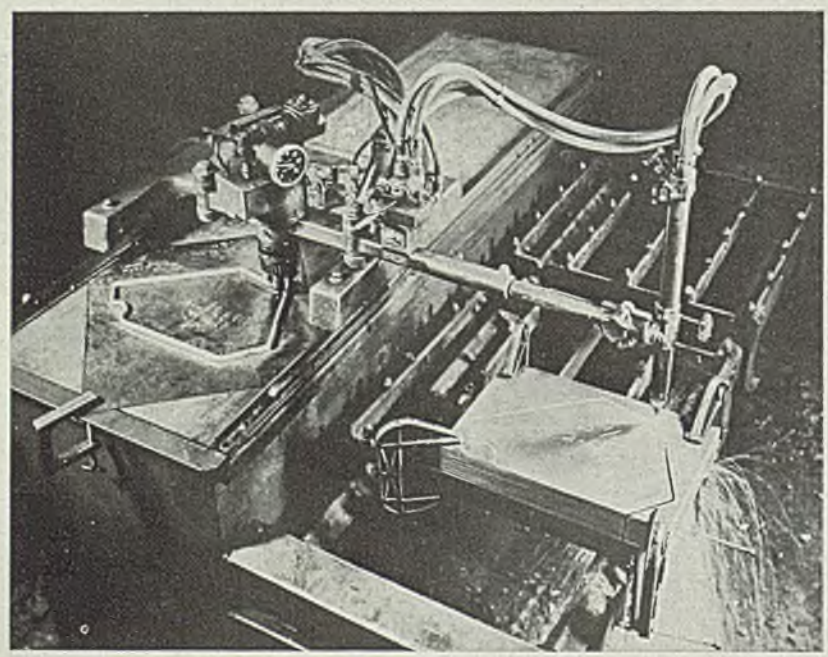
The physical properties, as listed in Table XIII, exceed those of the castings. Radiographs show that foundry welders can produce perfectly clean weld metal under production conditions.

Carbon steel castings are being normalized and drawn to bring about high strengths and good ductilities. Because of the low carbon content of weld metal deposits, alloys are used to match the strengths of these carbon steel castings. The basic lime-ferritic coating type and core wire is modified to enable the weld metal properties to match those of the heat treated castings.

One large foundry heat treats all castings before any repairs are made. If the repair is minor, the weld metal is used in the "as welded" condition. If the repair is major, a second heat treatment is used. Details of the procedure are outlined in Table XIV. Here too, x-ray cleanliness is exceedingly important to the metallurgical and inspection departments of this foundry.

With the expanding interest in chromium to retard graphitization in high temperature, high pressure power plant installations, it was only natural that type 2115 should be selected by a valve manufacturer to repair valve body castings containing 1.0 per cent chromium and 0.50 per cent molybdenum. The noticeable lack of spatter led this company's welding department to choose the unalloyed lime-ferritic type to weld wedge guides in gate valves. Cleaning costs were important, but even more desirable was the elimination of spatter from finished machined surfaces.

Another foundry found the manganese molybdenum lime-ferritic electrode suited to their needs in welding axle housings for earth moving machinery. The essential data is tabulated in Table XV.



STACK CUTTING: Fourteen pieces of 3/16-in. steel plate are shown here being flame cut at one time on this mechanized Linde Air Products Co. templet-guided setup for repeating irregular flat shapes. According to the company, a unit of Union Carbide and Carbon Co., New York, cutting speed is 7 in. per min. Standard aluminum strip templet is used to guide machine through cutting operation

HYDRAULICALLY CONTROLLED

Finish Grinder

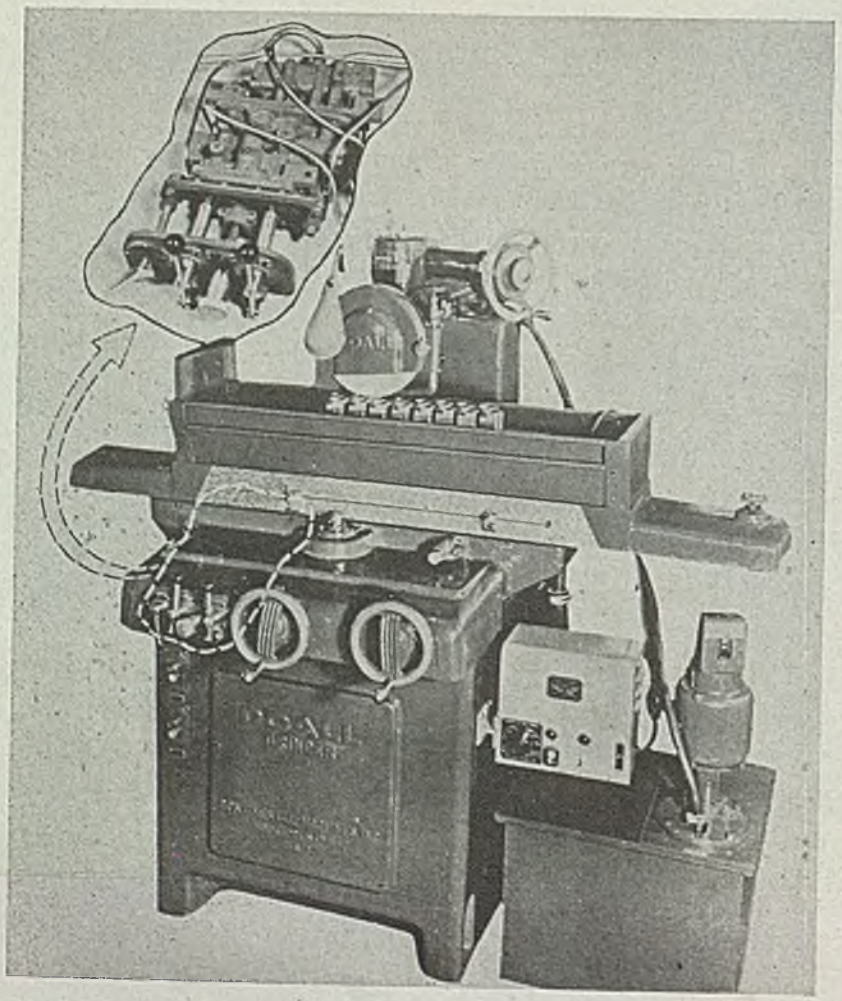
Five-way hydraulic valve with three components controls all operations of grinder with resulting increased speed and greater accuracy

A NEW hydraulic control valve has been incorporated into the DoAll G-10 surface grinder, manufactured by Continental Machines, Inc., Minneapolis, Minn., with results showing increased speed, efficiency, simplicity of operation and greater accuracy. This grinder will grind a surface to 6 microinches, it is claimed.

The new "five-in-one" valve has three components, the selector valve, crossfeed control and crossfeed directional valve. Selector valve has three positions for manual crossfeed, automatic crossfeed and rapid traverse for wheel dressing.

Crossfeed control valve is used to control the amount of crossfeed or indexing at each table reversal when using automatic crossfeed. It can be controlled to feed from 0.004 to 0.200-in.

The crossfeed directional valve controls direction of crossfeed in automatic position. A neutral position is used to stop work locating, or to use manual crossfeed as a bypass. Crossfeed can be set for any amount of travel.



Here gas-free metal was required for appearance after machining.

Metallic arc welded fabrication was abandoned by some enameling plants because the enamel chipped away from the weld metal. Hydrogen evolution was believed to have taken place during the firing of the enamel coating. Recently a company manufacturing bathtubs tried lime-ferritic electrodes although they were quite skeptical. The resulting enamelware proved to be quite satisfactory.

Glass lined tanks were plagued with the same troubles. Repairs to the lining where the glass had chipped off over the welds had to be attempted as many as three and four times before successful patches could be completed. The absence of spalled glass linings with lime-ferritic electrodes turned out to be the answer to an expensive production trouble.

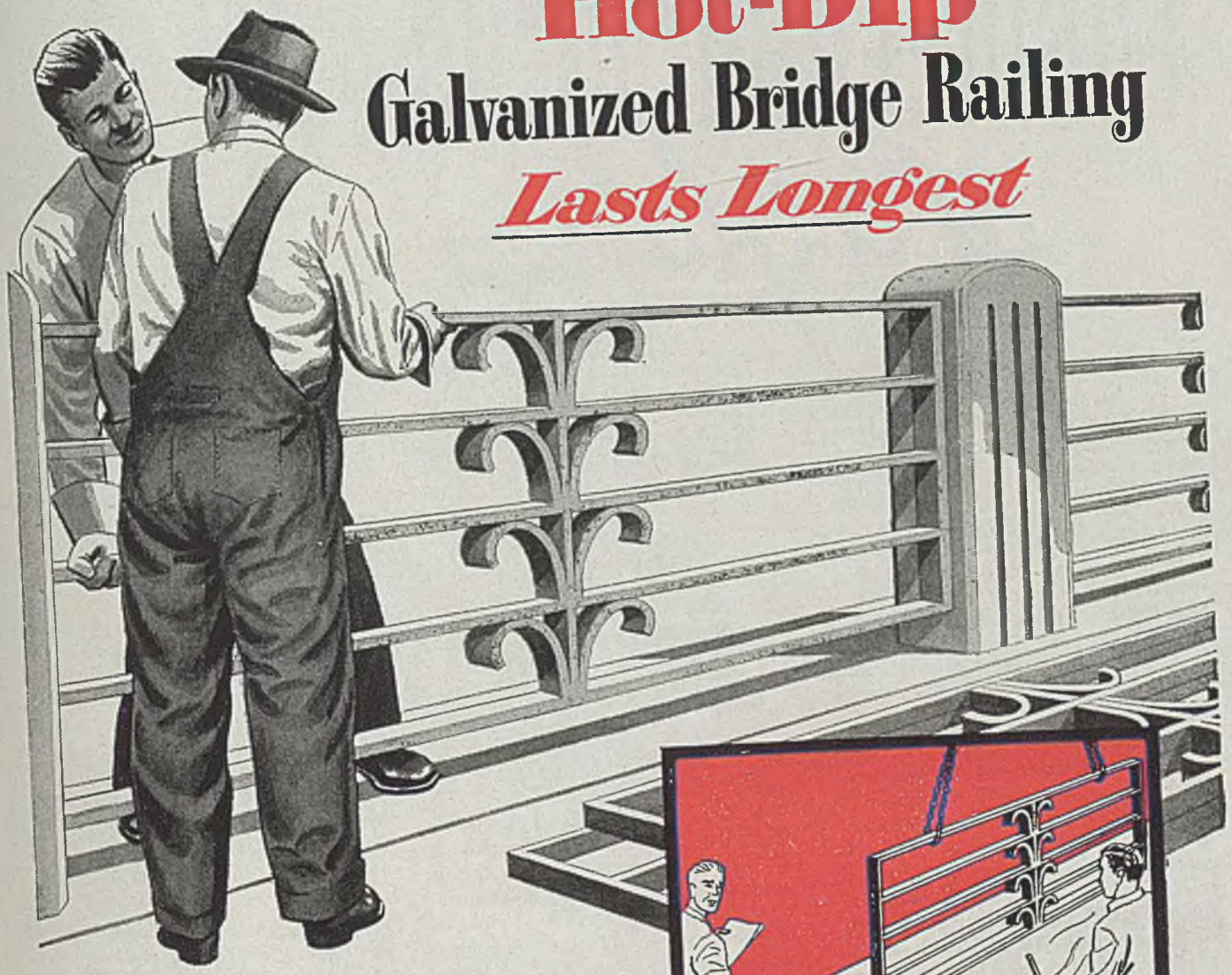
Although cast iron welding was not originally considered a field for the lime-ferritic electrodes, reports of successful applications have been received. A cast Meehanite header valued at $2000 was salvaged by welding with HTS. A sand hole caused the drill to deviate from the center line when drilling a boss. The casting was repaired by welding and the boss was drilled in the proper location.

Welding Malleable Cast Iron

Malleable cast iron was welded with lime-ferritic electrodes without preheating on a job where a standard cast iron electrode with a 300° F preheat left unmachinable hard spots. The welding procedure was designed so as not to overheat the malleable castings. The welds, heat affected zones and parent metal could be drilled without difficulty.

Experience shows that lime-ferritic electrodes, both carbon and alloy steel varieties, will do a great deal to improve quality welding. High carbon steels become much more readily welded. High sulphur free-machining steels, illustrated in Fig. 7, can be welded, permitting equipment builders to combine the advantages of extremely good machinability with welded fabrication. Steel founders have a new repair electrode that yields weld metal of a quality every bit as good as quality castings. Enamelers benefit from continuous linings unspoiled by hydrogen blisters. Cast iron welding can be more easily accomplished. Maintenance and repair departments find lime-ferritic electrodes a big help when the analysis of the steel part to be fixed is unknown. And some fabricators of very heavy equipment where welding stresses caused cracked welds learned to rely on the unusually good ductility of lime-ferritic weld deposits for their most critical welds.

Hot-Dip Galvanized Bridge Railing *Lasts Longest*



YEARS and YEARS of service are added to the life of bridge railings and other exposed installations that are Hot-Dip Galvanized by the Hanlon-Gregory process. This method of fusing base metal with molten zinc is your solution to expensive maintenance problems.

The World's Largest Job Galvanizing Plant, in the very heart of the steel industry, is prepared to provide the *best proven prevention* against rust—for your products—in any quantity.

THE WORLD'S LARGEST *and Fastest* JOB GALVANIZING PLANT

In the heart of the STEEL INDUSTRY

HANLON-GREGORY GALVANIZING COMPANY

Pittsburgh, Pennsylvania

ENGINEERING NEWS *at a glance*

WITH combined total of 65 years experience in various phases of hard chromium plating, ten employees, together with some outside investors, purchased the entire stock of Master Chrome Service Inc., Cleveland. One of the oldest and largest companies engaged in hard chromium plating, the company has active representation throughout Ohio and the Middle West.

BELIEVED the first compilation of its kind, a brochure containing a complete set of tables showing factoring of specimen tests for every material is being offered on request by W. C. Dillon & Co. Inc., Chicago. The charts represent weeks of patient calculation by experienced engineers. Through their use, it is reported, an operator will find that specimens with pressures per square inch all the way up to 200,000 lb can be tested quickly by using reduced area specimens.

METHOD of processing high speed steel rounds in diameters greater than 5 in. was announced recently by Jessop Steel Co., Washington, Pa., in collaboration with Barium Steel & Forge Co. Inc. of Canton, O. Called Vee-Oginizing the process assures a uniform carbide distribution throughout high speed steel, and eliminates the brittle carbide pattern found in large rounds processed by conventional methods.

IN a single brazing operation, light-walled alloy steel tubes and deep drawn steel stampings—over 120 in all—are brazed together in a roller hearth brazing furnace to form the Crosley engine block weighing only 14.8 lb, it was learned recently from Lindberg Engineering Co., Chicago. Completed engine block assemblies—four to a tray—are charged automatically into the continuous furnace. The work, which at all times is protected by the Hyen atmosphere against scaling or decarburization, first enters a preheating zone, then brazing chamber, where actual brazing takes place at 2060° F. From there, the blocks go to a slow cooling zone which reduces the temperature to about 1500° F. There Hyen Hydryzing atmosphere is forced over and through each block by fans. This quenches the cylinders and valve seats to obtain necessary hardness. Block is finally cooled to about 200° F in the Hyen air to prevent scaling. Process of assembling and hardening was invented by Powel Crosely Jr., and Lindberg engineers worked out the furnace to permit quantity production.

NINE features desirable in heavy-duty industrial floors and nine benefits in trucking performance derived directly from these features including faster movement of goods, enhanced employee safety and lower handling cost are pointed out by Walter Maguire Co. Inc., New York, in literature embodying test data on the use of 100 per cent emery aggregate for flooring. Installations cited in the bulletin range from flooring in metal-working plants, where heavy steel skids and steel-wheeled trucks are operated on Emeri-Crete floors, to dairy installations where wet floors and acid reactions complicate maintenance.

ESTABLISHMENT of both engineering and manufacturing facilities for designing and producing standard and special industrial heater and resistor units is announced by the recently formed St. Clair Electric Products Co., St. Clair, Mich. Among typical products which the company is equipped to design and produce at the outset are thermal control units, viscosity control units, voltage regulator resistors, ingniter coils and strip heaters. Production can be scheduled for both experimental and high volume runs. At present, additional manufacturing equipment is being installed in the company's plant—a portion of the Marysville magnesium plant formerly operated by Dow Chemical—to permit production of a line of standard replacement heating units for domestic electrical appliances.

FIRST peacetime application of the war-born packaged electric power plant was disclosed recently by William E. Knox, vice president, Westinghouse Electric International Co., who revealed that a 5000 kw plant is being installed in Barranquilla, Colombia. Big brother of the war-time packaged plant, this unit contains all necessary parts of a power station, including steam generating unit, turbine generator, pumps, piping, wiring and other essentials. Plant was engineered for Westinghouse by Ebasco Services Inc.

AN alloy of 37½ per cent gold and 62½ per cent copper, useful as solder in vacuum tube construction is described in a report now available from the Department of Commerce, Washington. It states the melting range of the solder — 950 to 990° C—is intermediate between that of copper and silver-copper eutectic. Twenty vacuum joints, including copper to steel, copper to fernico and copper to copper, were made with the solder without leaks or mechanical failures. According to the report, when fernico is soldered to copper, then sealed to glass, the solder joint may get quite hot during the sealing. High melting point of the new solder is an advantage in this case.

PLASTIC sheeting ranging from 0.005 to 0.020-in. in thickness are folded into a U-type 180 degree fold, with sides brought together tightly, by means of a machine being produced by Plastics Equipment Division of Taber Instrument Corp., North Tonawanda, N. Y. By utilizing thermostatically-controlled heat, the unit actually molds the sheeting into the particular fold desired without tearing or cracking it. According to the company, the machine enables an average operator to turn out about 700 "formed folds" per hour.

AMONG recent patents registered in Washington is a new type lifting jack and a flexible joint. The lifting jack, developed by Achille Kais of Detroit, is operated by a vertically swinging lever balanced by its forked end which straddles rack bar and load head, providing a more direct lift and preventing twisting of jack. During upward movement, weight of load is supported by lifting pawl which moves by spring pressure over teeth of rack bar and into recess. The flexible joint, invented by O'Connell H. Dashields of Philadelphia, is designed so one of the members may have both longitudinal and rotational movement with respect to one

"I framed that x-ray picture because *it saved me* $65,000"

. . . Radiography eliminated internally unsound castings . . . saved $50,000 in machining . . . showed foundry how to salvage $15,000 worth of rejected castings.

You might want to frame some of *your* x-ray pictures if you dug out all the facts and figures.

When you balance the relatively small cost of radiography against the actual sums realized through increased production and lowered costs, you see in black and white that . . .

. . . Radiography, applied at the right time and place, can mean the difference between getting into sound production fast and fighting delay . . . between an acceptable job and customer rejections . . . between a fair profit and heavy losses.

Your local x-ray dealer will be glad to discuss the economic side of radiography with you . . . will suggest additional ways to make radiography pay . . . in better design . . . lighter weight products . . . higher quality . . . more sales appeal. Or write to

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another. It has special application in pressing machines or the like. The elements have freedom of movement without danger of leakage, and the joint does not require frequent packing. A spring included in the joint serves to compress the packing at all times.

EDUCATIONAL in nature, a booklet due to be published soon by Liquid Plastics Division of Ferro Enamel Corp., Cleveland, discusses the metal preparation of organic finishing, importance of metal preparation, control of organic finishing materials and application, accelerated testing of organic coatings and selection of organic coatings for product finishes. Entitled "Review of Product Finishing with Organic Coatings", the publication is scheduled to be distributed gratis to companies requesting it.

PARTICULARLY adaptable for use as connecting rod and main bearings in heavy and light diesel engines, a grid bearing recently placed in production by P. R. Mallory & Co. Inc. at Indianapolis, combines good surface properties and good embedability with high strength and fatigue resistance. Although this type bearing was not developed soon enough to be used extensively during the war, one of its most striking applications was in a small radial aircraft engine adapted for use in tanks. As designed, the engine operated satisfactorily in aircraft, but when used in tanks, due to the great quantities of dirt and sand which entered the engine, the bearings wore so much in a few hundred hours that they had to be replaced. Installation of silver grid bearings in the engines increased the bearing life to such an extent that in many cases the bearings outlasted the machine.

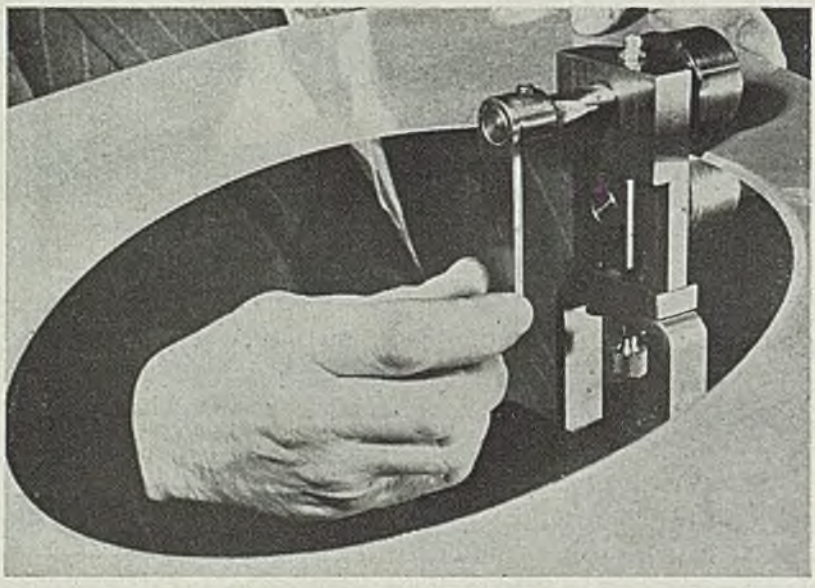
IN New York, it was learned, a section of the two-reel film on "Splitting the Atom" made in the Philips Research lab in Holland during the German occupation is appearing in the new March of Time film, "Atomic Power" released recently. The Dutch atom film which was practically produced under the noses of the Nazis, was brought over to the New York office of the company after the war. At the time it was being made, the laboratory staff had no way of knowing of the work being done on the atom in this country.

PAIRS of strip flush-with-the-floor conveyors appearing more like a traveling track, and currently manufactured by Chain Belt Co. of Milwaukee, may be one of the factors to alleviate the shortage of autos. Quite a contrast to the former method used to haul cars down the production line—that of using a chain that protruded from the floor—the new system supports the automobiles on its many 12-in. plates traveling along the floor in a continuous line. Projections which formerly imperiled workers are eliminated and cars can be easily removed anywhere along the line by inspectors without the use of a crane. Mechanism of the equipment such as outboard rollers for the plates, motors etc., is all concealed. One auto maker just recently completed installation of the system and expects to step up its production to 400 cars daily. Conveyors installed in this plant are approximately 346 ft long.

BEARING surface of the carbide is increased in a new punch and compacting die combination now being furnished by Penn Carbide Alloy Casting Co., Canonsburg, Pa. Design of the combination is said to increase production and reduce die inventories in powder metallurgical industries. Die is of conventional tungsten carbide type using a heat treated steel case shrunk around an insert. Punch is produced with a dove-tailed insert which is locked into the shank for added protection during operation. Design of the latter also eliminates possibility of misalignment caused by the braze taking a set when under pressure.

IN pointing out advantages of departmentalizing air compressor systems, Kellogg Division, American Brake Shoe Co., Rochester, N. Y., reveals greater flexibility is gained by spotting individual air compressors wherever they are needed instead of depending on a central source. Breakdowns, loss of air through pipe friction, production of pressure beyond actual requirements, cost of idling time of central compressors are eliminated in decentralizing — factors which, combined or singly, affect the whole plant instead of just one department.

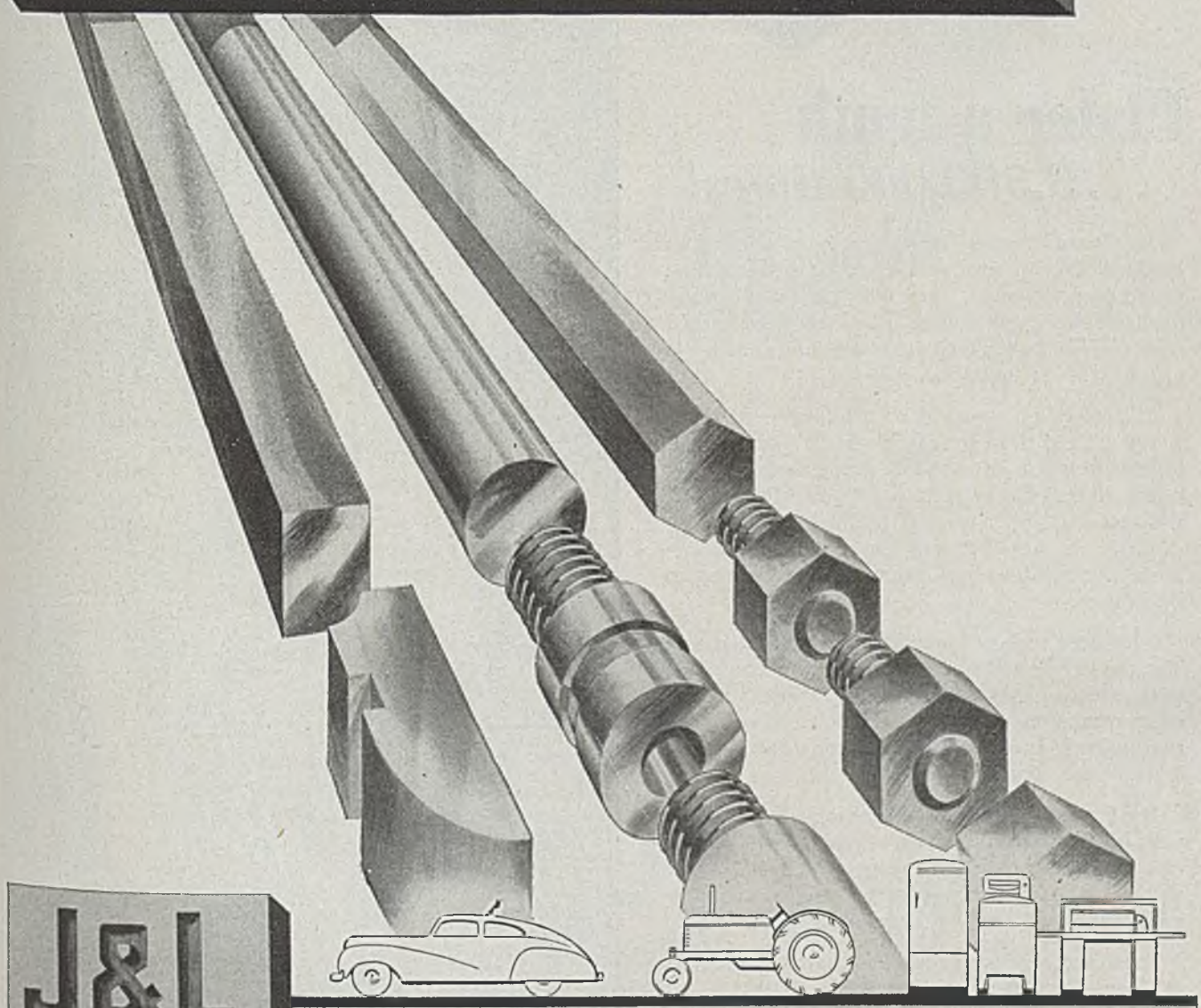
BECAUSE organic solvent vapors may be both a health and fire hazard, solvent-using operations should be controlled carefully so the concentration of vapor in the air is kept to a minimum. The sense of smell can be a helpful safety aid in such operations, but odors may not be noticed by men very accustomed to them. Sometimes other odors may mask the solvent vapor; also an atmosphere in which the solvent odor is only barely perceptible may still be unsafe. Therefore, Safety Research Institute Inc. of New York, recommends that a competent chemist be employed to make a periodic analysis of the workroom air at breathing level. Few solvents also can be detected by the use of continuous air sampling and mechanical recording devices.



SHEET metal up to 16-gage may be crimped either at the bench or on the job by means of the device illustrated above perfected by Frank Lucarelli, tool designer for Glenn L. Martin Co., Baltimore. Metal is crimped by two round dies, one with a projecting edge and the other rounded to fit, held together by a spring tension and an adjustable screw to fit them for various thicknesses of metal. Turning of crank pulls the metal between the dies. Edge of the metal, held firmly against a guide, is crimped to desired shape. Tool works equally well on straight or curved edges of sheet or on the inside edges of blanked out holes

J&L COLD FINISHED STEEL

FOR EASILY MACHINED · ACCURATE PARTS

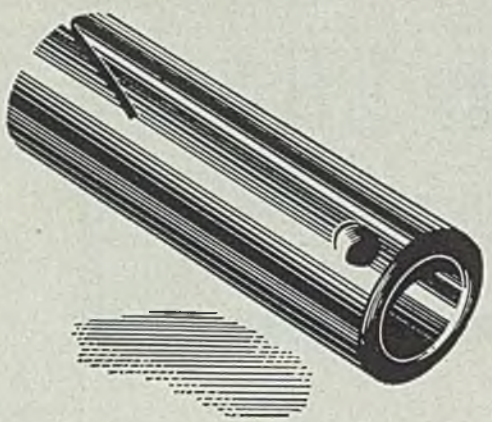


J&L STEEL

In addition to improved machinability and longer tool life obtained through use of J&L Cold Finished steel, many manufacturers specify this precision product for its improved surface finish. They also obtain in J&L cold drawn and cold rolled bars and special shapes the higher physical qualities needed for parts of modern high-speed machines. J&L engineers and metallurgists will be glad to assist you with your production problems. Write or phone your nearest J&L office.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PA.



Under a tenth
. . . 3,500,000 times!

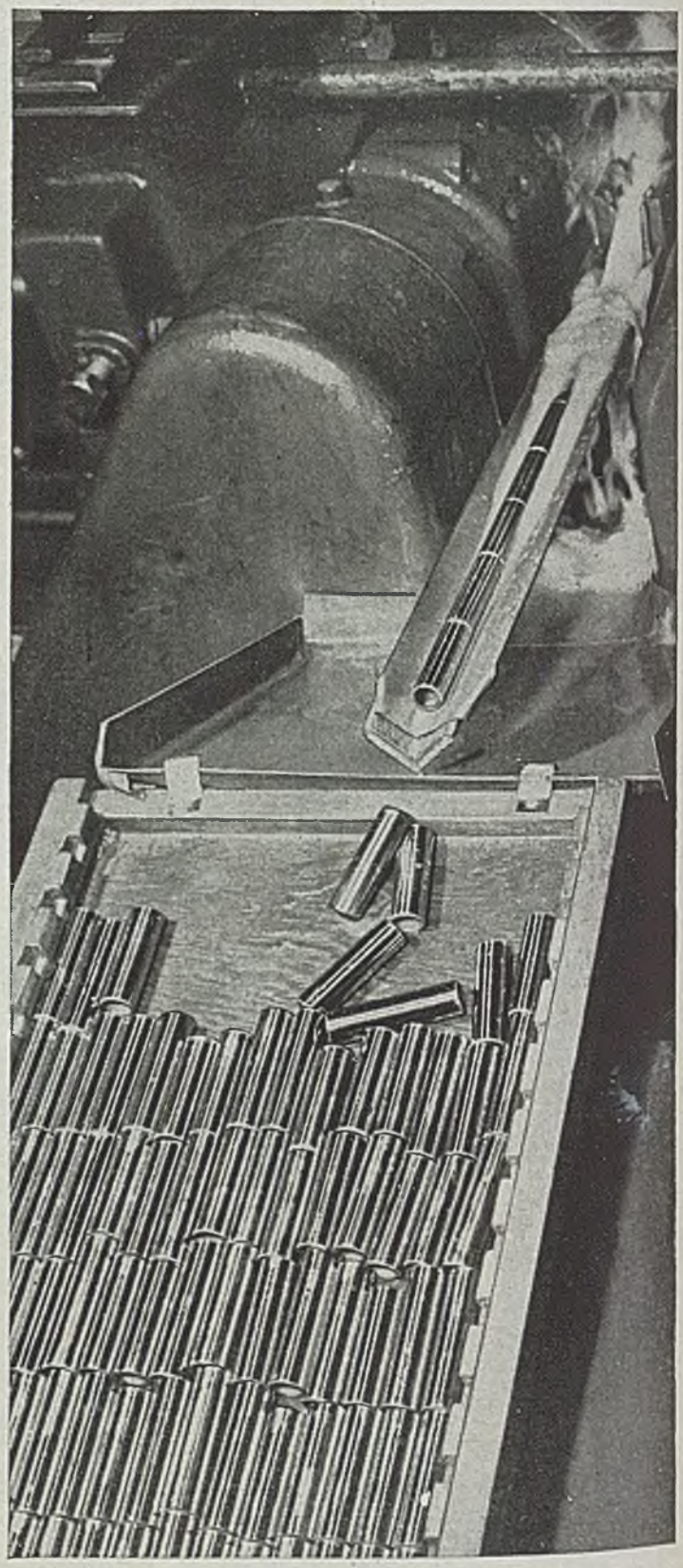
Using Frasse "Shelby" seamless tubing, the Haines Products Co. has produced more than 3½ million piston pins illustrated. These pins are cut off, chamfered, rough ground, slotted, drilled and counter-sunk. After case hardening, each pin is semi-finish and finish ground, and finally lapped.

Millions of pins — sized to a tolerance of under 1/10000", one thirtieth the diameter of a human hair! Starting from a uniform seamless tube, the latter stages of grinding and lapping remove the remaining .004", with each stage gauged electrically. Final finish on each piece is held between 2 and 3 micro inches — a quality story possible only with quality tubing to begin with.

It has been a story of supplier-user cooperation, too. The use of selected fine grain, McQuaid Ehn tested steel...developing a schedule of size specifications to effect maximum economy...the sequence of operations prior to hardening, to insure fine finish—these Frasse suggestions have proved helpful.

For Frasse is a specialist in tubing—and from 50 years of tube warehousing, *knows* tubing. Frasse stocks of mechanical tubing alone range from 3/32" all the way up to 10½" O. D. — not to mention the alloy tubing, condenser tubing, or stainless.

For steel tubing — and qualified engineering service in its applications...call upon Frasse. *Peter A. Frasse and Co., Inc., 17 Grand Street, New York 13, N. Y. (Walker 5-2200), 3911 Wissahickon Ave., Philadelphia 29, Pa. (Radcliff 5-7100), 50 Exchange St., Buffalo 3, N. Y. (Washington 2000) • Jersey City • Syracuse • Hartford • Rochester • Baltimore.*



FRASSE *for* ***tubing*** { CARBON / ALLOY / STAINLESS

Distributor of "Shelby" Seamless Mechanical Tubing

CLUTCH SAFETY DEVICE

. . . eliminates possibility of overload damage to automatic machinery

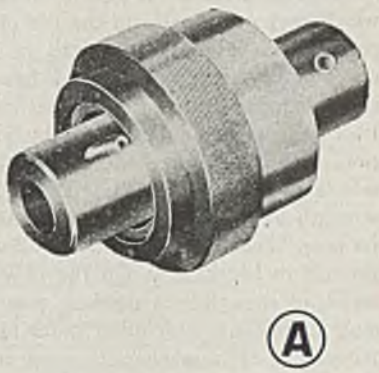
EVER present problem of overloads in the transfer of torque is said to be solved by a new clutch safety device patented recently by Otto E. Wolff, Polaroid Corp., Cambridge, Mass. Clutch brings about complete disengagement of two connected rotary machine parts through automatic introduction of a lubricant between the frictional surfaces the instant one of the parts is overloaded.

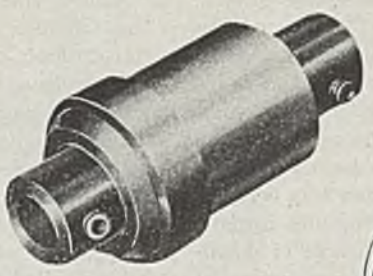
In one form, the Wolff clutch consists of a cylindrical shell attached to a hub, multiple shoes mounted on another hub so that they bear against the internal cylindrical surface of the shell, a means for controlling pressure between shoes and shell, and a lubricant within the shell.

Torque is transmitted from either hub and in either direction of rotation by static friction between shoes and shell. Since the shoes are free to tilt slightly, a film of lubricant is formed between shoes and shell, resulting in substantially complete disengagement of the clutch. Fluid film is maintained and clutch remains disengaged so long as there is relative motion between shoes and shell. The instant the relative motion ceases, the film is broken and the clutch is re-engaged.

Arranged for installation in a conventional transmission, clutch can be applied to an automatic gear changing mechanism. An overrunning clutch is mounted on the countershaft. On starting, the load is carried through the overrunning clutch and gears because the automatic clutch shoes are so lightly loaded at low speeds that they will not transmit torque.

When the load is up to speed, a momentary deceleration of the driving shaft to the speed of the driven shaft will engage the clutch. The drive is now direct, overrunning the gear train through the overrunning clutch. If the load in direct drive becomes excessive the clutch disengages and the gear train again picks up the load.





A shows two types of slip couplings with means for overload disengagement. In diagram at left, B, clutch elements are in driving position; right, overload causes film of lubricant to form between friction surfaces permitting disengagement of clutch. Coupling is disassembled in C to reveal shoes mounted on cage containing neoprene core. Core is compressed to expand shoes against shell

Slide Rules for Gage Design Copyrighted

Three new types of slide rules for gage design recently were copyrighted by employees of Frankford Arsenal Gage Laboratory, Philadelphia, and assigned to Ordnance Department. Two of these slide rules are for the design of plain gages, such a plain plugs and rings, snap gages, and adjustable length and flush pin gages.

One of the results is prepared in a circular arrangement and the other in a rectangular arrangement. The gage designer need only have component tolerance and size for determination of gage size, wear allowance and gage tolerance.

A slide rule for the design of thread gages for special threads was the third type copyrighted. This enables the gage designer to obtain from one very compact arrangement all the data necessary for the design of thread plugs, thread rings and setting plugs for national special threads.

These rules are being used at the Arsenal in the simplification of methods to improve design efficiency.

—o—

A rubber resin formulation containing no vegetable oils has been developed for use as a protective coating for concrete. Manufactured by Truscon Laboratories Inc.., Detroit 12, this inert coating reportedly is resistant to all chemicals, acids and salts and will withstand the effect of rain, sunshine, alternate wetting and drying and chemical fumes.

Stamping Machine Parts

(*Continued from Page 75*)

Most obvious failure is actual breakage, which may occur early in the life of the part due to excessive overload or may occur later after the material has become fatigued by constant repetition of load such as might be caused by vibration. To avoid breakage the designer selects a material with good tensile strength and a high endurance limit, or he must "beef up" the sections. But resistance to breakage is not the only criterion of strength. A machine part that must co-operate with other parts in the movement of a mechanism must maintain its shape. It must not stretch, twist, buckle or bend. The very quality of ductility so much desired for deep drawing must not be permitted to manifest itself in service. High yield point material is therefore necessary or the sections again must be beefed up. At high temperature distortion may occur at relatively lower loads and the material may creep. But some degree of ductility is necessary to provide resistance to shock or impact. Absence of ductility means brittleness. The desired combination therefore is high yield point and adequate per cent elongation. Thus at least five properties of the material necessarily must enter into the designer's calculations: Tensile strength, yield point, endurance limit, creep resistance, and impact strength.

Another aspect of distortion is the possible presence of locked-up stresses due to the method of manufacture. Removal of locked-up stress by heat-treating or subsequent machining causes distortion.

Stiffness or rigidity is the resistance to temporary deformation under load—it is the property responsible for "springback". Machine parts must not deform even temporarily to the point where moving members may stick. The property defining stiffness is modulus of elasticity. The modulus for steel is two or three times higher than for any other material —but is no higher for the finest grades of high alloy steel than for ordinary low-carbon deep-drawing steel. From this standpoint, therefore, steel stampings have a distinct advantage over other materials for the same thickness of the section.

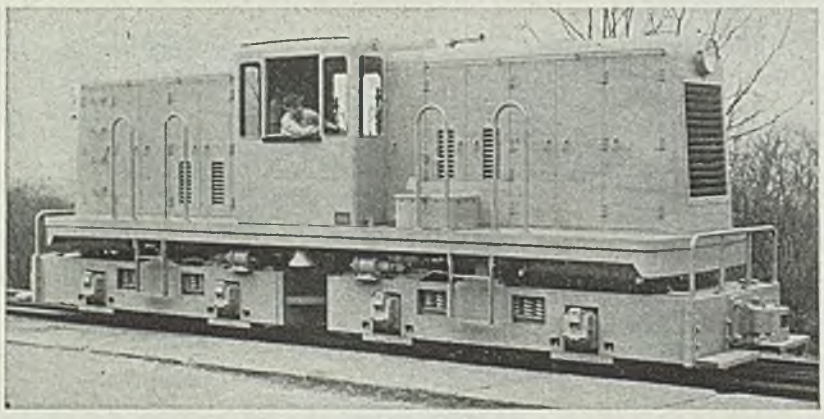
Noise and Vibration Characteristics

Closely allied to stiffness are the noise and vibration characteristics of the material. Parts capable of appreciable deflection have a tendency to respond to vibrations and resonate, thus aggravating vibration and noise. Stiff parts respond to high-frequency vibration in the sound range while more flexible parts are responsive to low-frequency vibrations, hence vibration characteristics can be controlled by choice of material and by thickness of section. Also important in this connection is the tendency to sustain or damp out vibrations—as evidenced in the ringing sound when a metal is struck. Compared with steel and copper, tin and zinc damp out vibrations most effectively, while aluminum and nickel tend to sustain vibrations longer.

For many types of machines weight is an important consideration—perhaps for portability as in vacuum cleaners, kitchen mixers, portable tools, etc., or for aircraft or transportation by air. Here the choice of stampings is logical because of the general thinness of sections and the relatively high strength of steel. The least dense material does not necessarily make the lightest part if the strength isn't adequate. Kettering once startled an audience by predicting that we would see an all-steel airplane before we would see an all-aluminum automobile. But that is just what has happened. If we compare strength with weight, we find that high-strength alloy steel, aluminum alloys and magnesium alloys have close to the same ultimate strength per pound. The same is true of stiffness. On the other hand, copper and its alloys are relatively much heavier. When light weight is vital but the part is not heavily stressed, the aluminum and magnesium alloys have the edge, especially if a certain thickness of metal must be maintained. Thus, for the same section, aluminum has only one-third and magnesium less than one-fourth the weight of steel. The lighter weight materials such as aluminum and magnesium can be used to advantage to simplify design—the thicker sections permissible obviating the necessity of more complicated construction.

Another class of light weight high-strength materials is the resin-bonded glass laminate, which has a weight comparable to magnesium and a strength comparable to low carbon steel. This material can be molded in simple shapes under quite low pressure, hence does not need heavy presses. Parts made by this process can therefore be regarded as potential competition for stampings, especially for short runs, since no expensive dies are needed. On the other hand, the present cost of glass cloth—over $1 a yard—is a factor against widespread use of such material in quantity at present. Available in flat sheet form as well as special molded shapes, the material can be blanked or punched.

Appearance has always been considered to some extent by designers, but ideas have changed radically in the last few years. There was a time when patterns representing fruits and flowers were cast on machine forms and elegant designs incorporated in structural members. Today the emphasis is on smooth contours and simplicity of line. Changing ideas and the influence of the industrial designer have had their effect, but much of the styling that has been done could not have been accomplished without the use of stampings—low cost, mass-produced coverings which concealed the innards of the machine and gave a pleasing impression of cleanliness and grace. The ability of die designers to meet the demands of the stylist is nowhere better illustrated than in the modern automobile tops and fenders. This is a phase of the stamping industry that



INDUSTRIAL LOCOMOTIVE: Largest narrow-gage diesel-electric locomotive ever built by General Electric Co., Schenectady, N. Y., this special 65-ton, 400-hp locomotive is one of five similar units for Carnegie-Illinois Steel Corp. Used in general switching around open hearth furnaces at the South Works plant, it has maximum trailing train weight of about 1400 tons on level track and 535 tons on 1.5 per cent grades. Two-axle trucks are of articulated design which makes them suitable for operation on 50 ft radius curves

ARISTOLOY

ELECTRIC FURNACE ALLOY STEELS

STANDARD STRUCTURAL ALLOY STEELS

MAGNAFLUX-AIRCRAFT QUALITY STEELS

BEARING QUALITY STEELS • ALLOY TOOL STEELS

CARBON TOOL STEELS • STAINLESS STEELS

NITRALLOY STEELS • SPECIALTY STEELS

COPPERWELD STEEL COMPANY

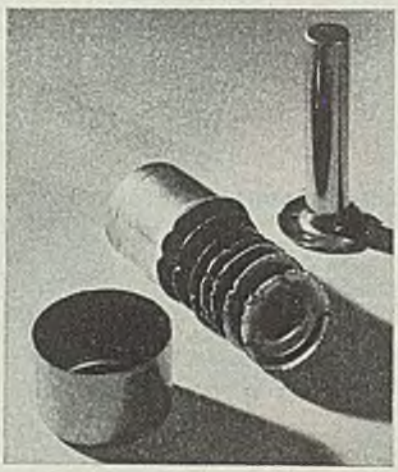
WARREN, OHIO

18-8 STAINLESS STEEL PEN CAPS

Drawn Without Annealing

TOTAL take-in or reduction from blank diameters of 80.5 per cent is made without annealing, in the production of 18-8 stainless steel pen caps at Eisen Metal Products Co., Hoboken, N. J.

Allegheny Ludlum Steel Corp.'s lead soft type 304 stainless, is supplied cold finished by Wallingford Steel Co., in strip size 2⅝ x 0.0105-in. Processing begins with an initial blank of 2.5-in. diameter. First shell is cut and drawn on a double action press and then hopper fed to another press, the latter containing eight stations. Rough shells in the separate stages of drawing sequence are shown in the accompanying photograph.



Product of the final draw is a thin-walled shell with a diameter of 0.488-in. and a height of 2.4375-in. From this the final pen is formed.

While particulars of the drawing operation were not revealed, it was indicated that care is necessary in developing correct die forms, in distributing the reduction over the various stages of the sequence, and in the selection of die material, speed of drawing and lubricants.

is so well established in the mind of the designer that it is hardly necessary to dwell upon it. On the other hand, overglamourizing of the plastics created a widespread notion that the plastic car is just around the corner. No doubt a beautiful car could be molded—perhaps out of glass cloth laminate—but what about the cost compared to stampings? And how well would a plastic fender endure the shock of bumping and scraping through city traffic? The designer considers these things and there is little danger of his going off half-cocked. But reputable engineers are interested and are investigating the possibilities of this car.

On the other hand, molded plastics have much to offer for household appliances such as refrigerators, washing machines, kitchen mixers, and so forth, and the stampings industry can expect stiff competition in this and several other fields. The strong selling point for stampings is the strength and toughness of the product and the fact that these qualities can be combined with beautiful appearance at no sacrifice of either.

Considerations so far discussed have had to do mostly with the functional requirements of a part—its necessary properties if the machine is to function properly and appeal to the buyer. If it is to be sold in quantity and at a cost attractive to the buyer, the method of manufacture enters in. While a very careful designer will draw up alternative designs employing, perhaps, die castings, stampings, combined perhaps with screw-machine products or die-forged parts, many other designers are apt to be governed in their choice by previous experience. If in his last similar problem he was fortunate enough to obtain unusually fine co-operation from the producer, including assistance in modifying his design for most economical production, then he is likely to give the same producer first consideration rather than shop around every time he has a new design. This is fine for the producer with the inside track but it is tough for the fellow with the competitive process. Although the ideal designer should be a strictly impartial engineer whose judgment is swayed only by scientific facts, the fact remains that he is still a human being. And the same rules of salesmanship and service apply to him as to anyone else.

Due to the multitude of considerations which enter into the machine designer's work it is impossible for him to be an expert in any one field. The designer can be expected to have a good general knowledge of the stamping process but the fine points of pressed metal techniques necessarily must be left to stampings experts. It is therefore important that every stampings producer should have at least one engineer whose business it is to be fully conversant with all the techniques of stamping, forming and drawing, with the limitations that it imposes on design, and with the short cuts and modifications that can be made to facilitate production and reduce cost.

At the same time the designer should be thoroughly familiar with the principal methods of joining metals, because of the fact that as mentioned before, a big field for stampings in machine design lies in the more extensive use of built-up parts made by permanently assembling stampings with each other and with screw machine parts or even drop forgings. Principal methods of joining may be broadly classified as brazing, welding and adhesion.

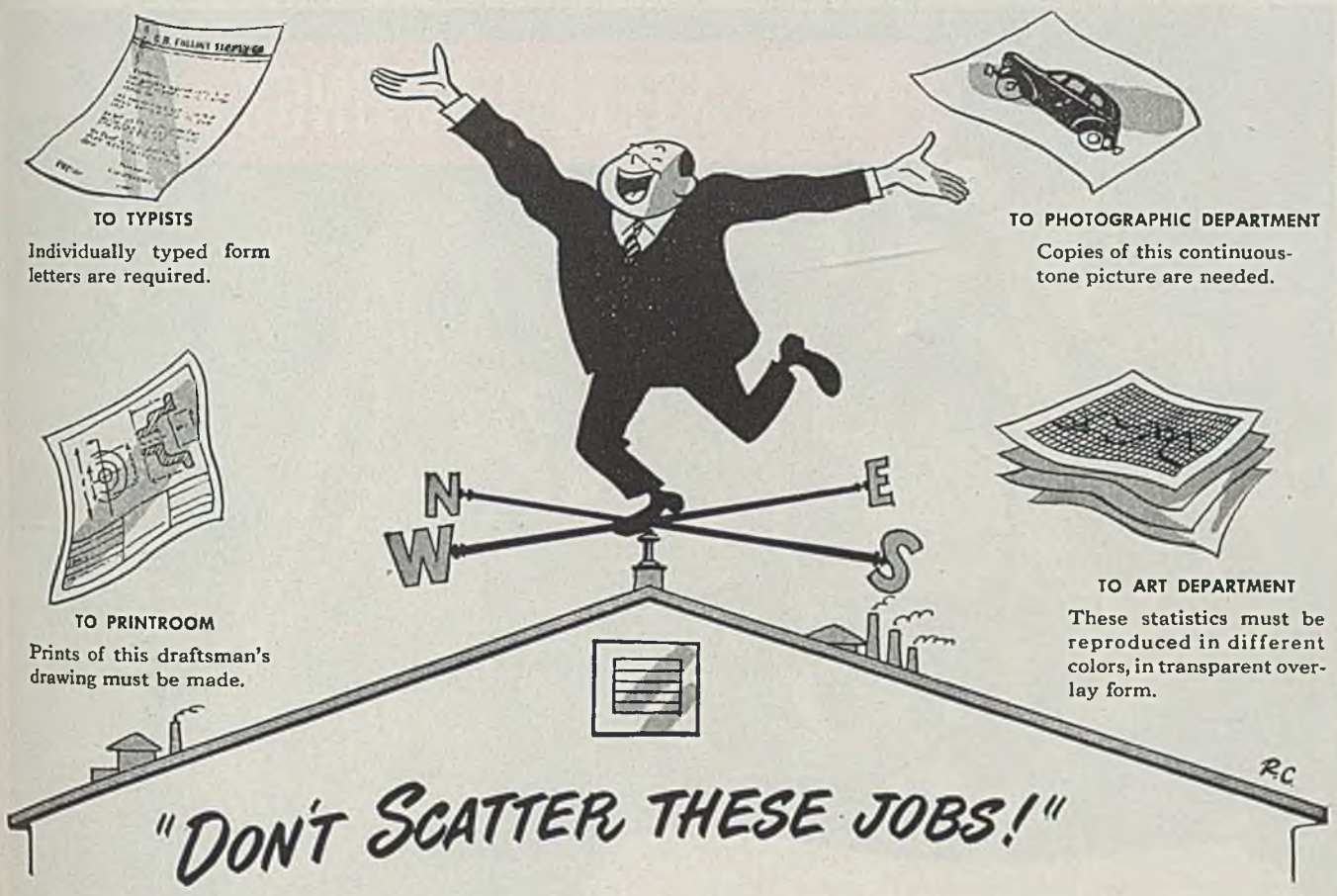
Brazing Alloys

Brazing alloys include a great variety of materials such as copper, silver alloys, bronze and the so-called eutectic alloys which are tailored to suit the base metals. In brazing, the metals to be joined, or parent metals, are not melted, the filler material always having a lower melting temperature than the parent metal. The holding power is derived primarily from a knitting together of the crystal grains of parent and filler metals together with a certain amount of alloying.

Tests made on a series of silver-brazed butt joints in stainless steel plate showed that for joints less than 0.024-in. thick the joint strength exceeded that of the filler metal alone. At the optimum thickness (about 0.015-in.) the joint strength was three times that of the filler alone. This is probably due to the formation of a new alloy of filler and parent metals. Below this optimum thickness, the strength falls off, due probably to the inability of the filler metal to penetrate between the joined surfaces at high spots when they were pressed together.

In the light of the foregoing it will be evident that stampings which are to be joined by brazing must be clean and accurate at the joined surface so that there is a uniform clearance of the correct value for maximum strength. The molten brazing alloy flows between the assembled surfaces by capillary action, but will not penetrate if the area is too large. Ordinarily a light press fit up to a clearance of 0.0015 to 0.003-in is best, depending upon the materials. How a press fit can suck in molten alloy can be understood if it is realized that metal surfaces are not uniformly smooth and with a light fit only touch at a few points, having sufficient space between at other points.

Because of the free flow and strong



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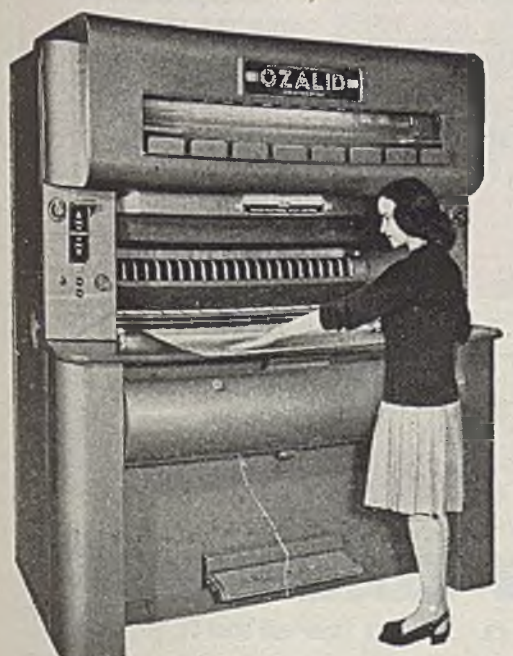

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clear joints it produces, copper is generally considered best. But a temperature exceeding 2000°F is necessary and to heat the mating parts properly it is generally necessary to employ furnace brazing. With the proper type of continuous furnace using a controlled atmosphere and preplaced brazing alloy, high production is possible. It is desirable to avoid a wide range of thicknesses in the parts to be joined, inasmuch as a section only a few thousandths thick will attain brazing temperature in a few minutes while a ½-in. section may require three-quarters of an hour to reach the same temperature.

A recent outstanding example of what can be accomplished with copper brazing is the cylinder block for the new Crosley 4-cylinder automobile engine. This assembly of approximately 125 pieces weighs 14.8 lb before machining, and only ½-lb of metal is removed in the few light cuts and honing operations required. The parts, consisting of 20-gage SAE 1010 stampings with cylinders and guides of chrome-molybdenum tubings are held in place by press fits, spot welds and crimping and copper brazed in a 60 ft furnace which includes a section in which air-hardening of the alloy steel parts is achieved.

The lower melting point brazing alloys can be melted by a gas torch or by induction or resistance electrical brazing. Induction heating avoids the necessity of heating the entire parts to be joined. Because it does not depend on conduction of heat through metal and through surface films it is extremely fast and can therefore be highly localized, preserving the physical properties of adjacent sections and avoiding scaling or even discoloration. With accurate control and automatic timing, uniform results are easily obtainable with unskilled operators. Induction heating depends on the creation of eddy currents in the material to be heated. Resistance losses of these currents are proportional to the square of frequency and the square of current in the field-producing conductor, while in the case of magnetic materials there is also the hysteresis effect due to molecular friction, proportional to frequency.

Another source of fast heat is electric resistance brazing which utilizes heat generated either in the parts to be joined or in the electrodes. The heat is applied under pressure which is maintained until the alloy has solidified.

Welding processes utilized in assembling stampings include resistance (including spot, seam), arc, gas, and atomic hydrogen. Of these the resistance welding processes, which require no filler, can probably best be adapted to the majority of stamping assembly designs. Heating is highly localized and pressure is maintained until the weld has solidified, thus insuring a sound joint. With arc welding the intensive heat (6000 to 7000°F) may be more widely distributed and precautions are necessary against warpage or against burning of thin sections. Gas and atomic hydrogen welding permit more controlled applications of the heat. Atomic hydrogen welding is actually a flame formed by the reuniting of hydrogen atoms (H) which have been dissociated from molecules (H_2) by the heat of an electric arc. The energy of reuniting produces a flame whose temperature is greater than any oxygen-gas flame but less than that of the arc itself. Control of heat is good, inasmuch as the flame can be held at a slight distance from the parts to be welded.

Joining With Resin Adhesives

Resin adhesives offer a method of joining that made great strides during the war. The best adhesives for metal—such as Cycleweld—require elevated curing temperatures of 200 to 300°F. Until set the parts are firmly held together in hydraulic or spring-loaded presses. Shearing strengths as high as 3000 psi are obtained with such adhesives which, incidentally, should be loaded in this manner rather than in tension. While such adhesives can be and are being used for metal joints, their great advantage lies in this ability to join metallic and nonmetallic parts such as plastics or rubber and metals, thus opening up a wide new field for combination parts. Vibration mountings are an example of applications in this field.

The engineer with a stamping company should also be thoroughly familiar with the other processes and quick to recognize where they may possibly have the edge over stampings so that the very best possible combination of parts results. Spinning, stretch-forming, tangent bending, roll-forming, etc., are to some extent competitive with stampings, and it is well worth while to study the types of parts that are being made by these processes so that alternatitve designs can be worked up to utilize stampings. One of the best-known examples of what can be accomplished by such study is the 0.30-caliber carbine trigger housing. Based on a 3 million production run, this part cost $5 as a machined forging and $4 as a machined casting. Designed as a composite stamping assembled from 14 separate parts by projection welding and copper brazing, requiring little machining, the part cost only $2.50.

If the widest possible use for stampings is to be achieved, it is important that stampings producers share the results of their efforts. They should not only study the work of others but should be willing to share their own information. In the Pressed Metal Institute stampings manufacturers have an ideal medium for the exchange of information. One of the most valuable services that the Institute can render its members is the dissemination of knowledge concerning new designs utilizing stampings. In this way the industry can go forward as a whole in healthy competition with other fabricating processes.

PORTABLE MINE ROOF: Electrical substation in the Nellis, W. Va., coal mine of American Rolling Mill Co., is covered with portable steel roof made from corrugated tunnel liner plates. As work progresses in the mine, metal roof can be moved to new location

Hot-Dip Galvanizing Practice

By WILLIAM H. SPOWERS JR.
President
Spowers Research Laboratories Inc.
New York

ONE of the latest and presumably the most efficient furnace settings yet designed for galvanizing is heated with vertical alloy tubes which radiate the heat against a large kettle of molten zinc.

Development of the vertical tube furnace dates back many years, to the days of the old soft coal, Dutch-oven type of installations when every few months all available help was gathered in the plant as quickly as possible to bail out what zinc remained in the kettle and to dig the rest of it from the pit beneath. Every few months kettle failure occurred. Today modern settings work continuously from 4 to 7 years and are not permitted to burn out and spill.

Troubles of the Dutch-oven furnace, still in use in some plants, were legion. That it could actually be used was its one virtue. If it lasted 6 months on continuous production it did well. Attempts to lengthen its life consisted mainly of placing a bed of lead in the bottom, which was to some extent effective but only resulted in the spill taking place at a higher point; the entire kettle was sometimes placed in a larger kettle which in turn contained lead; its dross loss was tremendous; tight bonds were impossible and constancy of temperature was unheard of.

The necessity for larger sized equipment made the use of coke desirable inasmuch as it was a soft fuel and could be fired directly against the kettle with little danger of hot spots. The use of lead in the bottom of these installations was for some time continued, more because of force of habit than of sound reasoning, but this has been finally discontinued. However, the dross area of

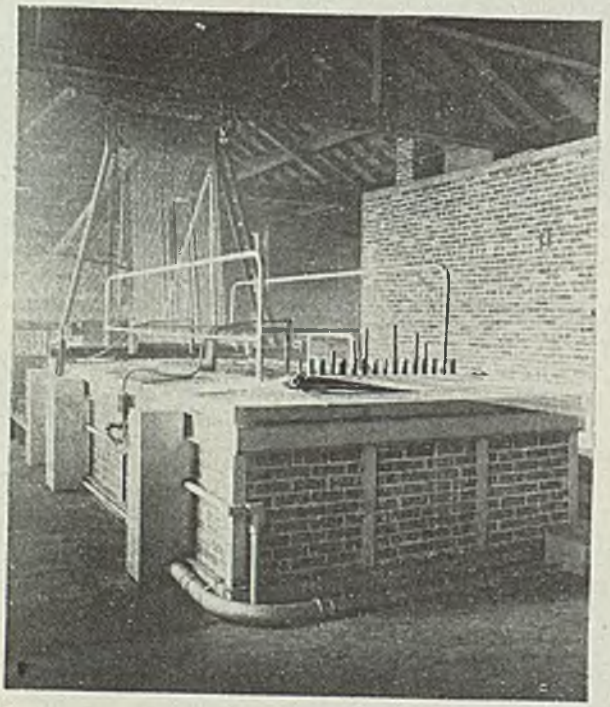
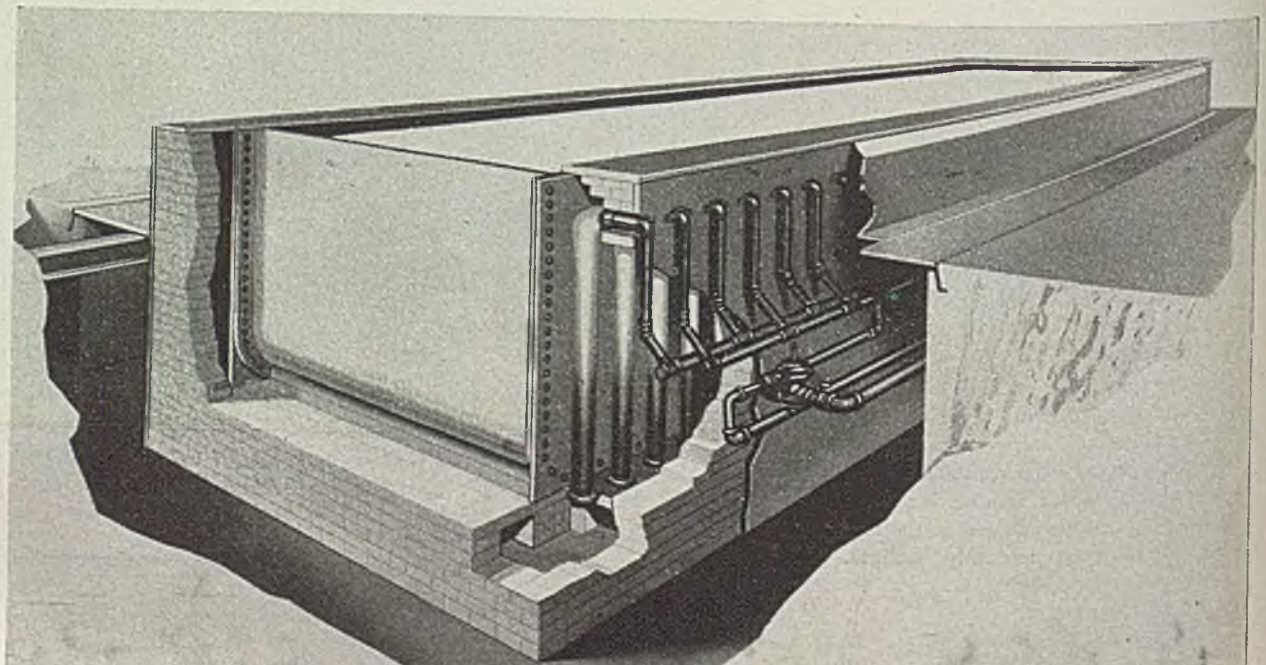


Fig. 5 (left)—A modern straight-wire galvanizing installation

Fig. 6 (below)—Vertical tube type galvanizing kettle. Cut-away section shows location of glow tubes inside furnace walls



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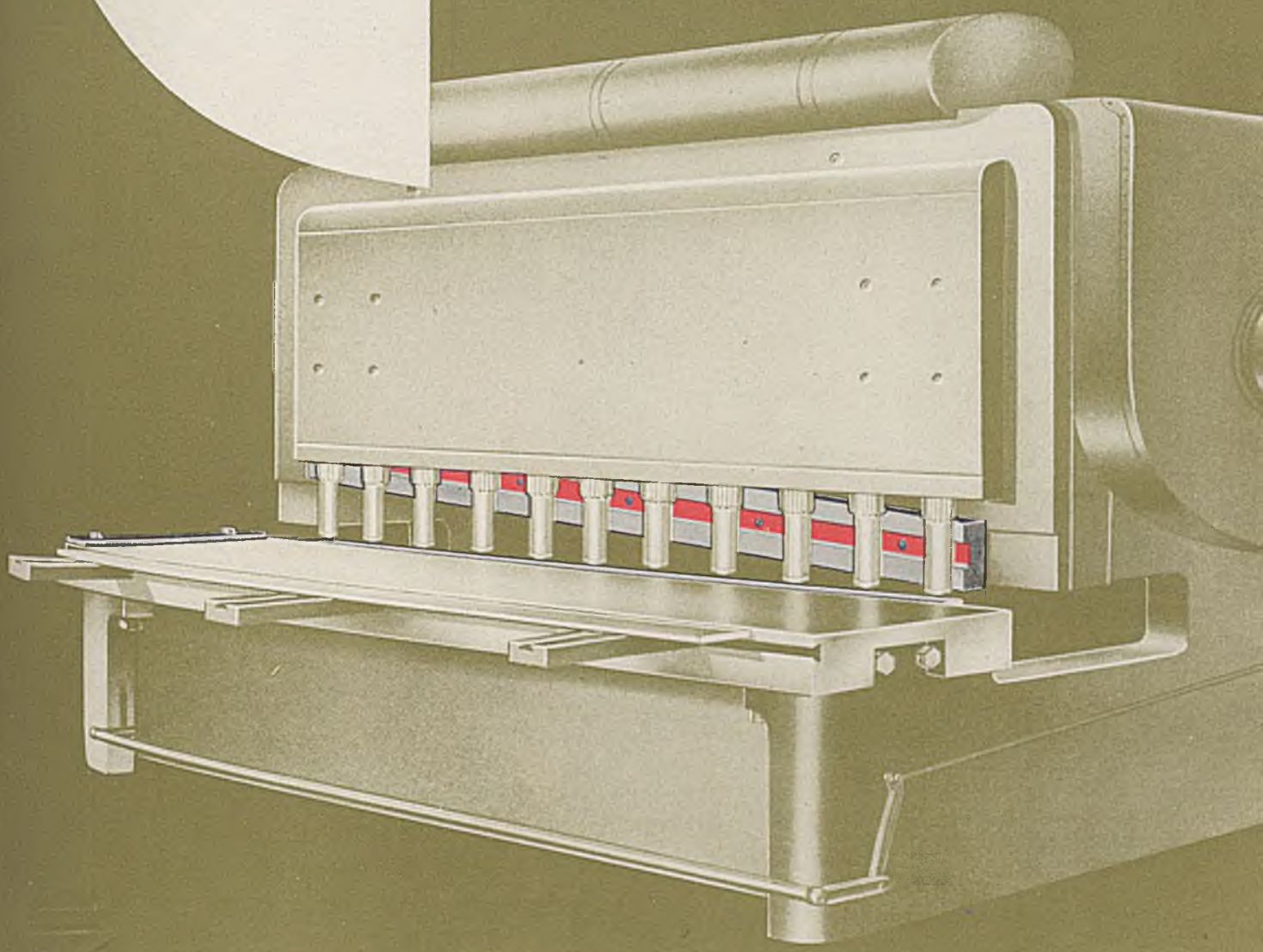

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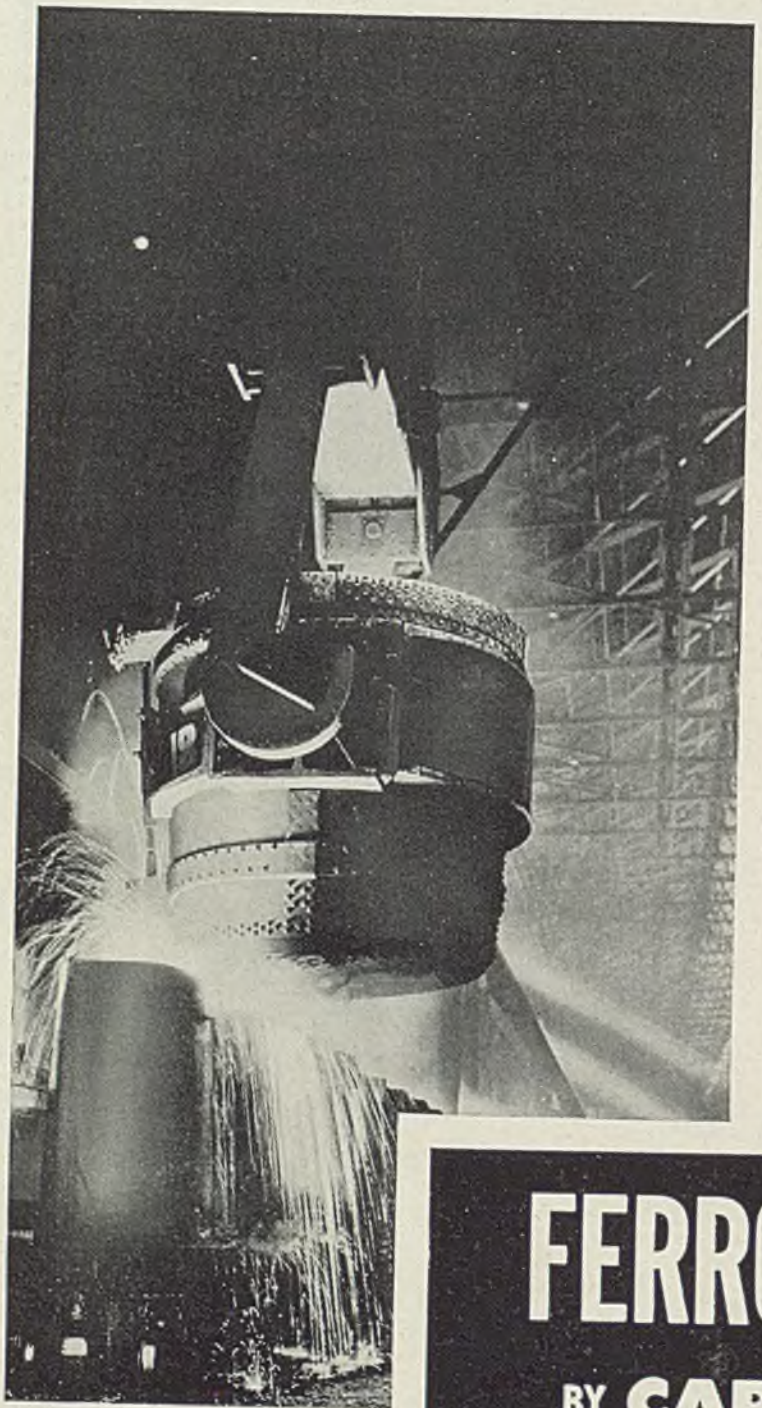

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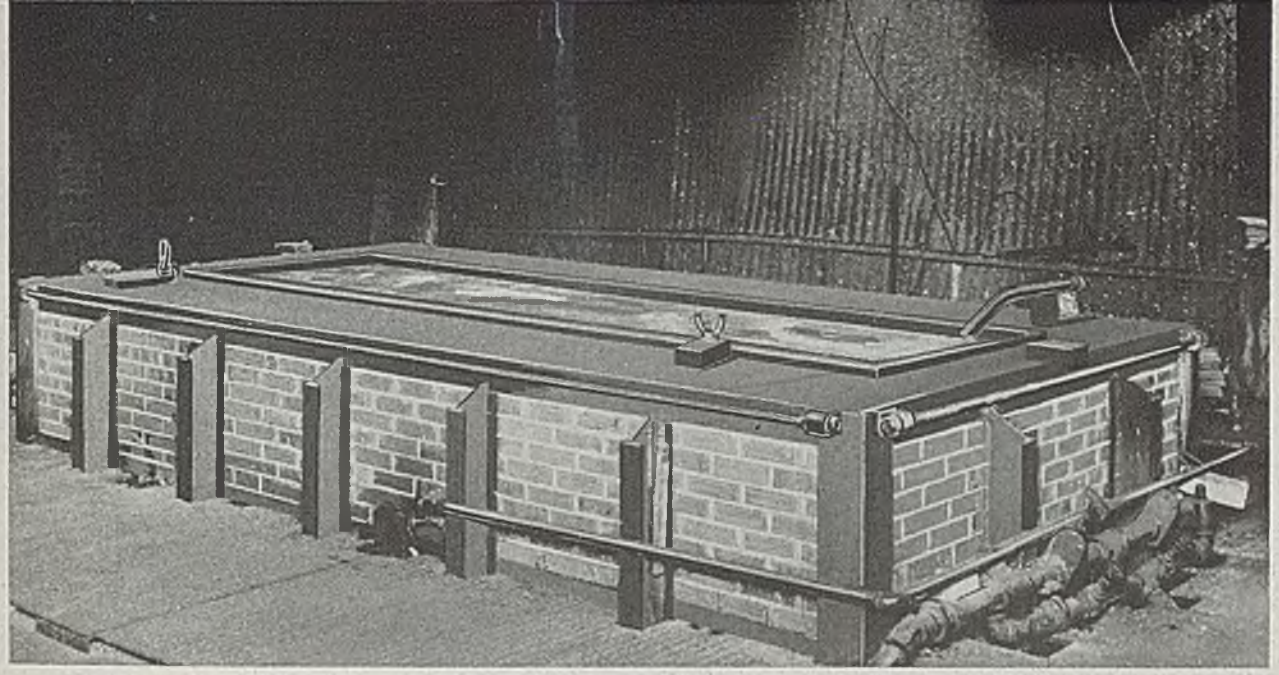


Fig. 7 (above)—High-fired gas installation. Setting of this type often afforded 4-year campaigns at full capacity production

about 8 in. in the bottom was still protected by bricking up the sidewall plates for about this distance on the outside.

The necessity for ample capacity had become apparent about this time. Attempts also were made to apply radiated heat to the kettle in order to avoid any impingements or localized conditions. The burners fire directly upon a bed of refractory stones which absorb the heat and radiate it against the sidewalls of the kettle. This design was a step forward and resulted in many economies over older settings because many of the first installations were based on capacity and sidewall area and the design centered about these fundamentals.

Later, however, after this principle had been established, came the high-fired setting shown in Fig. 12. This setting accomplished the desired result. With a properly capacitated kettle and a properly proportioned unit for the type and grade of work to be done, this setting offered a large degree of control over the heat input from top to bottom of the kettle, as well as from end to end when this control was needed. Many of the settings of this design have served 4 years and some 7 under full capacity production.

It is obvious that this design offers large savings in fuel over any of the so-called end burner open type units, because of the possibility of proper handling and guidance of each Btu developed.

Electrically-heated settings never have reached any high degree of popularity in this country probably because of high-cost current and high-installation cost. There are many possibilities, however, for the use of electricty in galvanizing but until current and installation costs are reduced and producers of this type of equipment pay more attention to the problems of the process little interest in the electrically-heated unit can be expected.

The author's idea, which led to the development of the vertical tube type galvanizing installation shown in Fig. 6 was appropriated from the vertical tube box annealing operation adopted recently by sheet manufacturers. Fig. 9 shows a section of the vertical tube box annealing furnace and a pile of sheets inside with the furnace covering the entire assembly. The tubes in the fire chamber are fired from below because, in this operation, the heat in the box rises to the top. Consequently the higher heat must be applied to the bottom in order to equalize the temperature throughout the pile of sheets being subjected to the annealing operation.

Fig. 10 is the same as Fig. 9 with the exception that it is inverted. Assume that the stack of sheets is a bath of zinc and that the inner cover is the galvanizing kettle. The tubes are now heated from the top, placing the highest heat at the top half of the kettle where it is most needed. Thus is the firing arrangement for the modern galvanizing kettle of the vertical tube type.

Data on the first wire galvanizing kettle heated by radiant heat were presented before the Wire Association Jan. 8, 1931. This kettle was first drossed April 18 and delivered 1020 lb of dross. It was drossed the second time May 23 and delivered 860 lb of dross. The consumption of spelter during 5 months of continuous operation was 175,822 lb dross totaled 1880 lb. This is a loss of slightly over 1 per cent for the 5 month operation.

This condition continued but with slight gain in dross percentage for 4 years when a new pot was installed. The initial kettle after removal showed an exceedingly uniform breakdown and had

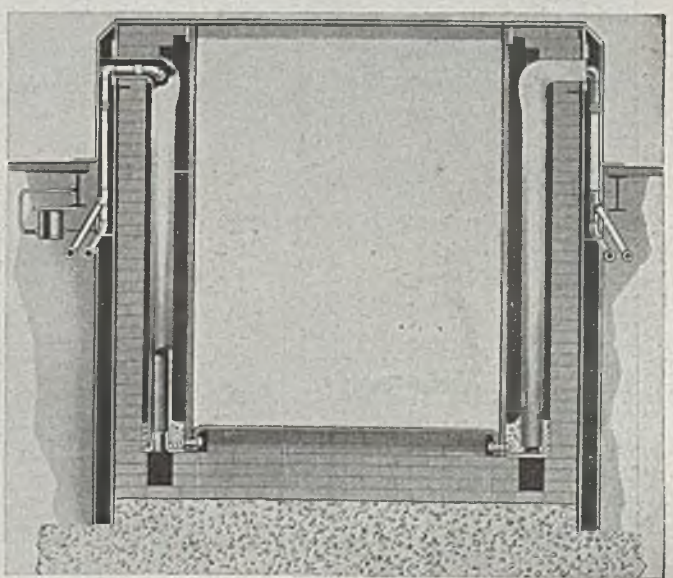
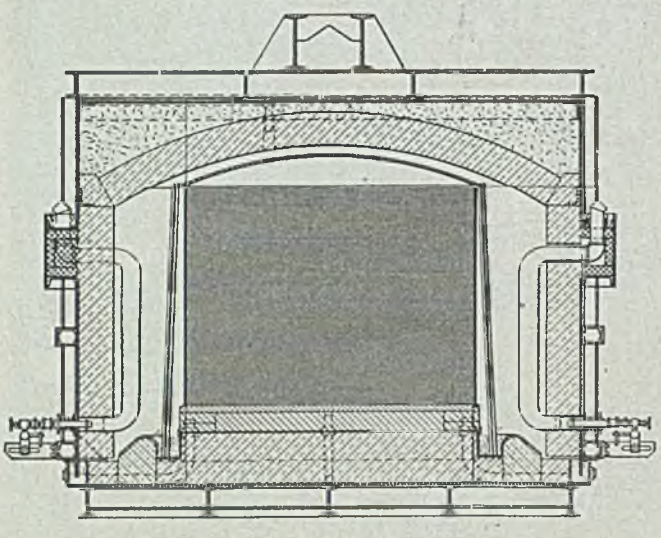


Fig. 8 (right)—Cross sectional view of vertical tube type galvanizing furnace



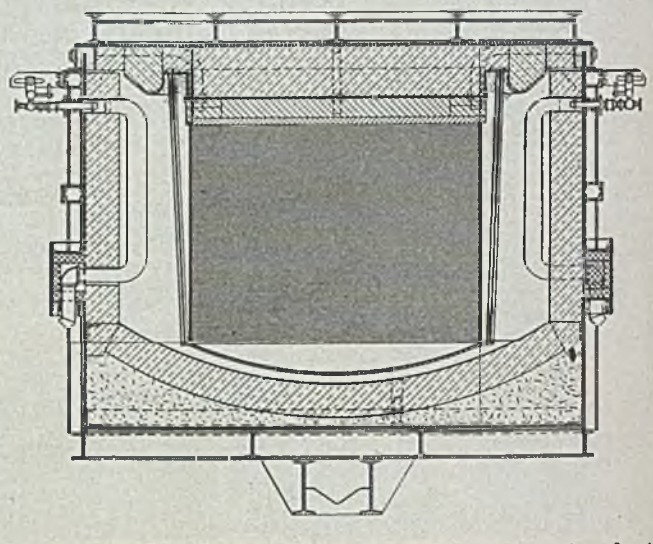


Fig. 9 (left)—Vertical tube annealing furnace. The furnace proper covers the pile of sheets as shown

Fig. 10 (right)—Same type of vertical tube annealing furnace as shown in Fig. 9. Illustration is inverted intentionally

the appearance of at least one year more of life.

A companion installation of the shallow underfired type, operated continuously during the same 5 months with a yield of 21 per cent dross and a kettle life of 6 months.

Operating data covering these installations prove that there is a distinct relationship between capacity and type of heat application with kettle life and dross consumption.

This installation was heated by the glowing ribbons of such design as to offer perfect control of heat input from end to end of kettle and from top to bottom.

However, this method of heating the galvanizing kettle was uneconomical in many localities because of high-fuel cost. Research, however, has resulted in the perfection of this glowing heat principle to gas or oil for hot galvanizing kettles.

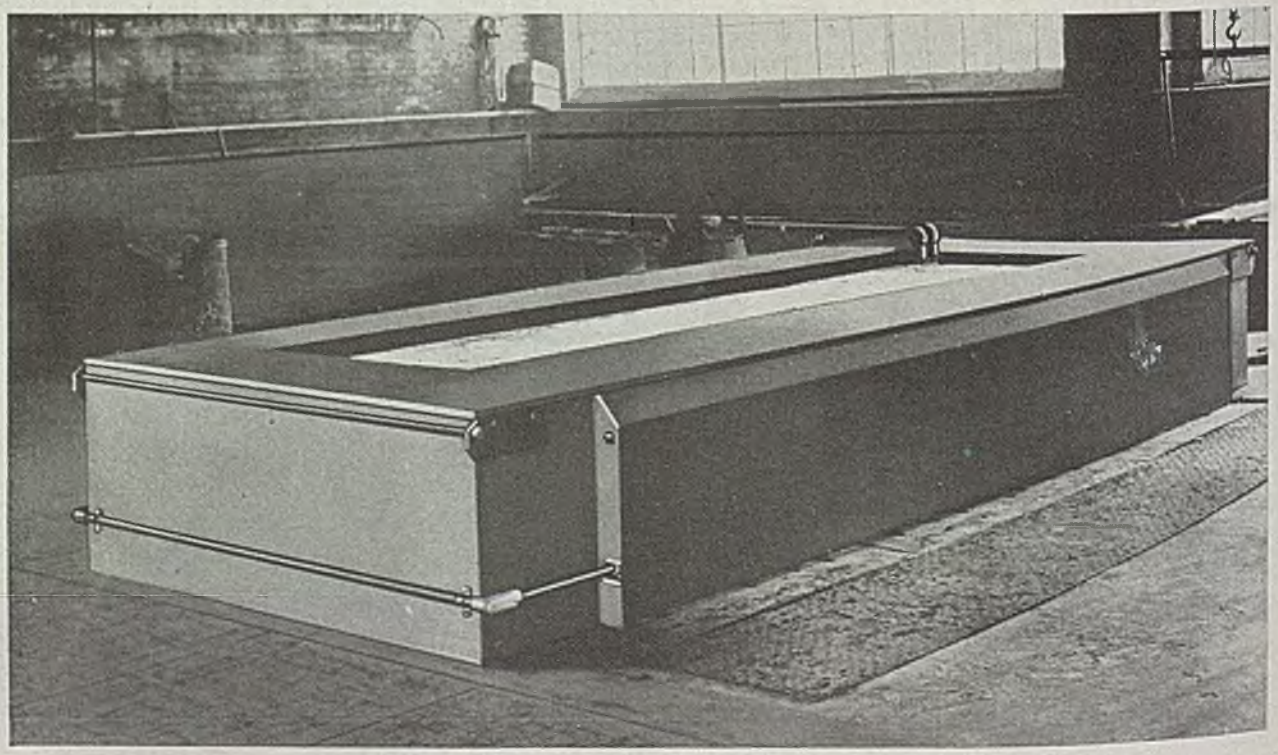
System of Heating

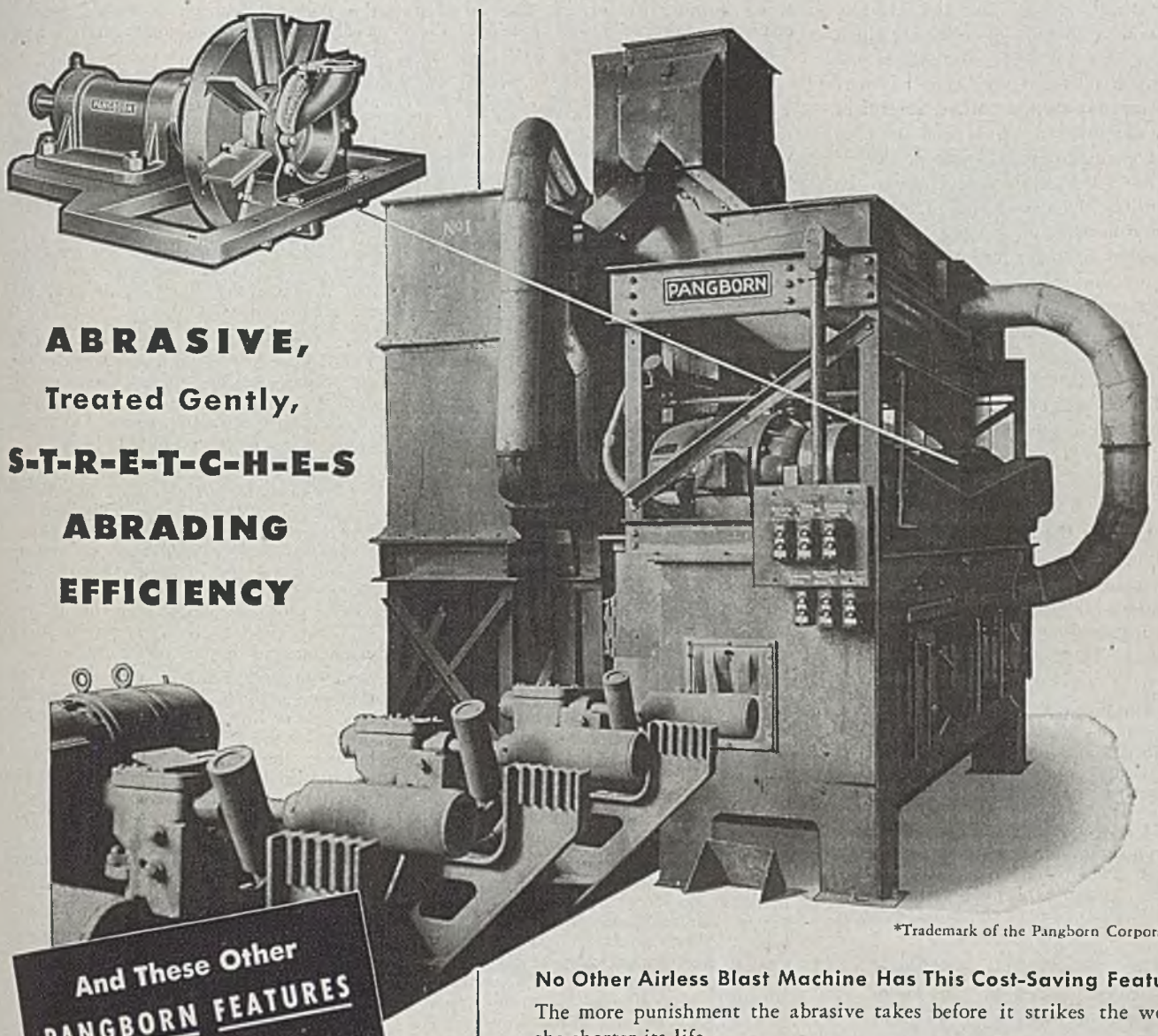
The feature of the initial installations is the system of heating which consists of a series of vertical tubes located inside the furnace walls. Gas burners fire into the upper ends of the tubes and the hot products of combustion exit from the lower. The vertical portions of the tubes are heated and the heat is radiated into the interior of the furnace.

One reason for the success of this type of firing is that the vertical heating element allows the fuel to be burned in the upper section of the tube so that a large portion of the heat liberated is radiated to the upper portion of the kettle where it is most needed.

These vertical hot tubes are located within the brickwork of the furnace along the sidewalls of the kettle at any interval necessary according to the tonnage and capacity of the kettle. The hot tubes are of chrome-nickel alloy and are all alike, each being approximately 4 in. diameter and equal in height to the depth of the kettle with a solid cast elbow at the top welded into sleeve. Gas burners are of blast type and fire into upper ends of

Fig. 11 (below)—Modern galvanizing kettle which is fired through vertical tubes





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the vertical tubes in the furnace.

A new principle in effecting high efficiency in tube-type heating is the application of refractory "core busters." These are star-shaped baffles, several of which are inserted within each tube to form a chain, from the lower portion of the tube to a point about half way to the elbow. The dual effect of these core busters is to cause the hot products of the combustion to scour the tube, thereby giving up the maximum amount of heat; at the same time they become incandescent so that considerable additional heat is forced through the tube by radiation.

A third effect of these core busters is to so baffle the tubes that the combustion is completed in the upper portion of the tube, thereby concentrating the largest amount of heat at the upper part of the kettle where it is most needed.

Fuel within the tubes is ignited by an actuating button.

Major advantages of this type of heat application for galvanizing kettles, which effect materially the economy of operation and quality of products, are as follows:

1. No Possibility of Flame Impingement on the Kettle: Fig. 6 shows that the burners and the flame given off are entirely self-contained in the tubes. Flame impingement on the kettle is impossible. Neither is there any heat flow against the sidewalls of the kettle. The heating area is a tight chamber utilizing every bit of heat given off by the glowing tubes for the purpose of heating the kettle and losing no heat to the outside. There is no burning gas or gas flow in this chamber; and as a result, a heat of the softest possible quality, plays against the walls of the kettle.

Fig. 12 (below) — Sectional view of high-fired gas kettle showing position of burners

2. Uniform Control of Heat Input From Top to Bottom of Kettle: Two of the greatest sources of heat loss in galvanizing kettles are first; radiation from the top; and second, from the work immersed in the top half of the kettle. These reasons alone require that the hottest heat be applied to the upper portion of the kettle.

But the necessity of high heat is more fundamental than either of these reasons and involves the dross formation. Heating a galvanizing kettle from the bottom or up through the dross or too low on the sides, or by the use of too concentrated a heat transfer area, creates a dross flow upward when it should be downward and produces more and more dross. Application of heat to the kettle at too low a point results also in a dross contaminated galvanizing area with the resulting bad effects on bonding, smoothness of coat, etc.

By the use of the previously mentioned core busters, the heat given off by the tubes may be controlled in any manner desired by the designer and enables him to control to a nicety the heat application from top to bottom of the kettle.

3. Uniform Control of Heat Input From End to End of Kettle: Fig. 6 and 8 depict how uniform heat control from end to end of the kettle is secured. This feature is important to the continuous galvanizer and is accomplished by the control of the individual tubes which are adjustable to suit any given galvanizing situation existent.

4. Low Dross Losses: Reference was made in the forepart of this section to actual results as to dross on a similar type of heat application and included ease to heat input, softness of heat application, absence of gas flow on the sidewalls, and of most importance, positive control of any dross flow within the molten zinc which makes conclusively for low dross losses in this type of furnace.

5. Long Kettle Life: The dissolving away of the side plates of the kettle makes a large contribution to dross losses. By the same reasoning low-dross losses make for long life of kettle. The heat given off by the tubes and delivered to the kettle is of the soft glowing type which affords an attractive kettle design.

6. Low Fuel Cost: In this design there is no opening in the heat chamber. Every Btu delivered by the tube is available for heating the kettle.

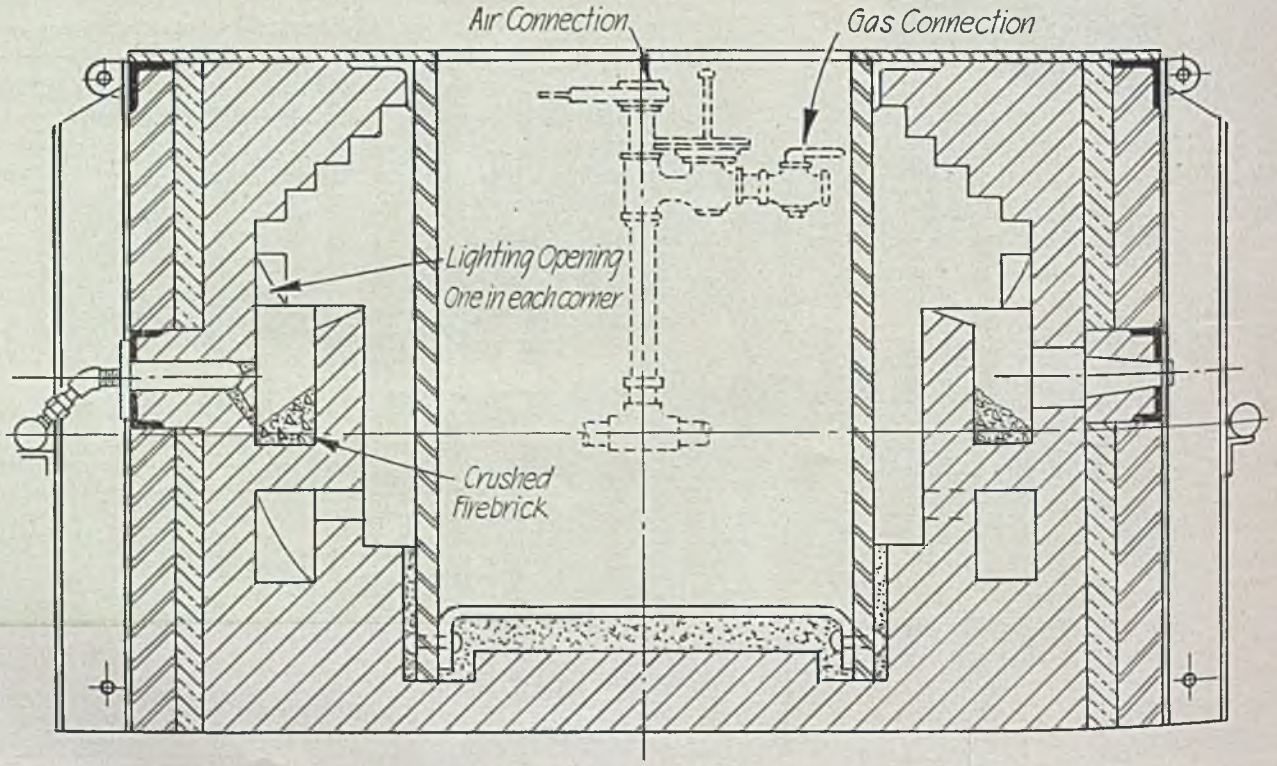
7. Availability for Either Gas or Oil: The flexibility of this design is such that either gas can be burned direct or oil that has been converted to gas by the simple use of a gasifier. In some localities this means a large economy in fuel.

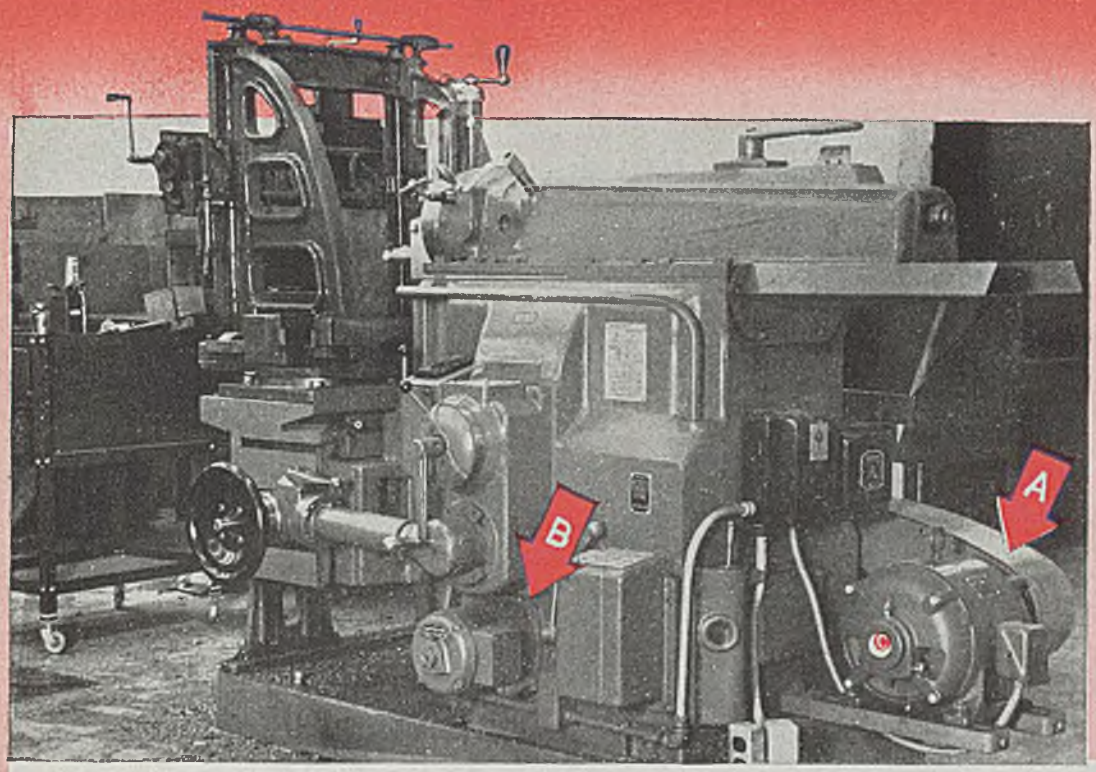
8. Kettle Replaced Without Disturbing Brickwork Setting: This installation is so designed that when eventually a replacement of kettle is considered advisable, this replacement may be accomplished simply by lifting out the old and dropping in the new vessel. The advantage of this procedure over the old rebuilding process is apparent both in economy and saving of operating time.

9. Compact Setting: On account of the grade of insulating brick used in this type of furnace, and the fundamental design of the furnace itself, the distance between the sidewalls of the kettle and outside brickwork is reduced 10 in. compared with the latest type impact-fired designs, and without any additional heat losses.

At present the two types of furnaces in most successful use and whose advantages are comparable are the high-fired refractory bed type, properly proportioned, and the previously mentioned vertical tube type.

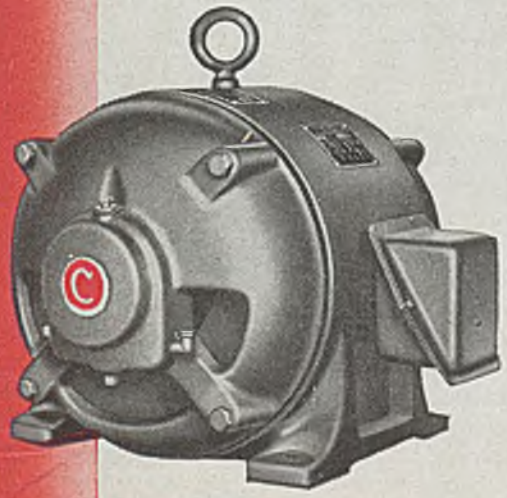
(To be continued)





(A) 3 horsepower Squirrel Cage main drive Motor for shaper. Top half of motor enclosed. **(B)** ⅓ horsepower Squirrel Cage traversing Motor drives the table gears moving the work across the tool travel.

Get All the Precision Your Machine Was Designed to Provide With CENTURY MOTORS' Remarkable Freedom From Vibration



Century motors' remarkable freedom from vibration contributes to the accuracy of the driven machine. Their ability to start, come up to speed, and run smoothly, helps to hold the precise tolerances demanded of tool room machinery — minimizes the possibility of vibration creating imperfections in the work.

Century motors are accurately and rigidly constructed — well balanced mechanically and electrically to maintain their smooth operation throughout a long life of satisfactory performance. The Form J design shown in the illustration has the top half of the motor enclosed to prevent chips from falling into the operating parts.

Century motors are engineered to the functional characteristics of the machines they drive to assure top performance.

Specify Century motors — built in sizes from 1/20 to 600 horsepower.

Century C MOTORS

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

Offices and Stock Points in Principal Cities

Handling BAR STOCK

Mechanized equipment for moving bars reduces handling time, saves manpower and prevents accidents

By BENJAMIN MELNITSKY

Fig. 1—Load is piled on dunnage by tilting forks and allowing bars to roll onto skids

Fig. 2—Another view of rig in Fig. 3 showing heavy load of rounds in proper position ready for transporting

DESPITE many advances in the science of materials handling—use of skids and pallets, improved means of crating and packaging, etc., bar stock is hard to handle. An average adult can handle a casting, forging, or machined part weighing 75 lb, but it is difficult and dangerous for this same man to handle a bar of similar weight. Reasons for this are important, not only in manually lifting bar stock but even more so in lifting and handling bars by fork truck, hoist, or other means.

Bars must be held in direct center for the weight to be distributed evenly; bars are slippery, greasy, and hard to hold; working area in lifting a bar is length of bar plus or minus several feet in either direction (whereas the working area for other materials is usually within the confines of the lifter's body). There are neither handles nor grips on bars (thus a good deal of initial energy is required to lift a bar from a flat, flush surface); round stock cannot be stacked; and other bar forms slip and move when they are stacked. To mitigate these factors, some general principles that will serve as guide for easier and more efficient handling of bar stock can be applied.

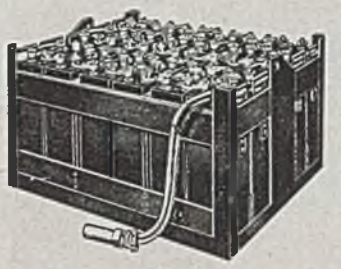
Handling Equipment: Layout of store room and the relation of this department to receiving department and shop influence need for and use of equipment. However, plant layout seldom is changed for refinements in materials handling. Thus the problem of handling bar stock must start in most cases with the basic premise that location of stores and the relation of stores to other departments is more or less set.

There are four ways of handling bar stock: (1) Manpower; (2) nonmechanized wheel handling; (3) mechanized wheel handling; and (4) mechanized lifting.

Nonmechanized Methods: Manpower used alone usually is archaic, wasteful, and dangerous. A safe, well-run storesroom is one where manpower is used as a directive force, not as a motive force. Trucks, wagons, and other devices that are pulled, pushed, or towed by hand are better than muscle-power alone, but are out-dated. There is justification for using hand-powered wagons or trucks if quarters are cramped, if no other equipment is available, if amount of material handled is too small to warrant purchase of gas-motor driven or electric-driven equipment, or if extremely short hauls are made. Other than that manpower, plus or minus wheels, is inade-

BATTERY TRUCKS need less attention

...ALKALINE BATTERIES



Tiering of materials to the ceiling permits maximum utilization of storage space. This is a stop-and-go handling job in which battery trucks excel because of their inherent flexibility and dependable operation.

Edison
ALKALINE BATTERIES

give most trouble-free power

THE performance of American industry during the war furnished convincing evidence of the superior dependability and high availability of battery-powered material handling trucks. They stayed on the job 24 hours a day—day in and day out—with an amazing regularity that many users thought was impossible until they saw it demonstrated. Here's why:

The electric drives in a battery truck are inherently simple, have few moving parts to require repair and replacement, and are free from wear-and-tear vibration. Exchange batteries keep the truck continuously supplied with power, so except for a few minutes to change batteries two or three times per 24-hour period, the truck need not stop working for servicing of its power unit.

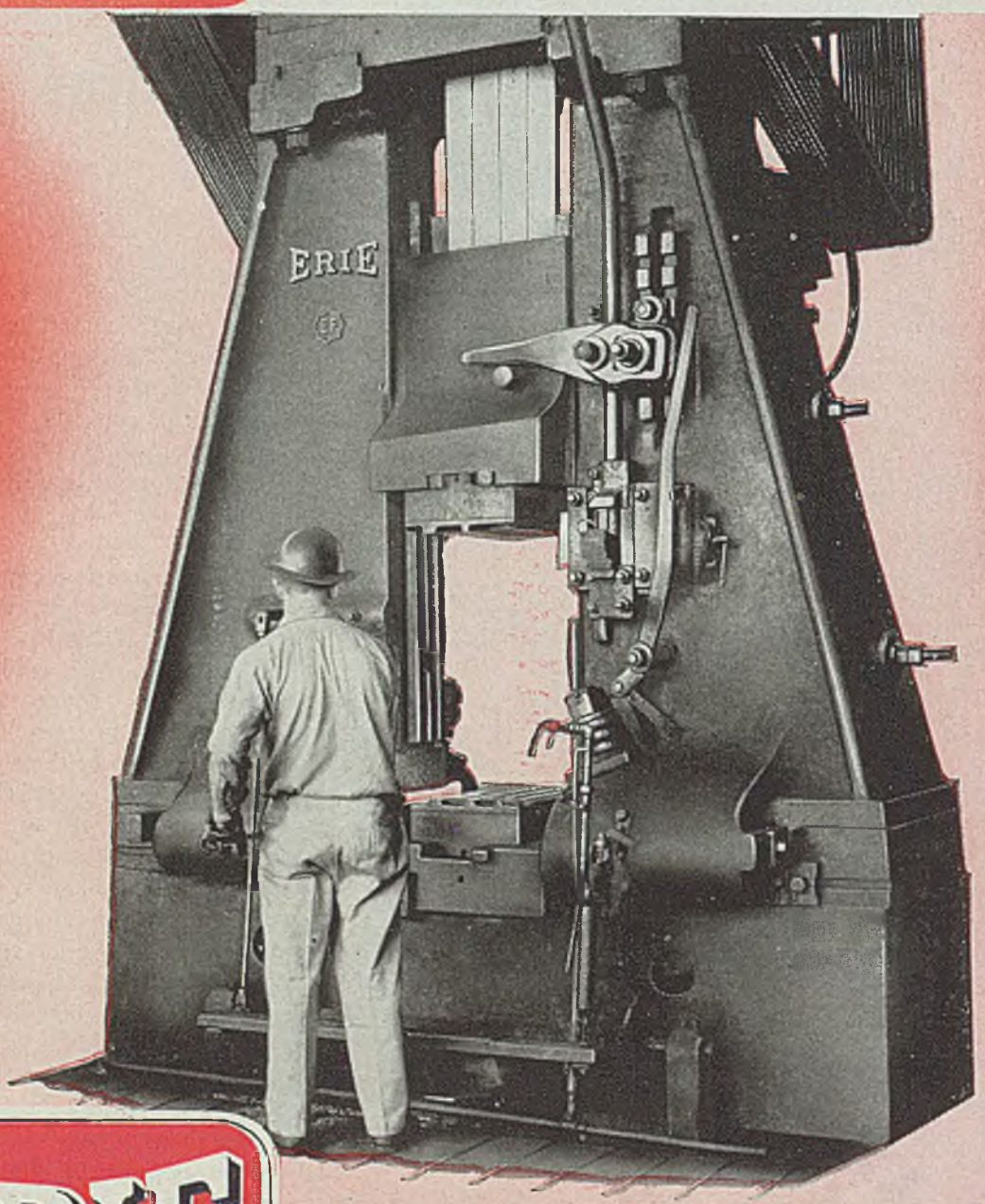
Besides requiring less attention, the battery truck is also economical to operate. It uses power most efficiently because it starts instantly, accelerates rapidly, and consumes no power during stops. The current used for charging its battery is the lowest-cost power available.

Because of these inherent advantages, the battery truck is therefore a most dependable and efficient material handling unit . . . especially when powered by Edison Alkaline Batteries. With steel cell construction, a solution that is a preservative of steel, and a foolproof electrochemical principle of operation, they are the longest-lived, most durable and most trouble-free of all industrial truck batteries. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. In Canada: International Equipment Co. Ltd., Montreal and Toronto

ERIE

Board Drop Hammers are Rugged

Erie Board Drop Hammers combine all the improvements developed during Erie's 50 years of experience in designing and building drop forging hammers. Into the Erie Board Drop Hammer has been designed and built the same ruggedness you find in all Erie Hammers. It gives you the reliability and strength of the heaviest Erie Steam Hammers. The result . . . economy in operation which no forge shopman can afford to overlook. Erie Board Drop Hammers are rated from 400 to 10,000 lbs.



ERIE

The 4,000 lb. Erie Board Drop Hammer above is completing the forging operation in the shop of a large tool manufacturer.

For full details write for Bulletin 339

ERIE BUILDS *Dependable* HAMMERS

quate for efficient handling of bar stock.

Mechanized Method: Fork truck and other powered materials handling equipment can be a great saver of time and money in moving, unloading, and storing bar stock. Fork truck can be used to unload bar stock directly from motor trucks where bars are accessible from the side. Wherever bars can be reached only from above, a hoist may be used in conjunction with the fork truck. A hoist lifts load out of freight car or motor truck, transfers it directly to fork truck, or drops load on floor where fork truck can get at it. Fork truck can pick up a load of bars, carry it to a scale, pick it off scale, transfer load to a wagon, and then tow the wagon into store room. Fork truck then can pick load from wagon and deposit it either on floor or near racks.

A fork truck lifting 3600 lb of bars from a specially designed wagon is shown in Fig. 3. Wagon is built so that the truck forks can get under the load. A load of 230 bars is taken out of a freight car, weighed, measured, and inspected, and moved to raw stores in 10 hours with the use of a fork truck and a hoist. When this same job was done by hand, it took more than a week.

Precautions should be taken when bars are carried on forks of a fork truck during unloading and before bars are transferred to wagons. Forks should be tilted back to prevent load from slipping; forks should be spread apart as far as possible to supply greatest carrying area; and bars should be bundled together with baling wire or otherwise secured and balanced evenly on forks.

Bars should be transferred to wagons as soon as possible. Wagons should have stakes on all sides to prevent bars from sliding to floor. And there should be a space under bars, whether they are on wagon or tiered in storage, to insert truck forks, as shown in Fig. 1. In this operation, same load as in Fig. 3 is piled on dunnage by tilting forks and allowing bars to roll on to skids. This is done in a matter of minutes. When done by hand and hoist, it took three men all day just to pile these bars on dunnage.

When bars are on a wagon or dolly, load can be steered through narrow doors, around sharp corners, and into cramped areas; whereas, if bars are carried on truck forks, width of path of travel in governed by length of longest bar.

In weighing bars carried on fork truck,

(*Please turn to Page* 124)

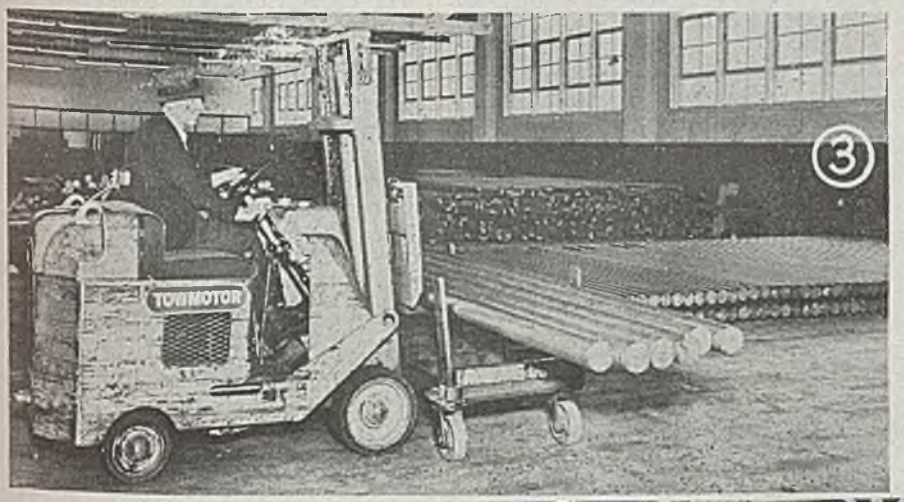


Fig. 3—This specially designed wagon has traverse boards so that forks of truck can slide under bars

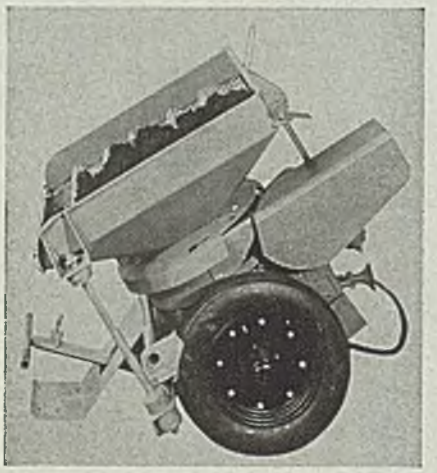
Fig. 4—Special bar-handling rig enables fork truck to push bars into rack

Industrial Equipment

Sand Screener

Portable model M Screenarator developed recently by Beardsley & Piper Co., 2540 North Keeler avenue, Chicago 39, cleans, cuts, screens, aerates and blends sand for production foundries and job shops. It is mounted on pneumatic tires for portability.

A brace from frame fits on wheels and locks them to eliminate movement of ma-



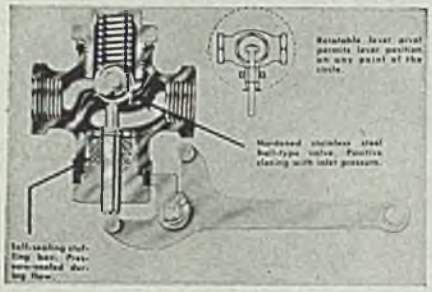
chine while in operation. Handle is retractable and is located so that machine can be moved forward without going around to opposite end.

When positioned for use, its low height and resting angle makes shoveling easy. Electrically operated, it plugs into an available power outlet. Conditioned sand may be discharged as far as 25 ft and elevated from 2 to 10 ft.

Steel 8/26/46; *Item No.* 9488

Air Operating Valve

Self-sealing, air operating, ball type valve, known as Type BA, is announced by Leslie Co., 152 Dalafield avenue, Lyndhurst, N. J. Fitted with a hand



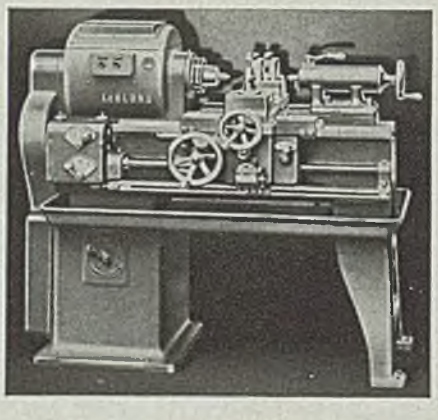
opening lever and rotatable pivot so that lever can be located in any position, valve can be opened instantly from any position with either a horizontal or vertical pull. Ball valve closes tight with inlet pressure and will not collect dirt or other foreign matter.

When fitted with a cam operated lever, valve becomes Type BAC (not illustrated) and permits instantaneous valve opening and closing by throwing lever in desired direction. Lever is held in position thrown until manually returned to the original position.

Steel 8/26/46; *Item No.* 9507

Light Cutting Lathe

R. K. LeBlond Machine Tool Co., Cincinnati 8, is offering a new 13 in. motor head rapid production lathe designed for light cutting operations at



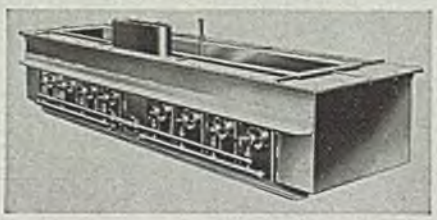
extremely high speeds. Instead of usual gears and belts, headstock contains a stator bolted to casting, and a rotor pressed onto spindle. Motor head operates at 5 hp at top speed, and runs quietly without vibration at speeds as high as 3600 rpm.

Electric start-stop box replaces levers and handles formerly used on the machine. All controls are within easy reach of operator, including finger-touch speed-change handle located in the head end leg.

Steel 8/26/46; *Item No.* 9535

Pot Furnace

A low-temperature, fire tube bath pot furnace capable of holding a very narrow temperature control band is announced by Don C. Campion Laboratories, 9086 Alpine avenue, Detroit 4. Adaptable for tinning, babbiting, lead dipping and



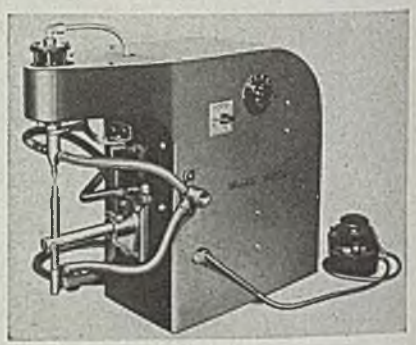
other operations up to 1200° F, the furnace is heated by burning a gas-air mixture in a fire tube submerged in bath to be heated.

System provides extreme sensitivity to temperature control by eliminating thermal head common to refractory-line combustion chambers. Hot products of combustion envelope exterior of bath pot on their long way around to exhaust port. Furnace can be built in almost any size and shape.

Steel 8/26/46; *Item No.* 9473

Spot Welder

A bench type spot welder announced by Weldex Inc., 7330 McDonald avenue, Detroit 10, is a 3 kva, 220 v, 60 cycle, single phase, air-operated welder with foot control, electronic timing and adjustable pressure switch. Known as model

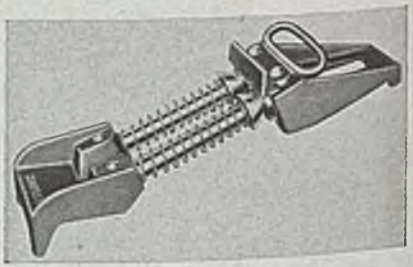


263-A, it spot welds light metals up to 18 gage. Machine measures but 21 in. high, 10 in. wide, and 23 in. deep, and weighs approximately 135 lb.

Steel 8/26/46; *Item No.* 9465

Track Shifter

Simplex track shifter manufactured by Templeton, Kenly & Co., 1020 South Central avenue, Chicago 44, provides fast track lining for any weight track in any type ballast, and for lining swings, sharp

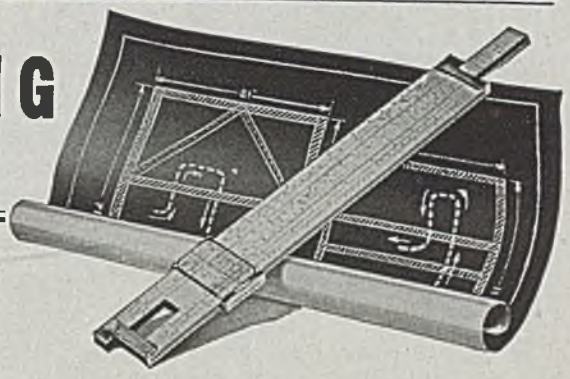


curves, frogs, turnouts, crossovers and ladder tracks.

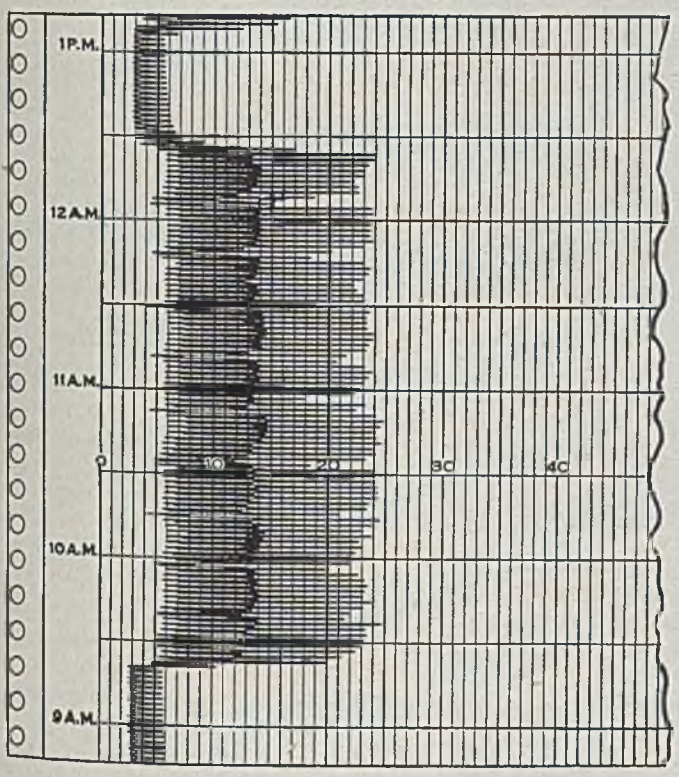
Powered by conventional track jacks, track shifters are placed under rails in holes located where desired. Jacks are not under proper end of track shifters and tilted well forward. Track is lifted just above grip of imbedded ballast on

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 119.)

OVEN ENGINEERING NEWS



SAFETY IS POSITIVE IN ALL IOE INSTALLATIONS



The Industrial Oven Engineering Company has long been a definite proponent in designing and fabricating equipment to perform hazardous operations economically, efficiently and primarily safely.

To this end, in cases where requirements are such, continuous records are made of the explosive conditions which are encountered in the atmosphere in highly dangerous processes like fabric cementing, fabric coating and solvent evaporation; in fact conditions encountered when processing most of the synthetic materials that are in use today.

The chart above shows the continuous record of explosive conditions in a continuous fabric system that has been in operation for some time on the rubberizing of fabric.

If you will observe the record closely you will find that all of the explosive concentrations fall below 25% of the lower explosive limit. This continuous record is taken at four points throughout the complete system and meter the explosive concentrations at all critical points in the system.

In reading the chart it will be observed that 3 of the readings are in the neighborhood of 15% of the lower explosive limit, while the readings at only 1 point run between the ranges of 20 and 25%.

This particular installation is handling approximately 3 gallons of solvent grades of gasoline per minute, and this gasoline was continuously evaporated at a temperature of 180° F.

In addition to such a careful check on explosive concentration the installation was further equipped with positive and foolproof means for the dissipation of static discharges which naturally build up on rapidly moving films, fabrics or papers as they pass continuously through a processing system.

Operating economies were considered also, and they incorporated such elements as continuous operation, high speed operation, space saving and attendant labor economy.

In every IOE installation safety is essential because without safety production usually lags.

All IOE installations are designed to eliminate the hazards of explosion and mechanical failure.

We make cord coating, cable lacquering systems, complete fabric cementing systems, complete fabric coating systems, continuous takeup and payoff stands, dip tanks, drying ovens, constant tension constant speed takeup machines for plastic resin tubing and coating cords, rubber tubing, V-belt cords and other continuous monofilament or film materials.

Write for "High Speed Handling and Drying in the Cementing of Tire Fabric."

This bulletin is a description of a high-speed continuous safe method for applying cements, coatings or impregnant to continuous materials.

IOE ENGINEERING VERSATILITY

THE INDUSTRIAL *Oven Engineering* COMPANY

13825 TRISKETT ROAD, CLEVELAND 11, OHIO

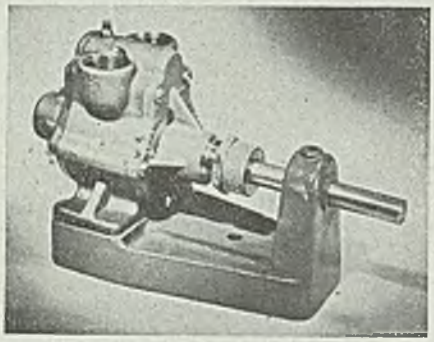
★ ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND ★

movable bushings of the track shifters. As these are inclined sharply forward, bushings move down their shafts, carrying track forward in the direction of line. When the track is shifted as far as desired, jacks are tripped and track is dropped.

Steel 8/26/46; *Item No.* 9544

Double Impeller Pump

A gearless pump with standard 1 in. connections has been developed for circulation of water, light oil and other liquids by Eco Engineering Co., 12 New York avenue, Newark, N. J. Pump employs double impellers made of several layers of a pressure-vulcanized, lami-



nated material, and is capable of operation in either direction.

Built-in driveshaft bearing and base eliminates side-pull when pump is powered by a belt-drive and pulley. Impellers pass sand, grit, filings, or sludge without stalling or pump body damage.

Pump can be mounted at any angle. Its capacity varies from 7.5 gpm at 600 rpm to 23 gpm at 1800 rpm.

Steel 8/26/46; *Item No.* 9446

Vertical Milling Machine

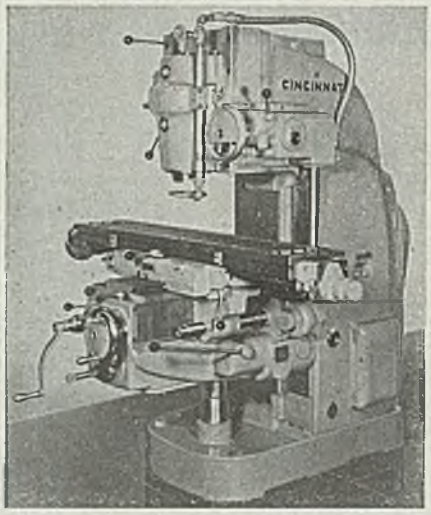
With wide speed and feed ratios—60 to 1 and 120 to 1, respectively—a new vertical style milling machine is being produced by Cincinnati Milling Machine Co., Cincinnati. Designated as model No. 2 MI, the machine is powered by a 5-hp motor and has 16 spindle speeds from 25 to 1500 rpm, changes being made hydraulically.

Motor and mounting may be removed as one unit by removing four bolts. This system is used to adjust belt tension. Multiple disk spring-loaded brake stops spindle instantly when drive clutch, which is of single disk dry-plate type, is disengaged.

With all lubrication except table and way being automatic, this system is enclosed within machine. Coolant system also is enclosed.

Each of the independent feed controls has its forward, neutral and reverse position and cross and vertical hand cranks are automatically disengaged when their respective power feed lever is engaged —an important safety feature.

Machine has a "live" rapid traverse at rate of 150 ipm, longitudinal and cross,

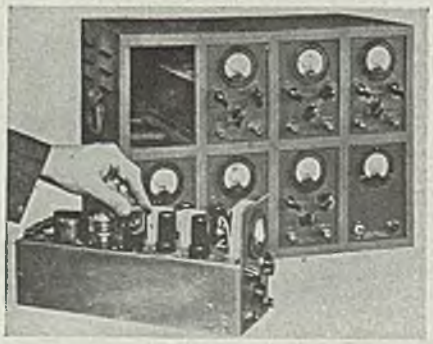


and 75 ipm vertical. It is equipped with a 4-position turret stop. Back gear construction maintains consistently low speeds throughout spindle drive.

Steel 8/26/46; *Item No.* 9741

Strain-Gage Amplifier

Strain-gage amplifier designed for use with resistance-wire, electromagnetic and magnetostrictive strain gages for amplifying small electric signals varying in frequencies from 0 to 1000 cycles per second is being manufactured by General Electric Co., Schenectady, N. Y. It is



operated in conjunction with either a magnetic oscillograph or a cathode ray oscilloscope.

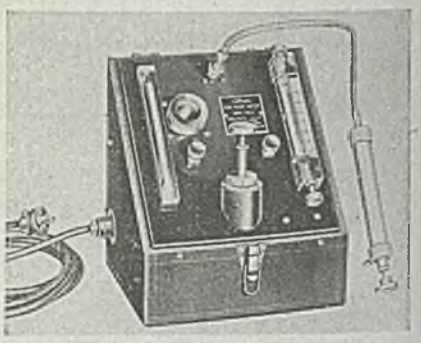
Available for use on 115-v, 60 cycle ac or for battery operation at 24 v, amplifier consists of a 5000-cycle oscillator unit, a power unit, and either two or six identical amplifier units, all mounted in separate chassis in a sturdy case. Amplifier channels are stablized against line voltage change or variations in tube characteristics. Each can be removed for servicing and inspection.

Steel 8/26/46; *Item No.* 9478

Dew Point Indicator

Illinois Testing Laboratories Inc., 420 North LaSalle street, Chicago 10, has developed the Alnor indicator for simple rapid determination of dew point, relative humidity, grains moisture per pound and latent heat of any noncorrosive gas. Indications take place in an enclosed observation chamber under conditions which can be controlled and reproduced.

Sample is drawn from surrounding air or any enclosed space or from a



tank or gas cylinder. It is held at pressure above atmosphere produced by a hand pump. Depressing operating valve produces a visible condensation suspended in air or gas in observation chamber. Procedure is repeated to find end or vanishing point of fog of condensation.

Temperature of dew point of air or gas sample is read from chart based upon initial temperature and pressure ratio. Other factors are obtained from reference charts once dew point is known.

Indicator is maunfactured in two ranges—for dew points between minus 20° F and room temperature and between minus 100 and 0° F. It may be operated on either 110 v ac power or battery power.

Steel 8/26/46; *Item No.* 9508

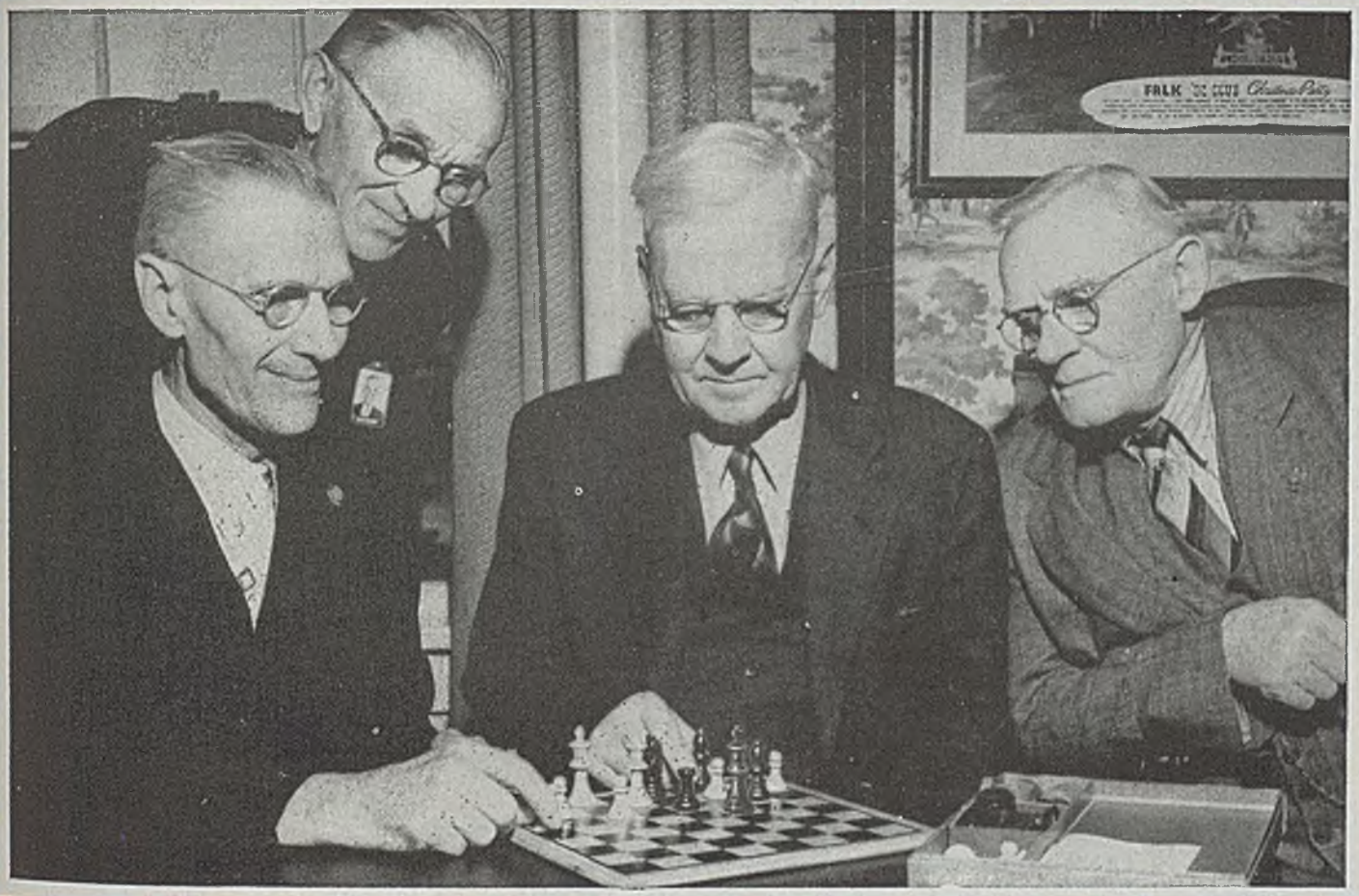
Battery Charger-Welder

A battery charger—arc welder combination developed by Hobart Brothers Co., Motor Generator Corp. division, Troy, O., includes separate control panels with instruments, for switching from charging to welding or from welding to charging.

Two models are being produced by Hobart, Model No. 496 is a 300-amp electric motor-driven welder including MGC panel circuit for charging at a maximum rate of 200 amp at 50 v, direct current.

Model No. 479 is a 400 amp electric

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 119.)



The world's most exclusive club

...Retired Members of the Falk Organization Who Meet Once a Week at The Falk Plant

There are only forty-eight of them. They are not as young as they used to be. They are all retired from active work—but their interest, their loyalty, their morale is undiminished.

They have their own rooms in the Falk plant where they meet once a week, have lunch, talk, play games. They wander through the shops and visit their old cronies who are still active. Some come under their own power; some are brought from and returned to their homes by company cars. One of them served Falk for nearly fifty years, and now Falk serves him and all the others.

This Club is indicative of a state of mind that exists at Falk . . . a state of mind that permeates every section of the business—management, engineering, and production.

The same genuine interest is shown by the whole organization through the suggestions made, through constantly improved techniques, through the ingenuity indicated in developing new designs, and through the high degree of production efficiency maintained.

That Falk's interest in its people is returned in full measure by the whole organization has a very tangible value to present and potential purchasers of Falk products. It is one of the reasons why Falk is a good name in industry and why it always pays to consult Falk.

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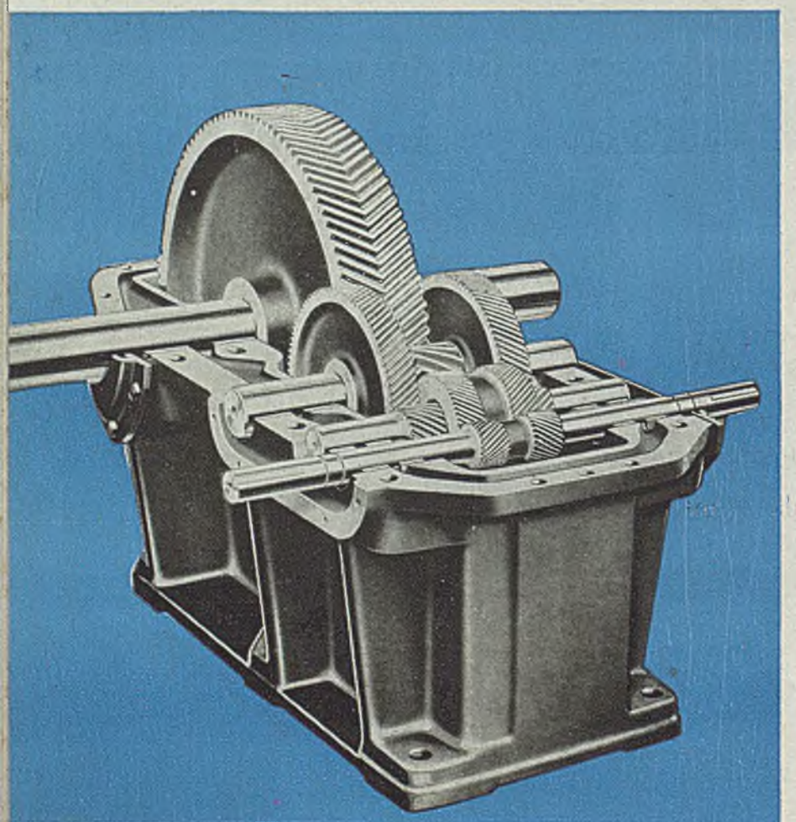
FALK Speed Reducer Design Embodies...

- ☆ STRENGTH...
- ☆ RIGIDITY...
- ☆ COMPACTNESS...
- ☆ SIMPLICITY.....



FALK parallel shaft, herringbone geared speed reducer. Ratios: single reduction, 2.2:1 to 10:1; double reduction, 11.5:1 to 70.2:1; triple reduction, 80:1 to 300:1.

YEARS of experience in gear research and manufacture and in gear reduction machinery dictate the design of Falk Speed Reducers. Experience gives the "know-how" that determines the materials, the special Falk techniques and machinery that make gears, shafts and housings strong and rigid for extremely long life on a wide variety of applications. Experience taught how to design simply, to provide a speed reducer to fit a job with continuous high efficiency in a comparatively small, compact housing.

Falk Speed Reducers are designed with a symmetrical arrangement that assures balanced performance . . . double ended shafts double the life of gears . . . Falk precision made herringbone and single helical gears attest highly efficient performance. A patented system of lubrication and interchangeability of parts assure long life.

In all, Falk Speed Reducer design gives you maximum efficiency, dependability and long life in a wide range of units to meet any requirement you may have.

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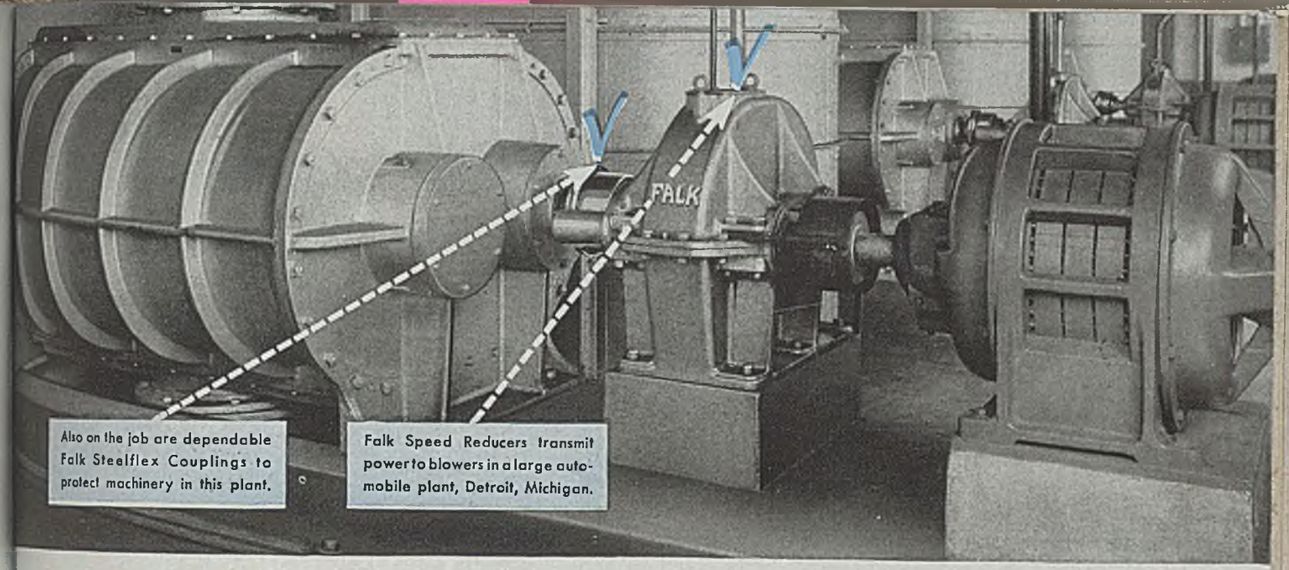
For over fifty years precision manufacturers of Speed Reducers . . . Motoreducers . . . Flexible Couplings . . . Herringbone and Single Helical Gears . . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches . . . Steel Castings . . . Contract Welding and Machine Work. District Offices, Representatives, or Distributors in principal cities.



Also on the job are dependable Falk Steelflex Couplings to protect machinery in this plant.

Falk Speed Reducers transmit power to blowers in a large automobile plant, Detroit, Michigan.

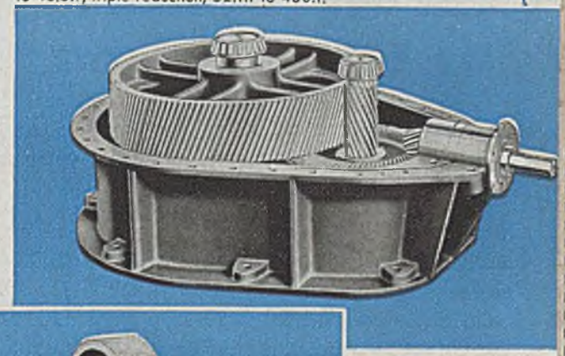
Plus Accurately Cut FALK Herringbone Gears

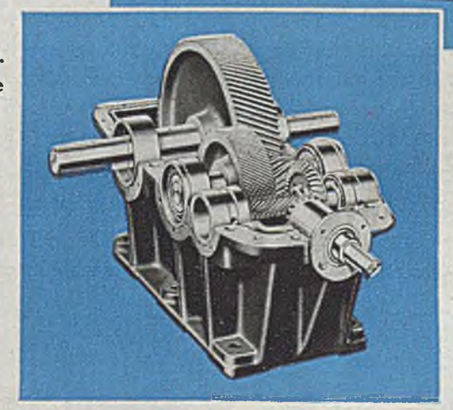
Falk Right Angle Speed Reducers are available in a wide range of types and sizes. Sizes range from 0.13 h.p. to 2000 h.p., with gear ratios from 1.5:1 to 515:1. All ratings conform to AGMA Standards; all Falk Speed Reducers have a 100% excess capacity and minimum efficiencies from 97% to 98½% depending upon the reduction.

Shown above is one of many applications where Falk Speed Reducers give day in and day out dependability. Some typical Falk Speed Reducers and their gear ratios are shown at right: a right angle unit with vertical low-speed shaft, and a right angle unit with horizontal low-speed shaft. On the opposite page is shown a parallel-shaft, herringbone geared speed reducer.

There is a Falk Speed Reducer to meet your requirement. Write for complete detailed information on the Falk line of Speed Reducers.

Falk right angle speed reducer with vertical low speed shaft. Available in single reduction units, 1.5:1 to 5.28:1; double reduction, 5.7:1 to 43.5:1; triple reduction, 52.1:1 to 430:1.

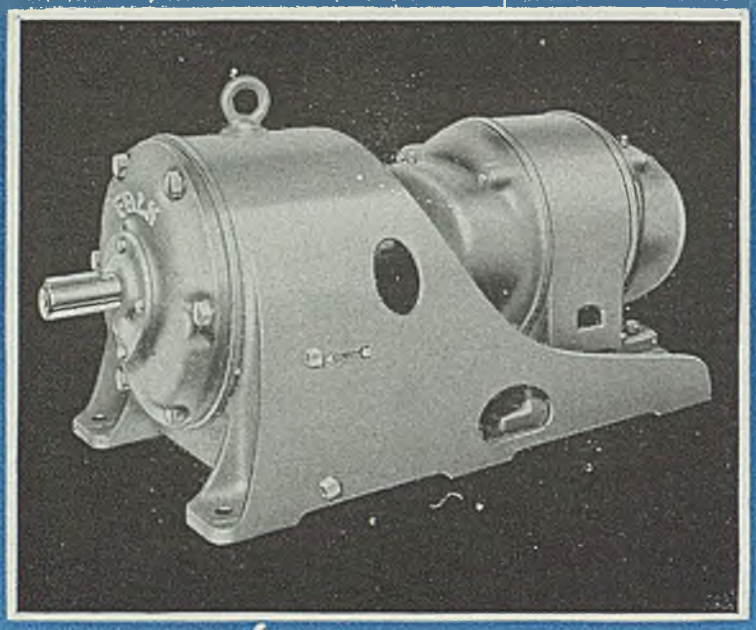




Falk right angle speed reducer. Available in single reduction units, 1.5:1 to 5.28:1; double reduction, 5.7:1 to 52.1:1; triple reduction, 56:1 to 515:1.

FALK

. . . A GOOD NAME IN INDUSTRY



ANY SIZE...SERVICE... HORSEPOWER... SPEED...TYPE... MOTOR

Falk Motoreducers are available in a number of models, of various sizes and ratings, with single, double, and triple reduction gear sets. Illustrations show, above, double reduction all-motor type DU, and, at right, double reduction vertical all-motor type DZX. Both are available in 1 to 75 horsepower range.

Falk is the only manufacturer of the all-motor type of motoreducer. This type permits use of any make of motor in both horizontal and vertical models.

Change Motors to Suit with FALK All-Motor Units

AN important feature of Falk All-Motor units is their interchangeability. It is possible to interchange motors or units, in the plant, on the job, in a few minutes' time.

With Falk All-Motor units you can use any make, speed, or type of motor desired, within the rating of the unit. This important feature makes possible the selection of a motor to suit the individual preference, and it means units and motors are easily, quickly interchanged throughout your plant. Fewer spare motors on hand are necessary. Falk Motoreducers are compact, self-contained unit drives available in either horizontal or vertical models ranging from 1 to 75 h.p. Single—double—or triple-reduction gears give an output range from 1430 down to 7.5 r.p.m.

Write Falk for Bulletin 3100, which gives details and specifications, and complete selection tables for all Falk Motoreducers for any service. It also contains load classification tables for common applications.

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For over fifty years precision manufacturers of Speed Reducers . . . Motoreducers . . . Flexible Couplings . . . Herringbone and Single Helical Gears . . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches . . . Steel Castings . . . Contract Welding and Machine Work.—District Offices, Representatives, or Distributors in principal cities.

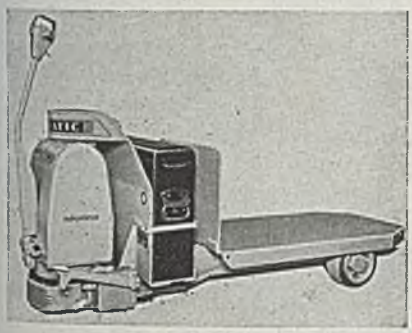
FALK . . . A GOOD NAME IN INDUSTRY

motor-driven welder for charging at a maximum rate per battery of 150 amp at 50 v, direct current.

Steel 8/26/46; *Item No.* 9365

Electric Hand Truck

Automatic Transportation Co., 149 West 87th street, Chicago 20, is manufacturing the Transporter, an electric propelled hand truck which is made in four models: 4000 and 6000 lb capacity



platform models for use with skid platforms; 4000 lb capacity pallet model; and a special 3000 lb capacity special pallet model for tinplate.

Steel 8/26/46; *Item No.* 9537

Plug-In Relay

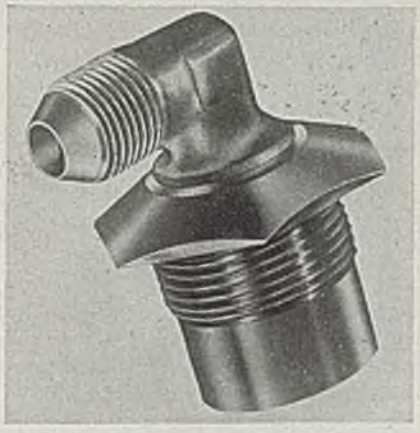
Hermetically sealed plug-in relays, developed recently by Ward Leonard Electric Co., Mount Vernon, N. Y. are designed for alternating or direct current operation in small radio transmitters, aircraft control circuits and other applications where space is limited. Completely encased in a cylindrical can, these relays provide protection against adverse atmospheric conditions such as moisture, dust, gases, corrosion, etc. Coil and contact connections are enclosed within metal housing and are brought to prongs of octal plug base.

Relays are offered in contact combinations to double pole, double throw with alternating current contact ratings (at commercial frequencies) of 4 amp, from 0 to 115 v and direct current contact ratings of 0.5 amp from 25 to 115 v.

Steel 8/26/46; *Item No.* 9482

Swivel Pipe Coupling

All-Flex ball bearing swivel pipe coupling, newest product of Snyder Sales Corp., 5225 Wilshire boulevard, Los Angeles 36, is designed to convey fluids under high pressure through a pipe which



swivels or rotates a full 360 degrees. A combination of multiple synthetic packings and metallic seals offers protection against leakage at high and low pressures.

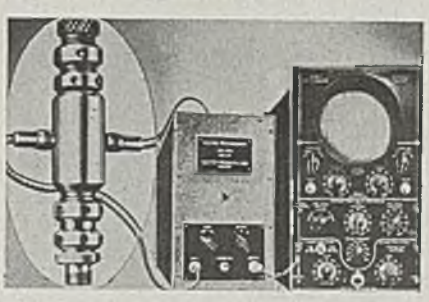
A double row of ball bearings, plus metal-backed packings, gives lowest possible resistance to rotation, permitting ease of operation at all pressures. Performance shows a torque of 2.5 in. lb at 1500 psi and 9.6 in. lb at 3000 psi.

Coupling is offered in sizes from ⅛ to 1 in. with a variety of threaded and elbow connections to meet various applications.

Steel 8/26/46; *Item No.* 9492

Pressure Analyzer

Pressuregraph developed by Electro Products Laboratories, 349 West Randolph street, Chicago 6, provides, with a cathode ray oscillograph, a linear pressure-time curve on its screen to indicate performance of any engine, pump, or other device subject to pressure variations. It shows erratic operation of a device



which normally cannot be observed by other means, due to inertia of fly-wheels, and other factors.

In addition to dynamic pressure variations, instrument shows static or slow pressure variations. It covers all mechanical speeds, and pressures up to 10,000 psi.

Operation is simple, only one control being involved. Pick-up is inserted in cylinder, chamber of airline, etc. Pick-up includes a diaphragm which, when acted on by pressure impulse, unbalances an electronic circuit. Unbalanced voltage from pick-up is amplified, and passed through a negative modulation suppressor, and then to oscillograph. Sweep circuit of oscillograph is adjusted to speed of engine of mechanism under test.

Steel 8/26/46; *Item No.* 9521

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

Circle numbers below corresponding to those of items in which you are interested:

9488	9544	9365
9507	9446	9537
9535	9741	9482
9473	9478	9492
9465	9508	9521

8-26-46

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(All claims are those of respective manufacturers; for additional information fill in and return the coupon on this page.)

Hardenability Testing

(*Continued from Page 73*)

recently ASTM hardenability charts have been used.

Heat treated parts—with some rare exceptions—are given a tempering treatment, and tempered hardness cannot be estimated accurately from the ordinary Jominy hardenability curve. A tempering temperature of 800°F applied to a well quenched piece of 0.30 to 0.50 carbon alloy steel may fall in hardness as little as 10 or as many as 20 points rockwell C. This loss is likely to run relatively high on straight nickel steels and relatively low on molybdenum bearing steels. However, the hardness specifications on hardened parts is likely to have little more spread than 5 points rockwell C. With such a large variation possible in the hardness produced by tempering, estimating the hardness which will be obtained in a particular part from the as-quenched Jominy hardenability curve is hazardous. For steels with 0.30 or more carbon we therefore temper the Jominy bars at 800°F, and plot this data on the hardenability chart also. This temperature was selected not because we consider it the desirable tempering temperature, but because we consider it the minimum tempering temperature which is at all suitable for medium carbon alloy steels.

Reaching Specified Hardness

If the Jominy bar tempered at 800°F indicates that any part in question would not reach the specified hardness when tempered at at least 800°F, the steel is considered unsuited for the particular part. Within the past few years we had a moderate number of lots of steel which Jominy hardenability tests indicated were unsuited for the parts for which we wished to use the steel. Most of these lots were either 9400 series steels near the lower side of their analysis range, or steels which were actually below the analysis range.

Chart accompanying this discussion shows the Jominy hardenability of a lot of steel purchased for 4340 along with the AISI hardenability band for 4340-H steel. The curve for the Jominy bar tempered at 800°F is also shown. It will be noted the analysis of this steel is below the specified range on nickel and toward the lower side of the range on manganese, molybdenum and chromium. The steel would be subject to rejection because of failure to meet the specified analysis. However, with deliveries taking many months, such low hardenability steels were usually replaced with other more suitable steel, if obtainable, and the low hardenability material used for less critical parts requiring less total hardness and less hardness penetration. In some cases low hardenability steel was used for parts which ordinarily are of carbon steels and not heat treated.

Returning to the chart, it will be noted that when tempered at 800°F hardness increases 3 points rockwell C—from 39 to 42—in going from 1/16 to 5/16-in. from the end. This is quite common, especially with steels which contain molybdenum. It is usually shown more as the tempered temperature increases, and may be the result of a precipitation hardening effect. Also, beyond 12/16-in. from the end the hardness after the 800°F tempering is identical with that as quenched. This also is a usual occurrence. In the poorly-hardened portion of the Jominy bar tempering, it usually shows only one or two points rockwell C less of hardness at the most; and frequently none at all or a gain of one or two points. If there is a slight gain it also is likely to be the result of a precipitation hardening effect.

Tentative Hardenability Bands

In June, 1945, the AISI issued section 10 of their Steel Products Manual, covering hot rolled alloy steels. This includes tentative hardenability bands for most of the commonly used alloy steels from which any of several different types of hardenability specifications may be selected. If these specifications are properly selected, and the steel is ordered to meet the specifications, failure to meet them may be the basis for rejecting the steel. For the past 10 months we have been ordering our alloy steels to meet hardenability specifications. Our specifications require that the steel meet or exceed the minimum hardenability shown by the AISI hardenability band at two distances from the quenched end. These distances are as follows:

For 0.27 or less carbon—1/8 and 4/16-in.
For 0.30 to 0.37 C, incl.—2/16 and 8/16-in.
For 0.40 or more carbon—2/16 and 12/16-in.

We selected the first point at 2/16-in. for the higher carbon steels because it may be determined more accurately than the 1/16-in. point. One sixteenth of an inch from the end of the bar is more likely to be effected by slight rocking or tilting. In spite of this, for the lower carbon steels, the 1/16-in. point is used because the hardness falls very rapidly for these steels. The farther point was selected at a distance which is usually equal to or beyond the point of inflection—the point where the curve is steepest. The as-quenched hardness at this distance is lower than desirable for good heat treating practice. We found, however, that a specified minimum hardness at this distance will cause rejection of certain undesirable heats which have relatively high carbon but low alloy, while a point nearer the quenched end would not cause rejection of the steel.

AISI hardenability specifications provide that Jominy hardenability acceptance tests be run in accordance with provisions outlined by the SAE. These provisions specify forging down the steel and normalizing it. We do not ordinarily do this. Our medium carbon alloy steels are usually purchased as hot-rolled annealed bars, and are machined and heat treated without any intervening forging or normalizing operations. The Jominy bars are run the same way: They are turned down to 1 in. round by 4 in. long with a flanged end for holding in the quenching fixture. They are heated to usual quenching temperature and end quenched in standard manner. Two opposite ¼-in. wide flats are ground the length of the bars. The hardness is taken along one of these as-quenched and the other after tempering at 800°F. Resulting data is plotted as shown on the accompanying chart except that the AISI range for the steel is not ordinarily put on. The chart is used for appraising the steel for any particular part. If hardenability is low, the steel is not used. We were never troubled with the hardenability being too high. With relatively high hardness specified for many of our parts, the as-quenched hardness always can be brought down to the desired level with a tempering temperature which is seldom above 1100°F and usually lower. The higher tempering temperatures are preferred as it is well known that for a given hardness and strength they give improved ductility.

Rerunning Hardenability Tests

So far, we have received no steel ordered to our hardenability specifications which failed to meet the specifications. When we do receive a lot of steel which falls below the hardenability specifications, it is necessary to rerun a hardenability test according to standard forging and normalizing procedure before we feel justified in rejecting the steel. With steel as scarce as it is this year, however, who would reject a lot of steel so long as it has a little iron it it?

Steel ordered before hardenability specifications were available, or before they were used, must be accepted if they come within the official analysis specifications. Looking back over the records we find 2 or 3 per cent of our alloy steel would have been subject to rejection if it had been purchased to hardenability specifications.

Occasionally the steel was for parts of small size or low hardness specifications, and it performed satisfactorily. When parts were larger or required higher hardness levels, it was necessary to shift the low hardenability steel to less critical parts or risk expensive rejections of finished parts which failed to meet the

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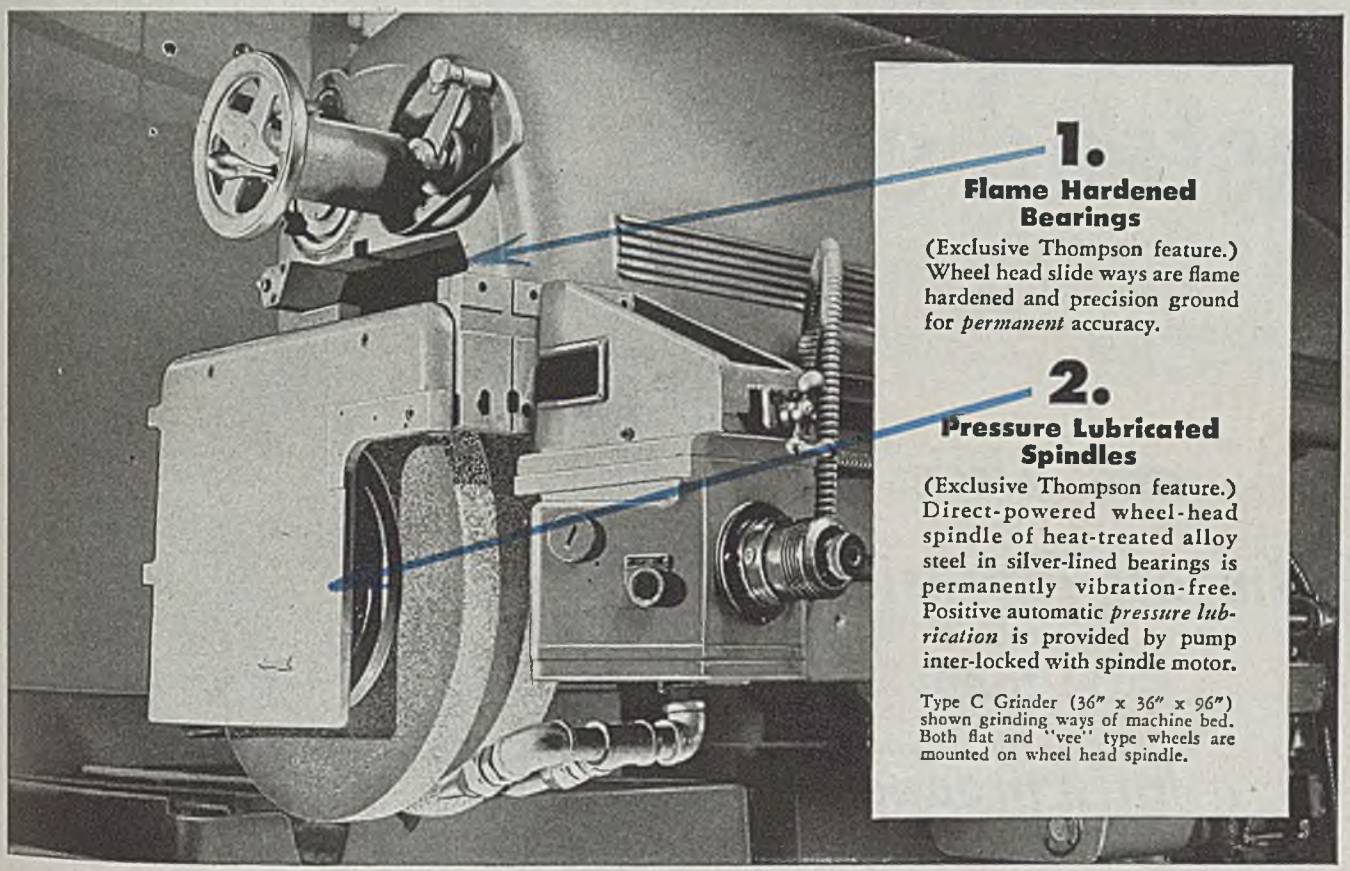

1. Flame Hardened Bearings

(Exclusive Thompson feature.) Wheel head slide ways are flame hardened and precision ground for *permanent* accuracy.

2. Pressure Lubricated Spindles

(Exclusive Thompson feature.) Direct-powered wheel-head spindle of heat-treated alloy steel in silver-lined bearings is permanently vibration-free. Positive automatic *pressure lubrication* is provided by pump inter-locked with spindle motor.

Type C Grinder (36" x 36" x 96") shown grinding ways of machine bed. Both flat and "vee" type wheels are mounted on wheel head spindle.

3. Automatic Wheel Truing (pioneered by Thompson). The stationary truer provides instant availability of the truing tool. All wheel head slides are now equipped with hydraulic wheel truing feeds. It is not necessary to disturb the work piece in order to true the wheel.

4. Angular Wheel Truing (pioneered by Thompson). Attachment equipped with two truing tools, both sides of the included angle are trued simultaneously. Universal motor with speed variation 5" to 40" p.m. controlled by governor insures accurate, smooth truing for fine finish and precision on work piece.

5. Automatic Down Feed (exclusive Thompson feature). Feed cycle of .00025" to .004" is available at each table reversal for plunge cutting or at each wheel head feed reversal. Feed mechanism has automatic trip—can be pre-set for size control from elevating hand wheel graduations, duplicating accuracy to .0002".

6. Automatic Sparkout Control (exclusive Thompson feature). Allows table and wheel head to continue finishing cuts after automatic down feed device has reached pre-determined size. At fixed time after work size is reached, table rapid traverses to loading position and stops automatically. Usually furnished in conjunction with automatic down feed. This device maintains accurate duplication of dimensions and makes possible battery installations by releasing operator for loading other machines.

7. Anti-Friction Elevating Unit (exclusive Thompson feature). Friction between screw and nut is reduced 70% to permit accurate feeding to .0001". Also minimizes effort of moving saddle assembly when making new setups without power elevation. Permits inexperienced operators to finish work by following handwheel graduations.

8. Double-Length Bed (exclusive Thompson feature). Massive *double-length* solid-cast beds are provided with heavy cross-section and numerous ribs at vital points to provide absolute rigidity for table.

• • •

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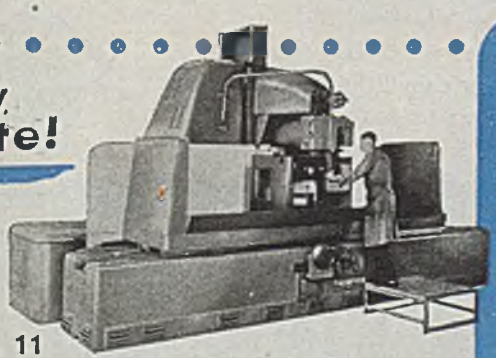

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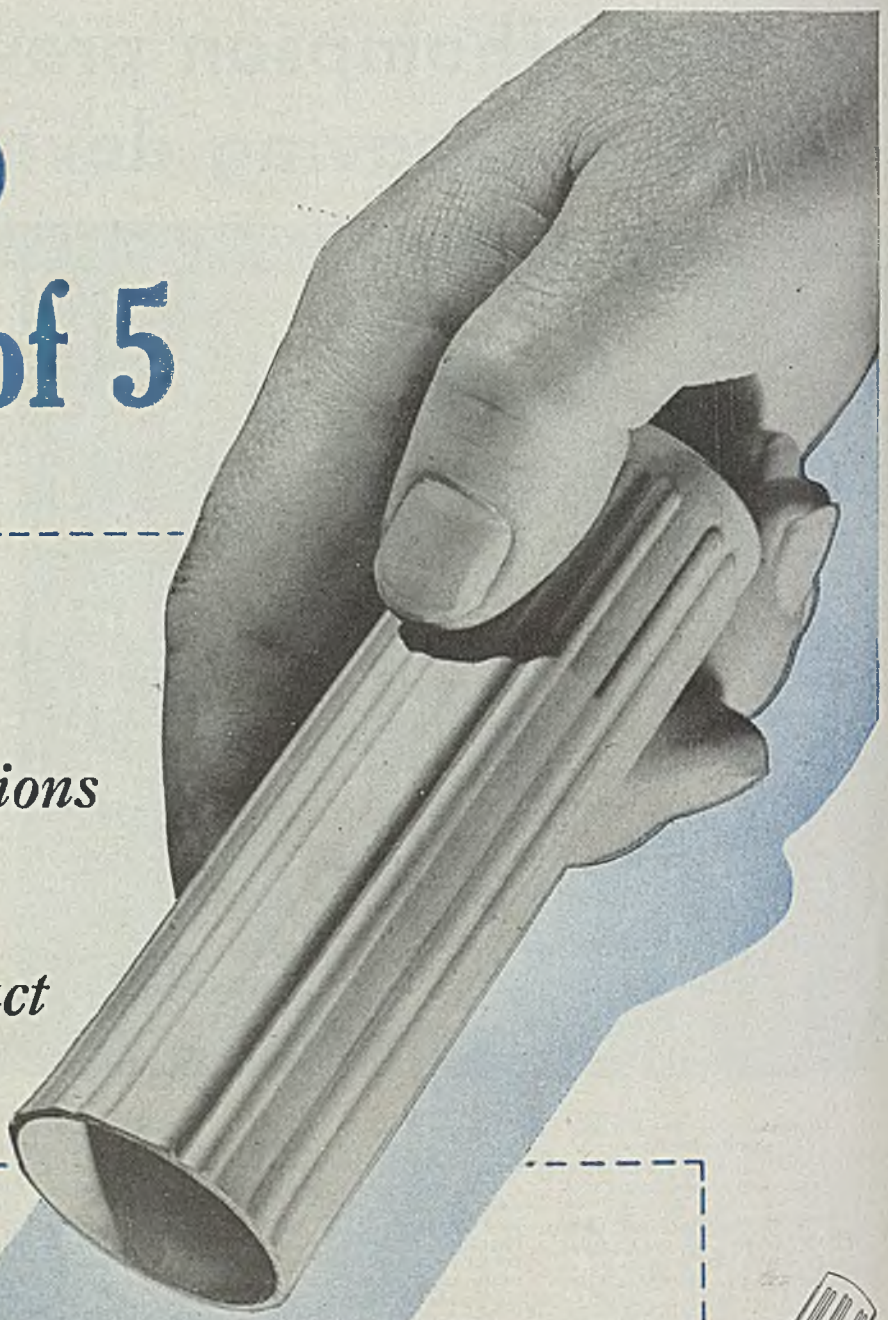
and Alcoa Impact Extrusions give them a finer product



One wallop of the press produces this Alcoa Aluminum impact extrusion —a handle for the Marsh Fountain Stencil Brush. Quite a contrast to the tedious, time-consuming five draws required to make the heavy metal part they previously used.

The fluted outer surface not only dresses up the product, but also provides a nonslip grip. The thick base—four times the thickness of the side wall—takes the punishment meted out when a workman decides to drive a nail with it.

You're many steps nearer the finished product when you start with an Alcoa Aluminum impact extrusion. To learn how they'll fit your processes, get in touch with the nearby Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Pennsylvania.

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specified hardness. Sometimes steel near the low side of the hardenability range, but still within it, may be unsuited for parts which require relatively high hardness. If this occurs, steel specifications should be changed to a material having a higher minimum hardenability—either by specifying a steel with higher carbon or more equivalent alloy content. The specified steel should have sufficient hardenability to always reach the hardness range of the parts involved, even when at the bottom of the standard hardenability range.

Carbon Content Raised

We found it advisable in many cases to raise the carbon content of steel for larger and higher-hardness parts. Sometimes this was done when substitutions were necessary, like substituting 9445 rather than 9440 for 4140. At other times the carbon was raised in the same grade of steel—like 4142 for 4140—if occasional lots of steel barely meet the hardness requirements.

We have no complaints about NE type triple alloy steels, provided they have sufficient hardenability. At present —with the same carbon content—9400 series steel has lower hardenability than 4100 series. Those in the 8600 and 8700 series come closer. If any of these series were modified to have equally good or better hardenability at an equally low cost, we would be quite willing to use them. We never used a satisfactory substitute for 4340 steel, although limited tests indicate that a steel like 9845 might be quite suitable if it were more readily available.

Jominy hardenability tests of carburizing grade alloy steels in the uncarburized condition are used, but they are given no draw like the higher carbon steels. These tests are less helpful than they are on the higher carbon steels. The analyses and grain size have an important bearing on distortion, retained austenite, etc., and are probably more important than they are in the higher carbon steels.

Jominy type tests may be run on specimens under 1 in. diameter. The standard Jominy quenching fixture with ½-in. orifice may be used on specimens as small as ⅜-in. diameter without the water hitting the sides. However, we do not ordinarily run such tests. The usual procedure on these small diameter medium carbon alloy steels is to oil quench a piece a few inches long and record its hardness as quenched and after an 800°F draw. Unless it is exceptionally low alloy steel there is little trouble with these small diameters except that decarburization may be relatively more severe than with some larger diameters.

In conclusion, we found Jominy hard-

enability testing of medium carbon alloy steels very useful—more useful as a rule than chemical analysis. It is less useful on carburizing grade steel. There is little trouble in substituting one alloy steel for another providing the substitute steel has equally great hardenability. We feel that carbon content has sometimes been undesirably low and should be high enough so that medium carbon alloy steel parts will be within the specified hardness range after tempering well above 800°F.

ACKNOWLEDGMENT

The author wishes to thank all members of Austin-Western heat treating and metallurgical departments for their loyal co-operation during the past hectic years, and particularly Mr. Wm. Siekman Jr., who has had charge of metallurgical testing on which this discussion is based.

Handling Bar Stock

(*Concluded from Page* 111)

distance between forks should be greater than width of scale. This permits forks to clear sides of scale when bars are placed on scale. After weight is recorded, forks are raised and bars taken off scale. If platform scales are used, pre-weighed skids or lengths of wood should be placed on scale so that when bars are dropped, there will be sufficient clearance between the bars and scale platform to permit truck forks to be withdrawn before load is weighed. After weighing, the truck forks are inserted between platform and bars, forks raised, and bars removed. If a platform scale of large capacity is used, the fork truck and load can be weighed together. If this is done, weight of truck should be known so that it can be deducted from gross weight.

The fork truck is especially valuable when bars are to be placed in racks. Truck with several bars on the forks may be driven parallel to rack with bars facing into desired section of rack. In this position, bars can be pushed in by hand. Larger bars may be dropped by fork truck on rollers placed in front of rack. Truck then faces bars and pushes them into rack. With special fixtures on forks, truck can rack bars as shown in Fig. 4. Here a specially designed bar-handling rig enables fork truck to carry bars into yard rack and push bars into racks. All heavy work is done by fork truck. Bracket at rear of the rig balances load against weight of truck.

Where spindle racks are used, bars can be racked a bundle at a time. Bundle is placed at end of forks, forks are raised over empty section of rack, and lowered between spindles. Ends of bars catch on spindles and forks drop free.

Hoists are one of the most useful types of bar stock handling equipment. Yard cranes, boom hoists, jib cranes, or car cranes, can be used. Value of the hoist lies in fact it can carry loads in and out of places not accessible to fork trucks. However, since the hoist's power is for vertical lifting, it should not be used for any heavy sideways pulling.

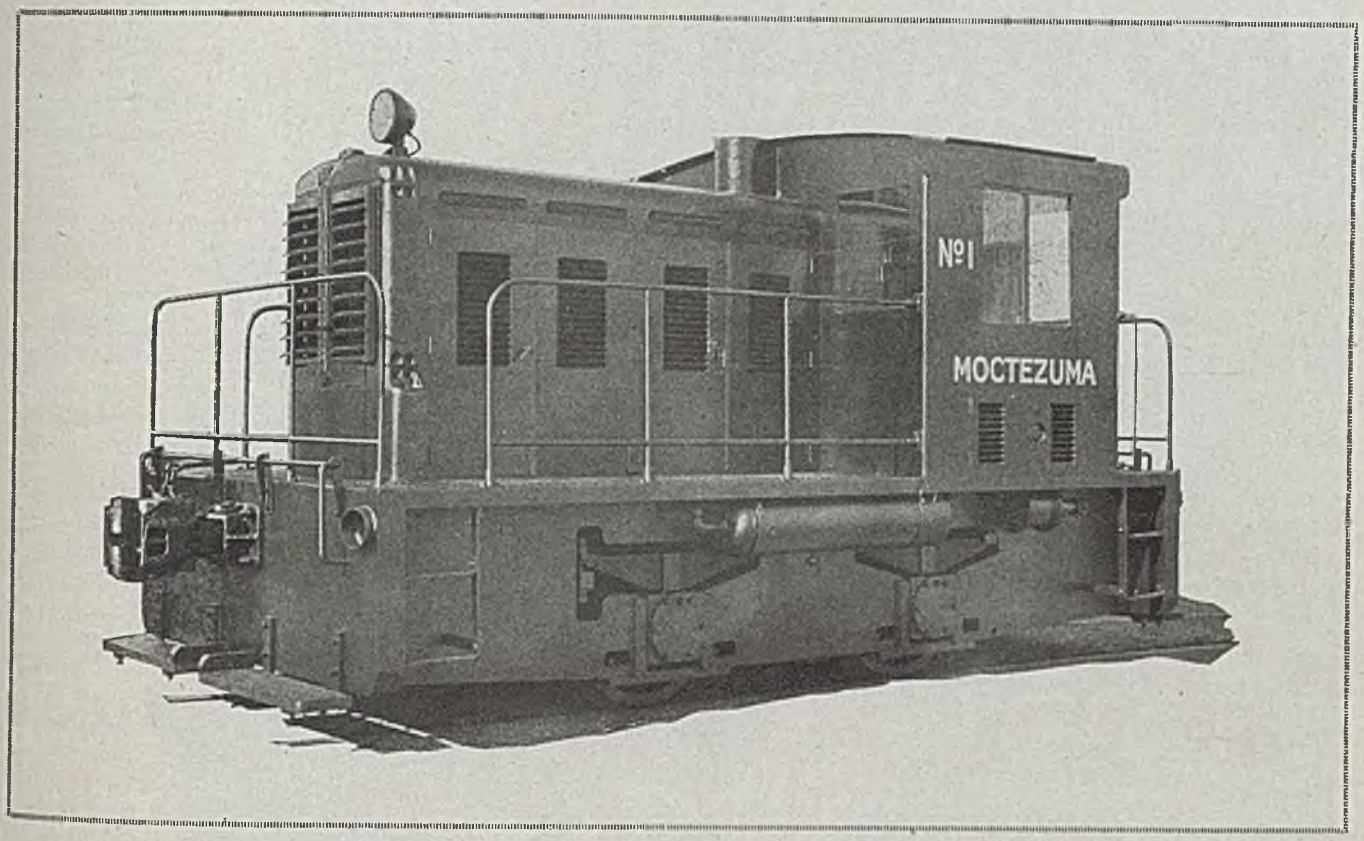
A hoist can be dangerous in hauling bar stock, if care is not exercised. Precautionary steps should become routine. Two men should operate a hoist, one to guide and steer the hoist, the other to guide and steer load. Bars should be bundled before being moved. Load being carried should be considerably lighter than rated capacity of sling or chain. Load chain should always have a lower capacity than hoist chain or wire rope. Thus, if anything gives it will be the load chain and not the hoist itself. Load should always be as close to floor as is convenient for men moving it. It is dangerous to lift loads over racks, saws, and people. Loads should be headed down the aisle not across.

Hoists are useful not only in carrying bars from one place to another and in unloading bar stock from freight cars or trucks, but also in racking bar stock. Depending on type of hoist used, a number of racking operations can be accomplished: (1) Heavy bars can be put into racks by using a hoist alone. Bar is raised till it faces into rack. Hoist is then directed toward rack and bar carried into rack as far as it will go. Hoist is lowered to permit chains to be moved toward end of bar. Hoist is raised and bar pushed in. This is repeated till bar is in rack. (2) Flat or square stock can be handled like heavy bars. However, where several bars are being put into the rack at one time, bars should be held flat in a sling.

General Precautions

Bars should never be left flush on the floor. There must be space for gripping by hand, inserting a chain or sling, or for prongs of a fork truck. Wooden spacers should be made standard equipment where bars stock is stored. Adequate provision should be made to prevent bars from slipping or rolling. Where bars are on the floor on dunnage, upright wooden posts should be nailed on ends of blocks to prevent bars from rolling onto floor. Wagons and trucks for bar stock should have removable sides or stakes to prevent bars from spilling. When bars are carried on prongs of fork trucks, the prongs always should be tilted back. Bundles of bar stock should always be separately blocked, as it is very difficult to extract one bundle from the group where there is little room for insertion of a sling or chain. Rows of bars or bundles should be separated by lengths of board.

Under all circumstances where bar stock is being handled, great emphasis must be placed on safety.



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If high operating and maintenance costs are pushing up your overhead figures on motive power operation, better check against the amazing cost figures that are coming in from satisfied users of Whitcomb Locomotives all over the world.

In the many unsolicited letters received, aside from instances of brilliant performance and amazing durability over years of service, users report very definite savings in fuel and oil consumption and in maintenance and repair costs.

Often these net annual savings represent as much as 30% of the original cost of the Whitcomb Locomotive. At that rate Whitcomb Locomotives pay for themselves within a few years. And they will keep right on piling up savings long after the purchase price is forgotten.

Diesel-Electric 25 tons to 95 tons.
Diesel-Mechanical 3 tons to 40 tons.

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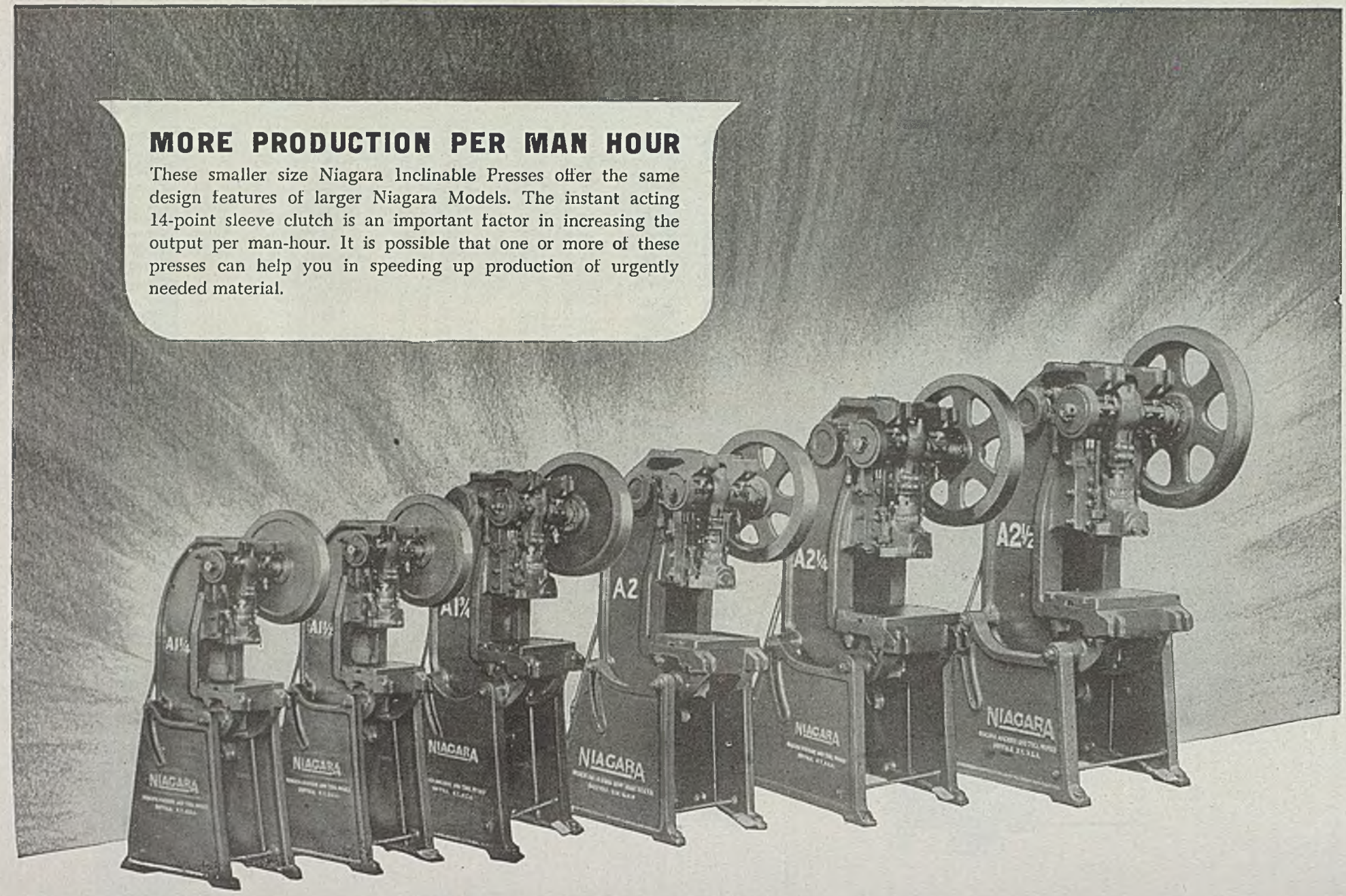

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N. Y. • District Offices: New York, Cleveland, Detroit

Heat Treating Aluminum

(*Continued from Page 79*)

how much copper is in the still molten portion of the material. In fact, such diagrams are called constitutional diagrams.

First we extend a horizontal dotted line left from Point 3 to Curve B (which represents the temperature at which freezing is completed for the different compositions). Then from the point where we strike Curve B, we run a vertical line to the base. Here the copper scale tells us that the alloy that completes freezing out at 1160° F contains about 1¼ per cent copper. So now we know that at Point 3, the crystals forming at Point 3 contain 1¼ per cent copper.

To find the copper content of the still molten portion, we run a horizontal line to the right from Point 3 to Curve A—the curve that indicates the beginning of freezing. At the point where this line strikes Curve A is the amount of copper in the alloy just beginning to freeze. By extending a vertical line from this point on Curve A to the base scale, we find that the molten material contains about 15 per cent copper.

At lower temperatures (between Point 3 and Point 4), the crystals just forming will contain more and more copper. Likewise, the remaining molten material will also contain a greater percentage of copper. Thus as the temperature falls, the material freezing out of solution at any particular moment corresponds to the alloy of aluminum and copper that freezes at that particular temperature. This "differential freezing" was first pointed out under that heading in last week's article.

Thus at any point between Curve A and Curve B, we have a mixture of solid particles and still molten liquid. The solid particles consist of aluminum with a certain amount of copper dissolved in them. When one metal remains dissolved in another like this, the combination is called a "solid solution."

Diffusion: At Point 4, all the material has solidified. By extending a horizontal line to the right to Curve A, we note that the very last crystals to solidify contained about 26 per cent copper, while the very first crystals to solidify (at Point 2) contained practically pure aluminum. So at Point 4 we have grains whose center consists of almost pure aluminum crystals and whose extreme outer surface is formed of crystals having 26 per cent copper. The entire copper content or average throughout the entire grain, however, is 3 per cent, since we can have no more or no less than the 3 per cent with which we started.

Now let's go somewhat below Curve B to say 1018° F—Point 5—and hold

the material at this temperature while we examine what is happening. At any position below Point 4, the material is a solid. But that does not mean that more changes do not occur.

To understand this last statement, we must go back to a fundamental. Any metal can exist in at least three different states—vapor, liquid or solid. In addition, many common metals appear in more than one solid form. These different forms are known as phases.

The aluminum-copper alloys we are studying have four phases—a completely liquid phase in the chart above Curve A, a second phase consisting of solid particles in molten material in the area between Curve A and Curve B, a third phase in the area below Curve B and to the left of Curve C where the material is a solid, and a fourth phase in the area below Curve B and to the right of Curve C where the material is also solid but in a different form as will be explained.

But let's get back to see what happens when we hold the temperature at Point 5—1018° F. At this comparatively high temperature, the phenomena we called solid diffusion (explained under homogenizing last week) proceeds at a comparatively rapid rate. This means that the fairly large amounts of copper near the grain boundaries diffuse rapidly inward throughout all portions of the grain so that it is not long before every crystal in the grain contains the same amount of copper—3 per cent in our example.

Point 5 can be said to be typical of any point between Point 4 and Point 6 in that anywhere in this range, the copper will diffuse throughout the entire structure if the temperature is held for a sufficient period of time. Of course, the diffusion progresses more rapidly at the higher temperatures, which means that a shorter period of time would be required for complete diffusion at those temperatures—again emphasizing the importance of time in the heat-treating cycle.

Precipitation: Curve C is the line indicating the beginning of the formation of a compound containing copper and aluminum called copper aluminide ($CuAl_2$). This compound starts to separate or precipitate out of the material at any temperature below Point 6—920° F for the 3 per cent alloy under consideration. This precipitation of a solid from out of another solid was mentioned previously in our discussion of precipitation.

At Point 7, more copper has separated out as copper aluminide. In fact at this temperature (around 850° F) about 99 per cent of the material is in the form of a copper aluminum alloy containing 2½ per cent copper, the remainder or other ½-per cent of copper being in the copper aluminide particles which have precipitated out of the copper-aluminum

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alloy and now exists between crystals and between grains. The other 1 per cent of material is in the form of copper aluminide. This now contains about ½-per cent of the total amount of copper, which of course is still 3 per cent since we have not added or taken away any of the original copper. At Point 8, Fig. 12, still more copper has precipitated out in the form of copper aluminide.

To develop maximum strength in the aluminum alloys, it is necessary to control carefully the size and distribution of the material precipitated out as it is this material which affords the added strength (due to keying, etc.) as previously explained.

Controls, Quenching: Now let's examine how heat treatments are used for strengthening the aluminum alloys and see what controls are employed to bring about the proper size and distribution of the precipitated particles.

First step is to bring the aluminum alloy up to the specified temperature, which will lie somewhere between Curve B and Curve C on the constitution diagram for the particular alloy under consideration. A whole series of constitution diagrams for various aluminum alloys will be found in the *Metals Handbook*. A diagram for aluminum-copper alloys, similar to our Fig. 12, can be found there.

Purpose of this first step is to dissolve the precipitated constituents, so they can later be re-precipitated in the form wanted. The material must be held at the specified temperature for a sufficient period of time for this dissolving action to occur throughout all portions of the piece being treated. This maintaining "at temperature" for the specified length of time is called soaking and constitutes the second step in the heat-treating cycle.

The third step is to cool the work rapidly (quench) by plunging the part into cold water. Purpose of suddenly dropping the temperature of the part in this manner is to prevent certain constituents from precipitating out, which they would do if cooled slowly. Here slow cooling would also tend to produce a precipitate consisting of large particles instead of the type we want.

Quenching from any particular temperature range tends to retain in the metal the structure present just before quenching. Thus quenching not only prevents the precipitation of certain constituents that we do not want to precipitate at that time, but it also helps control the constituents that we do want out of solution.

Purpose of the entire heat-treating cycle is to develop the right kind of precipitate in the right place in the metal structure. The precipitate we want should be of the "gritty" type rather than the "ball

bearing" type, as previously explained, in order to provide the maximum resistance to slippage of crystals. Also the precipitate must be uniformly distributed in extremely minute particles between crystals where it can exert maximum keying effect, rather than outside the grains or along grain boundaries.

Aging: The fast cooling to near room temperature upon quenching produces a supersaturated condition where the material has already dissolved in it more of the constituents than it normally can carry in solution at that temperature. Such a condition obviously is unstable. The result is that certain constituents begin to separate out or precipitate from the main mass of the aluminum alloy.

This precipitation occurs at room temperature with many of the aluminum alloys and this action then is known as natural aging. Certain other alloys must be heated slightly to bring this precipitation to completion within a reasonable length of time. This is called artificial aging. In either case, this controlled precipitation is aimed at providing the correct size, character and distribution of the precipitated particles in the aluminum to produce maximum strength and other mechanical properties that may be desired.

It should be pointed out that aluminum alloys hardened in this manner can be made soft and easily workable again by an annealing treatment. (However annealing alone will not produce maximum workability in aluminum alloys that have been heat treated, for additional cold working and subsequent re-annealing is required in these instances.) Recommended annealing cycles are designed to produce a precipitate in the form of large particles outside the grains along the grain boundaries and not inside between crystals. In this manner, minimum keying effect results and the material is "soft" because the crystals easily slip along their slip plates. This redistribution of the precipitate is in addition to the re-crystallization effect mentioned in our first discussion of annealing, that appeared in the first part of this article last week.

It will be evident from the explanation presented here that it is necessary to follow closely the recommended heat-treating cycles in order to produce maximum mechanical properties in the aluminum alloy. Even slight variations from the recommendations can cause considerable difficulty.

Recommended heat-treating cycles for the various aluminum alloys will be found in Parts IV and V, as will a more technical discussion of these heat treatments and information on possible difficulties and their solution.

(To be continued next week)

The Business Trend

Production Edges Up to Another Postwar High

GAINS in steel ingot, automobile, and electric power production pushed STEEL's industrial activity to a new postwar high mark of 152 per cent (preliminary) in the week ended Aug. 17. This is a rise of 2 points over the previous week.

In making gains, both steel ingot and automobile production reached new postwar levels. Steel ingot output was at 90 per cent of capacity, and automobile production totaled 88,560 passenger cars and trucks, compared with 77,825 in the week ended Aug. 10 and the previous postwar high mark of 84,720 in the week ended July 27.

Reflecting the uptrend in industrial production, electric power output in the week ended Aug. 17 also reached a new postwar high level.

Although the trend of industrial production has been upward, industrialists are keeping an apprehensive eye on the Great Lakes maritime strike in an effort to foresee its ultimate effect on industry as a whole.

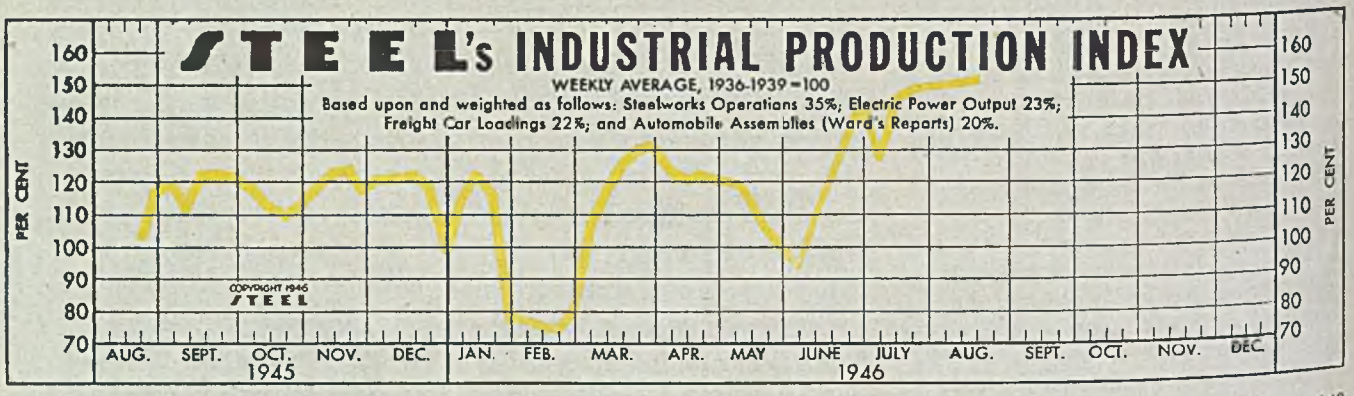
COAL—Continued high output of bituminous coal is whittling down the production deficit incurred during the miners' strike a few months ago, with the result that output this year through Aug. 10 is only 16.4 per cent below that for the corresponding period in 1945. Weekly production is running close to 12½ million tons.

PRICES—Inflationary movement of prices pushed the U. S. Bureau of Labor Statistics index of wholesale prices in the week ended Aug. 10 up to 127.1 per cent of the 1926 average. The current level is 20.5 per cent higher than at the end of the war. During the past two weeks, the index has advanced 2.4 per cent.

COST OF LIVING—The cost of living rose 1.4 per cent between Mar. 15 and June 15 and is now higher than at any time since January, 1921, according to the National Industrial Conference Board.

BUILDING—The estimated value of building permits issued in 215 cities turned upward in July, following three successive monthly declines, Dun & Bradstreet Inc. reported. Aggregate permit valuations in July were 10.8 per cent above those of June and 140 per cent higher than those of July, 1945. The approximate value of permits taken out in the 215 cities during the first seven months of 1946 was $1,700,819,182, the largest for any similar period since 1929 and almost three and one-half times the construction volume for the corresponding period of 1945.

RAILROADS—Advance reports from 86 Class I railroads, whose revenues represent 80.2 per cent of total operation revenues, indicate that railroad operating revenues in July decreased 16 per cent under that month in 1945, according to the Association of American Railroads. This estimate covers only operating revenues and does not touch upon operating expenses, taxes, or final income results. Estimated freight revenues in July, 1946, were less than in July, 1945, by 13.1 per cent, while estimated passenger revenues decreased 26.4 per cent.



The Index (see chart above): Latest Week (preliminary) 152 Previous Week 150 Month Ago 148

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)§	90	89	88	60
Electric Power Distributed (million kilowatt hours)	4,422	4,412	4,293	3,939
Bituminous Coal Production (daily av.—1000 tons)	2,050	2,042	2,116	1,915
Petroleum Production (daily av.—1000 bbls.)	4,843	4,821	4,937	4,934
Construction Volume (ENR—Unit $1,000,000)	$129.1	$119.6	$121.6	$49.1
Automobile and Truck Output (Ward's—number units)	88,560	77,825	80,985	11,205

*Dates on request. §1946 weekly capacity is 1,762,381 net tons. 1945 weekly capacity was 1,831,636 net tons.

TRADE				
Freight Carloadings (unit—1000 cars)	903‡	899	921	653
Business Failures (Dun & Bradstreet, number)	17	27	25	5
Money in Circulation (in millions of dollars)‡	$28,353	$28,326	$28,241	$27,351
Department Store Sales (change from like wk. a yr. ago)‡	+29%	+30%	+26%	−17%

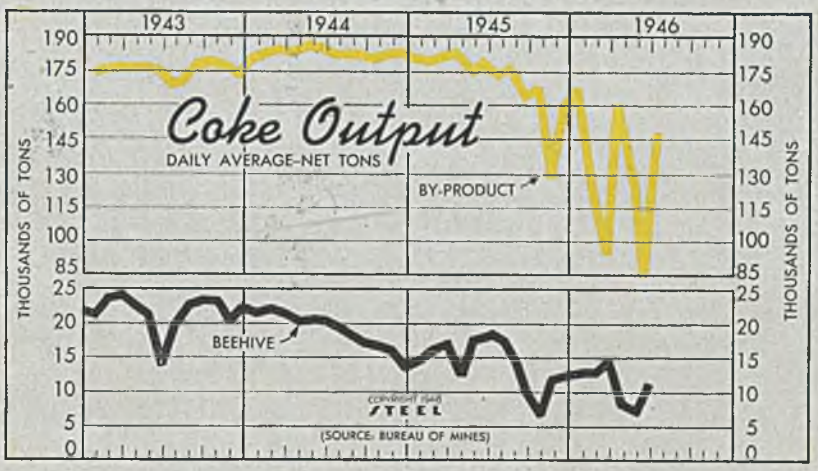
‡Preliminary. ‡Federal Reserve Board.

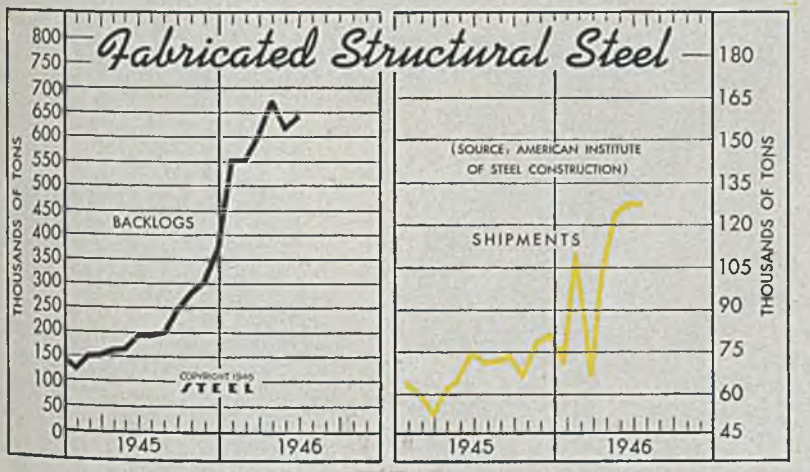
Coke Output

Bureau of Mines

(Daily Average—Net Tons)

	By-Product		Beehive	
	1946	1945	1946	1945
Jan.	122,570	179,879	13,069	14,745
Feb.	93,985	180,727	13,064	16,210
Mar.	161,290	182,120	14,897	17,115
Apr.	128,394	174,239	811	12,554
May	83,019	178,338	708	17,963
June	146,583	172,201	11,359	18,016
July	.....	175,163	.....	17,682
Aug.	.....	163,567	.....	14,669
Sept.	.....	166,559	.....	9,924
Oct.	.....	127,173	.....	6,407
Nov.	.....	159,646	.....	12,218
Dec.	.....	166,648	.....	12,659
Ave.	.....	168,855	.....	14,230





Fabricated Structural Steel

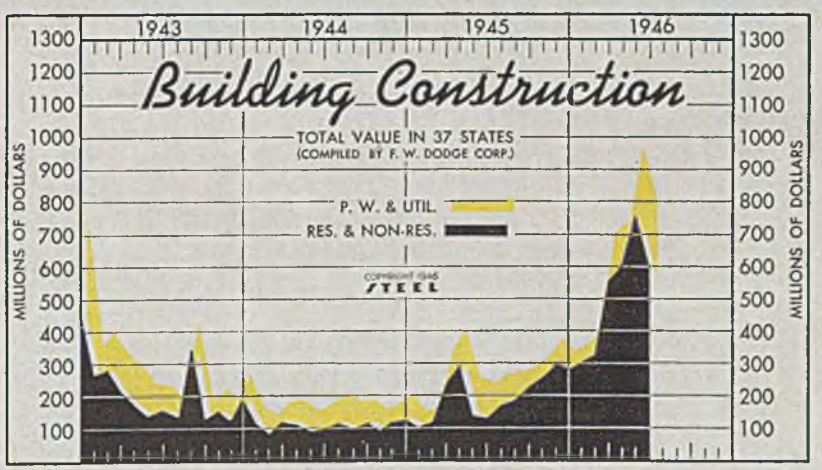
(000 Tons)

	Shipments			Backlogs		
	1946	1945	1944	1946	1945	1944
Jan.	107.5	57.0	35.2	552	124.4	113.1
Feb.	83.8	49.0	42.9	551	151.6	117.6
Mar.	102.8	59.5	41.4	605	153.3	108.3
Apr.	122.3	62.8	44.5	674	162.5	111.2
May	124.0	72.6	50.7	615	165.7	116.3
June	124.1	69.2	43.0	642	195.2	122.7
July	....	69.9	45.3	...	194.0	125.4
Aug.	....	70.6	55.2	...	201.1	130.4
Sept.	....	63.4	57.5	...	248.5	151.1
Oct.	....	76.6	61.6	...	282.8	174.4
Nov.	....	78.0	59.4	...	304.9	184.2
Dec.	....	68.8	61.3	...	375.2	142.5
Total	....	797.4	597.9	...	....	....

Construction Valuation in 37 States

(Unit—$1,000,000)

	Total	Public Works-Utilities		Residential and Non-Residential	
	1946	1946	1945	1946	1945
Jan.	357.5	50.2	39.8	307.3	101.2
Feb.	387.4	64.7	32.0	322.7	115.0
Mar.	697.6	143.6	90.6	554.0	238.3
Apr.	734.9	128.1	111.9	606.8	283.9
May	952.4	197.9	107.9	754.6	134.6
June	807.9	....	95.0	605.5	132.3
July	....	....	89.9	....	167.8
Aug.	....	....	77.5	....	186.1
Sept.	....	....	54.6	....	223.6
Oct.	....	....	61.1	....	255.5
Nov.	....	....	74.0	....	296.0
Dec.	....	....	51.0	....	279.7
Total	....	....	885.3	....	2,414.0



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,092	$11,791	$13,076	$7,865
Federal Gross Debt (billions)	$267.7	$267.5	$268.3	$263.0
Bond Volume, NYSE (millions)	$17.4	$15.6	$17.8	$18.1
Stocks Sales, NYSE (thousands)	3,747	4,102	4,660	3,096
Loans and Investments (billions)†	$59.8	$60.7	$60.6	$63.1
United States Gov't. Obligations Held (millions)†	$41,454	$42,296	$42,185	$46,771

*Member banks, Federal Reserve System.

PRICES

	Latest Week	Prior Week	Month Ago	Year Ago
STEEL's composite finished steel price average	$64.45	$64.45	$64.45	$58.27
All Commodities†	127.1	125.0	120.7	105.7
Industrial Raw Materials†	145.7	140.6	137.2	117.7
Manufactured Products†	121.3	120.6	115.3	102.0

†Bureau of Labor Statistics Index, 1926 = 100.

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HELPFUL LITERATURE

1. Forgings & Rail Equipment

Pittsburgh Forgings Co. & Greenville Steel Car Co.—64-page illustrated book entitled "A Pictorial Record of Pittsburgh Forgings Company and the Greenville Steel Car Company" covers history, manufacturing facilities and war production of these companies. Plant scenes and typical products fabricated are shown.

2. Diamond Wheels

Diamonds & Tools Inc.—16-page illustrated bulletin describes metal bond and ceramic bond diamond wheels for industrial uses. Complete dimensional data, specifications, types and grades and price lists are included.

3. Sealed Housings

Electrical Equipment Div., Federal Electric Co.—4-page illustrated folder "Fedelco-Sealing Service" presents design and manufacturing engineering service to manufacturers of electrical and mechanical devices for suitable enclosures, base, brackets and terminals. Devices can be sealed against humidity, fungus, insects and dust.

4. Rod Selector Chart

Eutectic Welding Alloys Corp.—18 x 23-inch wall chart for welders contains factual information on bonding and remelting temperatures for alloys as well as Brinell hardness. Strength in pounds per square inch of low temperature welding alloys is covered.

5. Limit Stops

Electric Controller & Mfg. Co.—8-page illustrated bulletin No. 1032 contains information on Youngstown safety limit stops for alternating and direct current materials handling cranes. Diagrams of various applications, sizes and standard features are included.

6. Industrial Trucks

Elwell-Parker Electric Co.—8-page illustrated catalog entitled "The Logistics of Bales" contains detailed discussions on selection of correct type of container in relation to materials handling, space limitations and transportation. Bale shipping and packaging is covered pictorially and editorially.

7. Multi-Stage Pumps

Economy Pumps, Inc.—8-page illustrated catalog No. C-945 covers casings, impellers, bronze diaphragms, balancing devices, stuffing boxes, shafts, bearings, bed plates, and painting of split case multistage pumps. Outline drawings and diagrams are included for observation.

8. Transfer Process

Eastman Kodak Co.—4-page pocket sized folder "Linagraph Transfer Process" reveals method of putting drawings on metal with photographic speed and accuracy. Complicated drawings can be reproduced at rate of 1000 square feet per hour with no chance of error. Process is pictorially presented.

9. Chipping Hammer

Ingersoll-Rand Co.—22 x 38-inch illustrated metal bound wall chart entitled "Easy Repair Operations for I-R Flapper Valve Chippers" graphically presents various parts of hammer and tools required for proper maintenance in plants, steel mills, foundry and shipyards. Clearances and settings are expressed in steel rule and micrometer values.

10. Mill Type Shears

Thomas Machine Mfg. Co.—8-page illustrated bulletin No. 126 lists specifications of several mill type plate shears which are built in sizes to handle thicknesses of up to 3 inches and widths to 14 feet or more.

11. Overhead Cranes

American MonoRail Co.—8-page illustrated bulletin No. MF-1 outlines development of MonoRail cranes during wartime to overcome various types of materials handling problems in variety of types of manufacturing plants. Accessories for use with systems are described also.

12. Plastics

General Electric Co.—20-page illustrated catalog entitled "1 Plastics Avenue" covers science of plastics from beginning to present day maturity. Sections are devoted to research and development, design and engineering, mold making, manufacturing, compression molding, injection molding, lamination processes and low pressure molding.

13. Weldments

Weldry Div., Graver Tank & Mfg. Co.—19-page illustrated catalog "Weldments" offers comprehensive discussion of weldments as modern metal fabrication method. Advantages, flexibility, requirements and comparative costs are included.

14. Fastening Device

B. F. Goodrich Co. — 10-page illustrated booklet entitled "Why a Rivet Went Nuts" describes Rivnut one-piece internally threaded and counterbored tubular rivet which can be upset or headed from one side and used as rivet, nut plate or both. Suggested applications are included.

15. Tool Steels

Crucible Steel Co.—30-page illustrated booklet entitled "Tool Steel for the Non-Metallurgist" explains characteristics of different types of tool steels and purpose for which each is best adapted. Suggestions for heat treatment are outlined. Tables give steels and corresponding Crucible brands.

16. Chipping Hammers

Cleveland Pneumatic Tool Co.—12-page illustrated bulletin No. 75B, second edition, presents information on 47 different sizes and styles of chipping, caulking and beading hammers. Suggested applications and accessories are listed.

17. Pneumatic Equipment

Curtis Pneumatic Machinery Div., Curtis Mfg. Co.—12-page bulletin and tear sheets present line of pneumatic equipment for wide range of industrial uses. Air compressors of all types and sizes are listed and specifications, construction features and applications are discussed. Price lists are included.

18. Flexible Couplings

American Flexible Coupling Co.—32-page illustrated catalog No. 461 presents data and information on American and Amerigear flexible couplings. Complete engineering data, specifications and load factors as well as installation and operating data are included.

19. Milling Machines

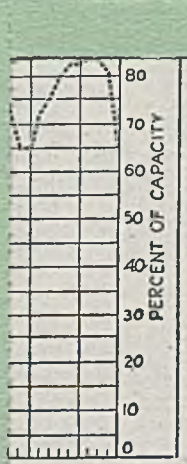
Cincinnati Milling Machine Co.—12-page illustrated catalog No. M-1429-1 presents specifications, construction features, standard equipment and dimensional drawings of plain and universal milling machines. Spindle speeds, feeds, lubrication, controls, and mounting information is included.

20. Electronic Heaters

Allis-Chalmers Mfg. Co.—4-page illustrated bulletin No. B6372 explains application of vacuum tube electronic heaters for both induction heating of metals and dielectric heating of nonmetallic materials. How two types of heating operate and advantages of each are pointed out. Applications are indicated. Production setup of standard 20-kilowatt heater is shown.

21. Diesel Engines

Cooper-Bessemer Corp.—4-page illustrated bulletin No. L-31 describes type LS stationary diesel engines. Cross sectional views, graphs showing rating curve for operation and specifications are given. Standard equipment is listed.



ous interruption due to the Maritime Union's strike could result in a shortage. However, stocks of Lake Superior ore at furnaces and docks on Aug. 1 were slightly higher than a year ago, being 30,438,615 gross tons, compared with 29,485,221 tons at the same date last year. Consumption is increasing, that of July being 6,423,035 tons, compared with 4,994,936 tons in June and nearly equal to the 6,532,273 tons smelted in July, 1945.

With OPA ceilings unchanged, average composite prices of iron and steel products are steady at the levels prevailing the past few weeks. Finished steel composite is $64.45, semifinished steel $40.60, steelmaking pig iron $27.50 and steelmaking scrap $19.17.

22. Flow Meters

Bristol Co.—8-page illustrated bulletin No. F1603 presents information on bellows-differential flow meters including mechanical and electric types and pneumatic transmissions. These meters use no mercury or liquid and require no lubrication. No part of meter-body shaft contacts measured fluid.

23. Laboratory Units

Refrigeration Div., Bowser, Inc.—4-page illustrated bulletin describes laboratory units for testing and processing at temperatures as low as —100 F. Specifications of 15 models are included.

24. Ball Bearings

Bearings Company of America—44-page illustrated spiral bound engineering data book, fourteenth edition, describes ball bearings and allied products. Specifications and engineering data are included on all types of ball bearings. Descriptive index simplifies location of specific bearings for specified duty.

25. Demineralizer

Boder Scientific Co.—2-page illustrated bulletin No. 111 describes Barnstead Bantam demineralizer for purifying water without use of heat, chemicals or electricity. Performance curves with hard and soft water are shown.

26. Cranes & Monorails

Abell-Howe Co.—12-page illustrated catalog describes overhead cranes and monorails for transportation of raw materials, work in progress and finished goods and for economical storage. Complete materials handling service available is outlined. Illustrations show numerous typical installations.

27. Welding Electrodes

Arcos Corp.—Fileable folding reference chart gives stainless steels by tradenames and proper Arcos alloy electrodes for welding each. Chromend electrodes for direct current reverse polarity welding and Stainlend electrodes for alternating and direct current welding are discussed.

28. Hobbing Machine

Barber-Colman Co.—8-page illustrated bulletin describes type D hydraulic hobbing machine for accurate heavy duty high production manufacturing. Hydraulic actuation and important mechanical improvements are covered. Dimensions and specifications are given.

29. Mechanical Goggle Valves

William M. Bailey Co.—6-page illustrated bulletin describes mechanical goggle valves in sizes from 6 to 72 inches in sizes for gas washers, precipitators, boiler plants, coke plants, blast furnace gas mains, chemical and metallurgical plants. Design and construction features are outlined.

30. Time Switches

Automatic Temperature Control Co.—4-page illustrated bulletin No. T-55 covers specially built time switches for volume users. Units for machines and process equipment where emphasis must be placed on low cost units and volume are covered. Wiring diagrams and applications for six types are shown.

31. Plastics

E. I. du Pont de Nemours & Co.—12-page illustrated brochure entitled "Du Pont Plastics" covers Lucite acrylic resin, Polythene, nylon, BCM low pressure laminating resin, cellular cellulose acetate, Butacite, Pyralin and Plastacele plastics. Workability and characteristics of each are listed.

32. Mill Products

Ampco Metal, Inc.—16-page illustrated bulletin No. 64B describes Ampco extruded rounds and shapes, rolled metal sheet, hollow bars and swaged rod. Material has exceptional resistance to wear, impact, fatigue and corrosion. Other features and characteristics are described in detail.

33. Diesel Nozzle Tester

Buda Co.—4-page illustrated bulletin No. 1238 describes universal diesel nozzle tester, a low cost portable tool that will test all makes and models of diesel nozzles and injectors.

34. Plastics

Nixon Nitrate Works — 12-page illustrated bulletin "Colorful Nixon Plastics" lists properties of cellulose nitrate rods, tubes and sheets, and cellulose acetate sheets. Typical uses are suggested. Data are given on cellulose acetate molding powder, ethyl cellulose molding powder and luminescent plastics.

35. Alloy Iron & Steel Castings

American Cast Iron Pipe Co.—56-page illustrated spiral bound catalog and data book describes centrifugally cast Acipco steel parts and tubes and industrial alloy iron castings. Specifications, characteristics and properties are covered fully. Production data are included.

36. Welding Electrodes

Alloy Rods Co.—6-page bulletin No. NA7-45 presents data on Nickel-Arc electrodes for use in making machinable welds on cast iron. Requiring no preheating, they are suitable for all-position welding on either alternating or direct current. Other advantages are cited.

37. Oxyacetylene Processes

Air Reduction Sales Co.—30-page illustrated bulletin entitled "New and Improved Oxyacetylene Methods for Steel Foundries" describes oxyacetylene processes for speeding production in steel foundries. Removal of risers, gates and sprues; flame scarfing to remove padding where risers have been removed; flame gouging for removal of webs, fins and defects; and flame descaling of normalized and annealed castings are covered.

38. Pumps

John S. Barnes Corp.—Three catalog pages describe Roto-Blade pumps Nos. N-471-A, N-491-A and N-511-A. These pumps are direct drive, flange mounted and have suction filter. Capacities range from 8.5 to 50 gallons per minute at 1200 revolutions per minute. Specifications are covered.

39. Materials Handling

American Hoist & Derrick Co.—30-page illustrated general catalog form No. GC1 presents complete line of materials handling equipment, including blocks and sheaves, cane handling machines, cranes, material elevators, pile drivers, car pullers, derricks, hoists, marine deck machinery, Handiwinches, Crosby wire rope clips and ditchers.

40. Plating Supplies

Udylite Corp. — 10-page folder "Udylite Price Guide for Plating and Polishing Supplies" lists prices of plating salts, anodes, chemicals, accessories and polishing supplies.

41. Gears & Gearing

D. O. James Mfg. Co.—575-page illustrated catalog No. 1000 presents power saving information, engineering data, dimensions, rating tables and design and application data on cut gears, gear speed reducing transmissions and flexible couplings. One-hundred page engineering section includes technical information on gear design problems.

42. Arc Welders

General Electric Co.—20-page illustrated bulletin No. GEH-1334 presents engineering data, construction features and specifications of motor or belt-driven direct current arc welders. Eleven models are presented and instructions and parts lists are included.

43. Buffing Compounds

J. J. Siefen Co.—3-page bulletin "Spraying Compositions to Buffs" discusses development and application of spray method of applying buffing compounds to revolving wheels. Step-by-step procedure is outlined and various application methods explained.

44. Potentiometer-Pyrometer

Bailey Meter Co.—16-page illustrated bulletin No. 232 presents information on Pyrotron electronic potentiometer pyrometer which is recorder-controller continuously recording one or two temperatures on circular 24-hour chart. Design, construction, specifications, performance data and standard charts available are discussed.

STEEL 14
1213 West Third St., Cleveland 13, Ohio

1	11	21	31	41
2	12	22	32	42
3	13	23	33	43
4	14	24	34	44
5	15	25	35	45
6	16	26	36	46
7	17	27	37	47
8	18	28	38	48
9	19	29	39	49
10	20	30	40	50

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COMPANY _____

PRODUCTS MANUFACTURED _____

ADDRESS _____

CITY AND STATE _____

This card MUST be completely filled out. Please TYPE or PRINT

Steel Supply to Consumers Better Despite Shortages

Lack of scrap and pig iron threaten to cut down present high rate but mills continue to hold position . . . Some prices are advanced

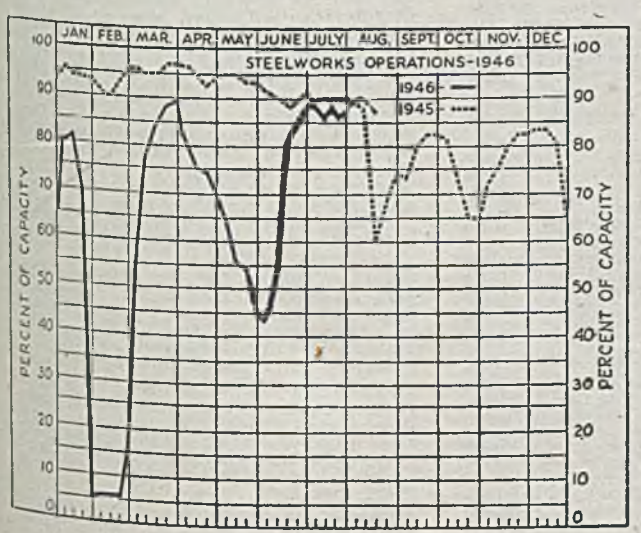
ALTHOUGH steel producers generally are still well behind on their commitments, flow of steel to consumers and jobbers is at peak for the year to date. How much longer present rate of shipments will be maintained or increased, will depend in large measure on supply of raw materials, particularly scrap, and the outlook is not promising. With overall supply of these materials as acute as ever and with consumers' stocks at the lowest point reached since before the war indications point to a decline in steel production unless new remedial measures can be applied promptly, especially with regard to scrap, on the price of which dealers and Washington continue at odds.

Plate production in some districts, curtailed for weeks because of pig iron and scrap shortages, has declined further and an important producer now operating at 40 to 50 per cent is considering suspending entirely within a week or two.

The situation in pig iron shows some signs of betterment, temporarily at least, with two eastern stacks changing from foundry grades to basic, giving steel mills in that area a better supply of iron. At the same time scrap supply is smaller.

Maritime Commission has definitely advised shipbuilders of the abandonment of plans to go ahead on construction of two superliners for the Pacific trade. Bids were to have been taken Sept. 20, each ship to take 18,000 tons of steel, including 12,000 tons of plates. Also plans for going ahead at present on three liners for the Mediterranean trade, on which Bethlehem Steel Co. is low, have been given up.

In spite of difficulties in maintaining production in the face of shortages the industry is maintaining a high level. The estimated national rate for last week receded only 1 point to 89 per cent of capacity, after establishing a high the prior week, best since July of last year. Eight of the districts showed slight declines, in most cases because of necessity for furnace repair, though some resulted from lack of scrap and pig iron. Pittsburgh declined 1½ points to 97 per cent, Cleveland 1½ points to 90, Buffalo 2½ points to 86, Wheeling 8½ points to 85, Detroit 4 points to 86, Cincinnati 5 points to 84, Birmingham 6 points to 93 and New England 4 points to 86. Unchanged rates were maintained at Chicago 92½ per cent, Youngstown 88, St. Louis 54½, eastern Pennsylvania 81 and West Coast 84.



DISTRICT STEEL RATES

(Percentage of Ingot Capacity Engaged in Leading Districts)

	Week Ended Aug. 24	Change	Same Week 1945	Same Week 1944
Pittsburgh	97	— 1.5	50	90.5
Chicago	92.5	None	80.5	97.5
Eastern Pa.	81	None	70	93.5
Youngstown	88	None	72	92
Wheeling	85	— 8.5	96	92
Cleveland	90	— 1.5	77	90
Buffalo	86	— 2.5	62.5	90.5
Birmingham	93	— 6	95	95
New England	86	— 4	78	80
Cincinnati	84	— 5	86	88
St. Louis	54.5	None	65	87
Detroit	86	— 4	81	82
Estimated national rate	89	— 1	70	95

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Prices of fire clay, silica and ladle brick have been advanced $4 to $6 per thousand to make up for increased manufacturing costs, as OPA control has been lifted. Prices on magnesite and basic brick continue unchanged from recent levels. Office of Price Administration has allowed an increase of $1.75 per ton on soil pipe, which producers say takes this product out of the red by a slight margin. On revival of OPA the price was rolled back to the June 30 level and this resulted in relatively little being produced. As this product is important in the housing program the price relief was granted to assure larger supply.

Maximum operation of the Great Lakes fleet during the remainder of the season will be necessary to assure an adequate supply of iron ore to carry the industry over to the opening of the shipping season next spring. Any serious interruption due to the Maritime Union's strike could result in a shortage. However, stocks of Lake Superior ore at furnaces and docks on Aug. 1 were slightly higher than a year ago, being 30,438,615 gross tons, compared with 29,485,221 tons at the same date last year. Consumption is increasing, that of July being 6,423,035 tons, compared with 4,994,936 tons in June and nearly equal to the 6,532,273 tons smelted in July, 1945.

With OPA ceilings unchanged, average composite prices of iron and steel products are steady at the levels prevailing the past few weeks. Finished steel composite is $64.45, semifinished steel $40.60, steelmaking pig iron $27.50 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Aug. 24	Aug. 17	Aug.10	One Month Ago July, 1946	Three Months Ago May, 1946	One Year Ago Aug., 1945	Five Years Ago Aug., 1941
Finished Steel	$64.45	$64.45	$64.45	$64.45	$63.54	$58.27	$56.73
Semifinished Steel	40.60	40.60	40.60	40.60	40.60	37.80	36.00
Steelmaking Pig Iron	27.50	27.50	27.50	27.50	25.50	24.00	23.00
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	19.17

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 (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Aug. 24, 1946	July, 1946	May, 1946	Aug., 1945
Steel bars, Pittsburgh	2.50c	2.50c	2.50c	2.25c
Steel bars, Philadelphia	2.86	2.86	2.82	2.57
Steel bars, Chicago	2.50	2.50	2.50	2.25
Shapes, Pittsburgh	2.35	2.35	2.35	2.10
Shapes, Philadelphia	2.48	2.48	2.465	2.215
Shapes, Chicago	2.35	2.35	2.35	2.10
Plates, Pittsburgh	2.50	2.50	2.50	2.25
Plates, Philadelphia	2.558	2.558	2.55	2.30
Plates, Chicago	2.50	2.50	2.50	2.25
Sheets, hot rolled, Pittsburgh	2.425	2.425	2.425	2.20
Sheets, cold-rolled, Pittsburgh	3.275	3.275	3.275	3.05
Sheets, No. 24 galv., Pittsburgh	4.05	4.05	4.05	3.70
Sheets, hot-rolled, Gary	2.425	2.425	2.425	2.20
Sheets, cold-rolled, Gary	3.275	3.275	3.275	3.05
Sheets, No. 24 galv., Gary	4.05	4.05	4.05	3.70
Hot-rolled strip, over 6 to 12-in., Pitts.	2.35	2.35	2.35	2.10
Cold-rolled strip, Pittsburgh	3.05	3.05	3.05	2.80
Bright basic, bess. wire, Pittsburgh	3.05	3.05	3.05	2.75
Wire nails, Pittsburgh	3.75	3.75	3.25	2.90
Tin plate, per base box, Pittsburgh	$5.25	$5.25	$5.25	$5.00

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$38.00	$38.00	$38.00	$36.00
Slabs, Pittsburgh, Chicago	39.00	39.00	39.00	36.00
Rerolling billets, Pittsburgh	39.00	39.00	39.00	36.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.30c	2.30c	2.30c	2.15c

Pig Iron

	Aug. 24, 1946	June, 1946	Apr., 1946	July, 1945
Bessemer del. Pittsburgh	$29.77	$29.69	$27.69	$26.19
Basic, Valley	28.00	28.00	26.00	24.50
Basic, eastern del. Philadelphia	29.93	29.93	27.84	26.34
No. 2 fdry., del. Pgh. N. & S. sides	29.27	29.19	27.19	25.69
No. 2 foundry, Chicago	28.50	28.50	26.50	25.00
Southern No. 2, Birmingham	24.88	24.88	22.88	21.38
Southern No. 2 del. Cincinnati	28.94	28.94	26.94	25.44
No. 2 fdry., del. Philadelphia	30.43	30.43	28.34	26.84
Malleable, Valley	28.50	28.50	26.50	25.00
Malleable, Chicago	28.50	28.50	26.50	25.00
Charcoal, low phos., fob Lyles, Tenn.	33.00	33.00	33.00	33.00
Gray forge, del. Pittsburgh	28.69	28.69	26.69	25.19
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	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	$8.75	$8.75	$7.50	$7.50
Connellsville, foundry ovens	8.62½	9.50	8.25	8.25
Chicago, by-product fdry., del.	15.10	15.10	13.75	13.67

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight. Pricing on rails was changed to net ton basis as of Feb. 15 1946.

Semifinished Steel

Carbon Steel Ingots: Fob mill base, rerolling quality, standard analysis, $33.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $48.69.

Rerolling, Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $39; Detroit, del., $41; Duluth (billets), $41; Pac. ports (billets), $51. (Andrews Steel Co., carbon slabs, $41; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Granite City Steel Co., $47.50 gross tons slabs from D.P.C. mill. Geneva Steel Co., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $47; Detroit, del., $49; Duluth, billets, $49; forging billets fob Pac. ports, $59.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 fob Toronto, O.; Geneva Steel Co., $64.64, Pacific ports.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $58.43; del. Detroit $60.43; eastern Mich. $61.43.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $38. (Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, fob mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb, 2.05c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lb, $2.30. Do., over ⅜—⅝-in., incl., $2.45; Galveston, base, $2.40 and $2.55, respectively. Worcester add $0.10; Pacific ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.50c; Duluth, base, 2.60c; Detroit, del., 2.60c; eastern Mich., 2.65c; New York, del., 2.86c; Phila., del., 2.86c; Gulf ports, dock, 2.85c; Pac., ports, dock, 3.15c. (Sheffield Steel Corp. may quote 2.75c, fob St. Louis; Joslyn Mfg. & Supply Co., 2.55c, fob Chicago.)

Rail Steel Bars: Same prices as for hot-rolled carbon cars except base is 5 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.921c; Detroit, del., 3.021c. (Texas Steel Co. may use Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.108	4300	$1.839
2300	1.839	4600	1.298
2500	2.759	4800	2.326
3000	0.541	5100	0.379
3100	0.920	5130 or 5152	0.494
3200	1.461	6120 or 6152	1.028
		6145 or 6150	1.298
3400	3.462	8612	0.703
4000	0.487	8720	0.757
4100 (.15-.25 Mo)	0.757	9830	1.407
(.20-.30 Mo)	0.812		

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.625c; Detroit, del., 3.725c, eastern Mich., 3.755c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, 2.50c; Gulf ports, dock, 2.70c; Pacific ports, dock, 2.75c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, del., 2.50c; Gulf ports, dock, 2.70c.

Iron Bars: Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Terre Haute, single ref., 5.42c; double ref., 6.76c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base, 2.425c; Granite City, base, 2.525c; Detroit, del., 2.525c; eastern Mich., del., 2.575c; Phila., del., 2.615c; New York, del., 2.685c; Pacific ports, 2.975c. (Andrews Steel Co. may quote hot-rolled sheets for shipment to the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 3.00c on hot carbon sheets, Sparrows Point, Md.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite City, base, 3.375c; Detroit, del., 3.375c; eastern Mich., del., 3.425c; New York, del., 3.615c; Phila., del., 3.635c; Pacific ports, 3.925c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 4.05c; Granite City, base, 4.15c; New York, del., 4.31c; Phila., del., 4.24c; Pacific ports, 4.60c.

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29-gage, per square, 3.73c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corrugated, copper alloy, 4.15c; Granite City, 4.25c; Pacific ports, 4.60c; copper iron, 4.50c; pure iron, 4.50c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.60c.

Aluminized Sheets, 20 gage: Pittsburgh, hot-dipped, coils or cut to lengths, 9.60c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.20c; Granite City, base 3.30c; Detroit, del., 3.30c; eastern Mich., 3.35c; Pacific ports, 3.85c; 20-gage: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.80c; Detroit, del., 3.90c; eastern Mich., 3.95c; Pacific ports, 4.45c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.90c	4.65c	4.00c
Armature	4.25c	5.00c	4.35c
Electrical	4.75c	5.50c	4.85c
Motor	5.425c	6.175c	5.525c
Dynamo	6.125c	6.875c	6.225c
Transformer			
72	6.625c	7.375c	.....
65	7.625c	8.375c	.....
58	8.125c	8.875c	.....
52	8.925c	9.675c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary Cleveland, Birmingham, Youngstown, Middletown, 6-in. and narrower: Base, 2.45c; Detroit, del., 2.55c; eastern Mich., del., 2.60c; Pacific ports, 3.10c. (Superior Steel Corp. may quote 3.30c, Pitts.)

Over 6-in.: Base, 2.35c; Detroit, del., 2.45c; eastern Mich., del., 2.50c; Pacific ports, 3.00c. (Superior Steel Corp. may quote 3.20c, Pitts.)

Cold-Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less, 3.05c; Chicago, base, 3.15c; Detroit, del., 3.15c; eastern Mich., del., 3.20c; Worcester, base, 3.25c. (Superior Steel Corp. may quote 4.70c, Pitts.)

Cold-Finished Spring Steel: Pittsburgh, Cleveland base, 0.26-0.50 carbon, 3.03c. Add 0.20c for Worcester.

Tin, Terne Plate

(OPA ceiling prices announced March 1, 1946.)

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb base box, $5.25; Granite City, Birmingham, Sparrows Point, $5.35.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb base box, 0.25 lb tin, $4.60; 0.50 lb tin, $4.75; 0.75 lb tin, $4.90; Granite City, Birmingham, Sparrows Point, $4.70, $4.85, $5.00, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pacific ports, boxed, 4.30c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted, 4.05c; Pacific ports, 4.80c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box, $4.55; Granite City, Birmingham, Sparrows Point; $4.65.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb $12.50; 15-lb $14.50; 20-lb $15.50 (nom.); 40-lb $20.00 (nom.)

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.50c; New York, del., 2.71c; Phila., del., 2.558c; St. Louis, 2.74c; Boston, del., 2.86c; Pacific ports, 3.05c; Gulf ports, 2.85c.

(Granite City Steel Co. may quote carbon plates 2.65c fob D.P.C. mill; Geneva Steel Co., Provo, Utah, 3.20c fob Pac. ports; Central Iron & Steel Co., Harrisburg, Pa., 2.80c, basing points; Lukens Steel Co., Coatesville, Pa., 2.75c, base; Worth Steel Co., Claymont, Del., 2.60c, base; Alan Wood Steel Co., Conshohocken, Pa., 2.75c base.)

Floor Plates: Pittsburgh, Chicago, 3.75c; Pacific ports, 4.40c; Gulf ports, 4.10c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.787c; Gulf ports, 4.273c; Pacific ports, 4.49c.

Clad Steel Plates: Coatesville, 10% cladding: nickel-clad, 18.72c; inconel-clad, 26.00c; monel-clad, 24.96c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.35c; New York, del., 2.54c; Phila., del., 2.48c; Pacific ports, 3.00c; Gulf ports, 2.70c.

(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.60c, Bethlehem, Pa., on the general range and 2.70c on beams and channels from 4 to 10 inches.)

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.65c; Pacific ports, 3.20c.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham, per 100 pounds)

Wire to Manufacturers in carloads

Bright basic or bessemer	*$3.05
Spring (except Birmingham)	*$4.00

Wire Products to Trade

Nails and staples

Standard and cement-coated	†$3.75
Galvanized	‡$3.40

Wire, Merchant Quality

Annealed	$3.50
Galvanized	‡$3.85

(Fob Pittsburgh, Chicago, Cleveland, Birmingham, per base column)

Woven fence, 15½ gage and heavier	72
Barbed wire, 80-rod spool	**79
Barbless wire, twisted	**79
Fence posts	74
Bale ties, single loop	72½

*Add $0.10 for Worcester, $0.05 for Duluth and $0.50 for Pacific ports.

†Add $0.30 for Worcester, $0.50 for Pacific ports. Nichols Wire & Steel may quote $4.25; Pittsburgh Steel Co., $4.10.

‡Add $0.50 for Pacific ports.

§Add $0.10 for Worcester; $0.70 Pacific ports.

**Pittsburgh Steel Co. may quote 89.

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			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	53	30	⅛	21	0½
¼ & ⅜	56	37½	¼	27	7
½	60½	48	1-1¼	31	13
¾	63½	52	1½	35	15½
1-3	65½	54½	2	34½	15

Lap Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	58	46½	1¼	20	0½
2½-3	61	49½	1½	25½	7
3½-6	63	51½	2	27½	9
7-8	62	49½	2½-3½	28½	11½
9-10	61½	49	4	30½	15
11-12	60½	48	4½-8	29½	14
			9-12	25½	9

Boiler Tubes: Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D.		—Seamless—		—Elec. Weld—	
sizes	B.W.G.	Hot Rolled	Cold Drawn	Hot Rolled	Cold Rolled
1"	13	.....	$9.90	$9.36	$9.65
1¼"	13	.....	11.73	9.63	11.43
1½"	13	$10.91	12.96	10.63	12.64
1¾"	13	12.41	14.75	12.10	14.37
2"	13	13.90	16.52	13.53	16.19
2¼"	13	15.50	18.42	15.06	18.03
2¼"	12	17.07	20.28	16.57	19.83
2½"	12	18.70	22.21	18.11	21.68
2¾"	12	19.82	23.54	19.17	22.95
3"	12	20.79	24.71	20.05	24.02
3½"	11	26.24	31.18	25.30	30.29
4"	10	32.50	38.68	31.32	37.52
4½"	9	43.16	51.29	.....	.....
5"	9	49.96	59.36	.....	.....
6"	7	76.71	91.14	.....	.....

Pipe, Cast Iron: Class B, 6-in. and over, $60 per net ton, Birmingham; $65, Burlington, N. J.; $62.80, del., Chicago; 4-in. pipe, $5 higher. Class A pipe, $3 a ton over class B.

Rails, Supplies

Standard rails, over 60-lb, fob mill, net ton, $43.40. Light rails (billet), Pittsburgh, Chicago, Birmingham, net ton, $49.18.

Relaying rails, 35 lb and over, fob railroad and basing points, $31-$33.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates $51 net ton, base. Standard spikes, 3.65c.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago. Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow bolts.

(Ceiling prices advanced 12 per cent, effective July 27, 1946; discounts remain unchanged.)

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, nuts separate, 71-10 off, nuts attached, 71 off; bulk, 80 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅛-in. and smaller	..	64
¼-in. and smaller	62	..
½-in.-1-in.	..	60
⅝-in.-1-in.	59	..
1⅛-in.-1½-in.	57	58
1⅝-in. and larger	56	..

Additional discount of 10 for full kegs.

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset 1-in. and smaller	71 off
Headless, ¼-in. and larger	60 off
No. 10 and smaller	70 off

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural	4.75c
⅛-inch and under	*65-5 off

*Plus 12 per cent increase on base prices, effective July 26.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $2.75-$3.00 off

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr.	V.	Mo.	Base, per lb.
18.00	4	1	...	72.49c
1.5	4	1	8.5	58.43c
...	4	2	3	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Base, Cents per lb

CHROMIUM NICKEL STEELS

	Bars	Plates	Sheets	H.R. Strip	C.R. Strip
302	25.96c	29.21c	36.79c	23.93c	30.30c
303	28.13	31.38	38.95	29.21	35.71
304	27.05	31.38	38.95	25.45	32.46
308	31.38	36.79	44.36	30.84	37.87
309	38.95	43.28	50.85	40.03	50.85
310	53.02	56.26	57.35	52.74	60.59
312	38.95	43.28	53.02	.....	.....
*316	43.28	47.61	51.94	43.28	51.94
§321	31.38	36.79	44.36	31.65	41.12
†347	35.71	41.12	48.69	35.71	45.44
431	20.56	23.80	31.38	18.94	24.35

STRAIGHT CHROMIUM STEEL

403	23.93	26.51	31.92	22.99	29.21
**410	20.02	23.93	28.67	18.39	23.80
416	20.56	23.80	29.21	19.75	25.45
††420	25.96	30.84	36.25	25.70	39.49
430	20.56	23.80	31.38	18.94	24.35
‡‡430F	21.10	24.35	31.92	20.29	26.51
440A	25.96	30.84	36.25	25.70	39.49
442	24.35	27.59	35.17	25.96	34.62
443	24.35	27.59	35.17	25.96	34.62
446	29.76	33.00	39.49	37.87	56.26
501	8.66	12.98	17.04	12.98	18.39
502	9.74	14.07	18.12	14.07	19.48

STAINLESS CLAD STEEL (20%)

(Fob Pittsburgh and Washington, Pa., plate prices include annealing and pickling.)

304	.....	19.48	20.56	.....	.....
410	.....	17.31	18.39	.....	.....
430	.....	17.85	18.94	.....	.....
446	.....	19.48	20.56	.....	.....

* With 2-3% molybdenum. § With titanium. † With columbium. ** Plus machining agent †† High carbon. ‡‡ Free machining.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$8.75
Connellsville, foundry	8.50- 8.75
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	14.40
Chicago, outside delivered	14.35
Chicago, delivered	15.10
Terre Haute, delivered	14.85
Milwaukee, ovens	15.10
New England, delivered	16.00
St. Louis, delivered	†15.10
Birmingham, delivered	12.25
Indianapolis, delivered	14.85
Cincinnati, delivered	14.60
Cleveland, delivered	14.55
Buffalo delivered	14.75
Detroit, delivered	15.10
Philadelphia, delivered	14.6[illegible]

*Operators of hand-drawn ovens using trucked coal may charge $9.35; retroactive to May 17, 1946.

†15.68 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal, freight allowed east of Omaha	
Pure and 90% benzol	15.00¢
Toluol, two degree	22.00¢
Industrial xylol	22.00¢
Per pound fob works	
Phenol (car lots, returnable drums)	11.25¢
Do., less than carlots	12.00¢
Do., tank cars	10.25¢
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.00¢
Per ton, bulk, fob plants	
Sulphate of ammonia	$30.00

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on mill prices announced March 1, 1946

	Hot-rolled bars	Structural shapes	Plates	Floor plates	Hot-rolled sheets (10-gage base)	Hot-rolled strip (14-gage and lighter, 6-in and narrower)	Hot-rolled strip (12-gage and heavier wider than 6-inch)	Galvanized flat sheets (24-gage base)	Cold-rolled sheets (17-gage base)	Cold-finished bars	Cold-rolled strip
Boston	4.356[1]	4.203[1]	4.203[1]	6.039[1]	4.050[1]	5.548[1]	4.418[1]	5.725[14]	5.031[14]	4.656[21]	4.965
New York	4.134[1]	4.038[1]	4.049[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5.501[13]	4.838[14]	4.584[21]	5.075
Jersey City	4.155[1]	4.018[1]	4.049[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5.501[13]	4.890[14]	4.605[21]	5.075
Philadelphia	4.114[1]	3.937[1]	3.875[1]	5.564[1]	3.774[1]	4.664[1]	4.554[1]	5.499[15]	5.139[25]	4.564[21]	5.064
Baltimore	4.093[1]	4.05[1]	3.865[1]	5.543[1]	3.64[1]	4.293[1]	4.193[1]	5.365[17]	5.118[26]	4.543[21]	.....
Washington	4.232[1]	4.22[1]	4.067[1]	5.632[1]	3.842[1]	4.432[1]	4.332[1]	5.667[17]	5.007[24]	4.532[21]	.....
Norfolk, Va.	4.377[1]	4.303[1]	4.262[1]	5.777[1]	4.037[1]	4.927[1]	4.477[1]	5.862[17]	4.552[24]	4.677[21]	.....
Bethlehem, Pa.*	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.60[1]	3.65[1]	3.92[1]	5.55[1]	3.575[1]	4.21[1]	4.11[1]	5.20[15]	4.625[16]	4.20[21]	4.96
Buffalo (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[15]	4.525[16]	4.10[21]	4.60
Pittsburgh (city)	3.60[1]	3.65[1]	3.65[1]	5.25[1]	3.575[1]	3.95[1]	3.850[1]	5.327[12]	4.625[24]	4.20[21]	4.70
Pittsburgh (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[12]	4.525[24]	4.10[21]	4.60
Cleveland (city)	3.60[1]	3.88[1]	3.65[1]	5.48[1]	3.575[1]	3.95[1]	3.850[1]	5.347[12]	4.625[24]	4.20[21]	4.70
Cleveland (country)	3.50[1]	.....	3.55[1]	.....	3.475[1]	3.85[1]	3.750[1]	.....	4.525[24]	4.10[21]	4.60
Detroit	3.70[1]	3.952[1]	3.90[1]	5.572[1]	3.675[1]	4.050[1]	3.950[1]	5.491[12]	4.725[24]	4.25[12]	4.95
Omaha (city, del.)	4.32[1]	4.37[1]	4.37[1]	5.97[1]	4.045[1]	4.52[1]	4.42[1]	6.00[15]	5.72[24]	4.945[21]	.....
Omaha (country)	4.22[1]	4.27[1]	4.27[1]	5.87[1]	3.945[1]	4.42[1]	4.32[1]	5.90[15]	.....	.....	.....
Cincinnati	3.902[1]	3.983[1]	3.952[1]	5.583[1]	3.671[1]	4.046[1]	3.946[1]	5.296[15]	4.271[24]	4.602[21]	.....
Youngstown*	.....	.....	.....	.....	.....	.....	.....	4.85[12]	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.475[3]	3.85[1]	3.750[1]	5.10[16]	.....	.....	.....
Chicago (city)	3.75[1]	3.80[1]	3.80[1]	5.40[1]	3.475[1]	3.95[1]	3.850[1]	†5.40[15]	4.425[24]	4.20[21]	4.90
Milwaukee	3.908[1]	3.958[1]	3.958[1]	5.558[1]	3.633[1]	4.108[1]	4.008[1]	†5.558[15]	4.583[24]	4.358[21]	5.058
Indianapolis	3.83[1]	3.88[1]	3.88[1]	5.48[1]	3.743[1]	4.118[1]	4.018[1]	5.368[15]	4.793[24]	4.43[21]	5.030
St. Paul	4.092[2]	4.142[2]	4.142[2]	5.742[2]	3.817[2]	4.292[2]	4.192[2]	5.666[15]	4.767[24]	4.852[21]	5.393
St. Louis	3.918[1]	3.968[1]	3.968[1]	5.568[1]	3.643[1]	4.118[1]	4.018[1]	5.622[15]	4.593[24]	4.522[21]	5.222
Memphis, Tenn.	4.296[1]	4.346[1]	4.346[1]	6.071[1]	4.221[1]	4.596[1]	4.496[1]	5.746[15]	.....	4.821[21]	.....
Birmingham	3.75[1]	3.80[1]	3.80[1]	6.153[1]	3.675[1]	4.05[1]	4.05[1]	5.20[15]	5.077[24]	4.99[21]	5.465
New Orleans (city)	4.358[1]	4.408[1]	4.408[1]	6.329[1]	4.283[1]	4.658[1]	.....	5.808[15]	5.304[24]	5.079[21]	.....
Houston, Tex.	4.00[3]	4.50[1]	4.50[1]	5.75[3]	3.988[3]	4.668[3]	4.563[6]	5.763[24]	5.819[16]	4.10[21]	.....
Los Angeles	4.65[4]	4.90[4]	5.20[4]	7.45[4]	5.225[4]	5.30[4]	5.200[4]	6.55[12]	7.425[6]	6.033[21]	5.863
San Francisco	4.20[7]	4.15[7]	4.15[7]	5.85[7]	4.125[7]	5.85[7]	4.50[7]	6.35[15]	6.875[15]	5.783[21]	7.583
Portland, Oreg.	4.70[27]	4.70[27]	5.00[27]	6.75[27]	4.875[27]	6.65[27]	5.000[27]	6.20[15]	6.825[15]	5.983[15]	.....
Tacoma, Wash.	4.60[6]	4.70[6]	5.00[6]	6.75[6]	4.87[6]	5.80[6]	4.60[6]	6.40[15]	6.55[15]	6.23[21]	.....
Seattle	4.60[6]	4.70[6]	5.00[6]	6.75[6]	4.87[6]	5.80[6]	4.60[6]	6.40[15]	6.55[15]	6.23[21]	.....

*Basing point cities with quotations representing mill prices, plus warehouse spread; †open market price.

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	$5.45
Mesabi nonbessemer	5.05
High phosphorus	5.05
Mesabi bessemer	5.20
Old range nonbessemer	5.30

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	18.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.	Nom.
N. African low phos.	Nom.
Swedish basic, 60 to 68%	Nom.
Spanish, N. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$39.75
48% 3:1	41.00
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	41.00

Domestic (seller's nearest rail)

48% 3:1	$43.50

less $7 freight allowance.

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 15c to 17c per unit less than Metal Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnaces

Designation	Chemical Composition Limits, Per Cent: Carbon	Mn	Si	Cr	Ni	Mo	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	$0.812	$16.230	$1.353	$27.050
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.812	16.230	1.353	27.050
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.866	17.312	1.407	28.132
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.703	14.066	1.244	24.886
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.298	25.968	1.677	33.542
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.298	25.968	1.677	33.542

Extras are in addition to a base price of 2.921c, per pound on finished products and $58.43 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

Maximum prices per gross ton fixed by OPA schedule No. 10, last amended July 27, 1946; $2 increase may be charged on adjustable pricing contracts made between May 29 and July 27. Delivered prices do not include 3 per cent federal tax, effective Dec. 1, 1942.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$29.50	$29.00	$30.50	$30.00
Newark, N. J., del.	31.20	30.70	32.20	31.70
Brooklyn, N. Y., del.	32.28	.....	.....	32.78
Birdsboro, Pa., base	29.50	29.00	30.50	30.00
Birmingham, base	24.88	23.50	29.50	.....
Baltimore, del.	30.22	.....	.....	.....
Boston, del.	29.68	.....	.....	.....
Chicago, del.	28.72	.....	.....	.....
Cincinnati, del.	28.94	28.06	.....	.....
Cleveland, del.	28.62	27.74	.....	.....
Newark, N. J.	30.82	.....	.....	.....
Philadelphia, del.	30.05	29.55	.....	.....
St. Louis, del.	28.62	29.54	.....	.....
Buffalo, base	28.50	27.50	29.50	29.00
Boston, del.	30.06	29.56	31.06	30.56
Rochester, del.	30.03	.....	31.03	30.53
Syracuse, del.	30.58	.....	31.58	31.08
Chicago, base	28.50	28.00	29.00	28.50
Milwaukee, del.	29.73	29.23	30.23	29.73
Muskegon, Mich., del.	32.05	.	.	32.05
Cleveland, base	28.50	28.00	29.00	28.50
Akron, Canton, del.	30.04	29.54	30.54	30.04
Detroit, base	28.50	28.00	29.00	28.50
Saginaw, Mich., del.	30.81	30.31	31.31	30.81
Duluth, base	29.00	28.50	29.50	29.00
St. Paul, del.	31.13	30.63	31.63	31.13
Erie, Pa., base	28.50	28.00	29.50	29.00
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.06	29.56	31.06	30.56
Granite City, Ill., base	28.50	28.00	29.00	28.50
St. Louis, del.	29.00	28.50	.....	29.00
Hamilton, O., base	28.50	28.00	.....	28.50
Cincinnati, del.	29.68	29.18	.	29.68
Neville Island, Pa., base	28.50	28.00	29.00	28.50
*Pittsburgh, del., N.&S. sides	29.27	28.77	29.77	29.27
Provo, Utah, base	26.50	26.00	.	.
Sharpsville, Pa., base	28.50	28.00	29.00	28.50
Sparrows Point, base	29.50	29.00	.....	.....
Baltimore, del.	30.60	.	.....	.....
Steelton, Pa., base	.	29.00	.	.
Swedeland, Pa., base	29.50	29.00	30.50	30.00
Philadelphia, del.	30.43	29.93	.	30.93
Toledo, O., base	28.50	28.00	29.00	28.50
Youngstown, O., base	28.50	28.00	29.00	28.50
Mansfield, O., del.	30.66	30.16	31.16	30.66

*To Neville Island base add: 61c for McKees Rocks, Pa.; 93c Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.24, Oakmont, Verona; $1.38, Brackenridge.

Exceptions to above prices: Struthers Iron & Steel Co., Struthers, O., may charge 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron. Republic Steel Corp. may quote $2 a ton higher for foundry and basic pig iron on the Birmingham base.

High Silicon, Silvery

6.00-6.50 per cent (base) $34.00
6.51-7.00..$35.00 9.01- 9.50. 40.00
7.01-7.50.. 36.00 9.51-10.00. 41.00
7.51-8.00.. 37.00 10.01-10.50. 42.00
8.01-8.50.. 38.00 10.51-11.00. 43.00
8.51-9.00.. 39.00 11.01-11.50. 44.00

Fob Jackson county, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01 to 14.50%, $50 Jackson co.; each additional 0.50% silicon up to and including 18% add $1; low impurities not exceeding 0.005 P, 0.40 Si, 1.0% C, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus.

Fob furnace, Lyles, Tenn., $33.00. (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $28.00
Valley base 28.00

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $34.00 base; $35.38, del., Philadelphia. Intermediate phosphorus, Central Furnace, Cleveland, $31.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point. Net prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $81.00

High Heat Duty

Pa., Ill., Md., Mo., Ky. 65.00
Ala., Ga. 65.00
N. J. 70.00

Intermediate Heat Duty

Ohio 57.00
Pa., Ill., Md., Mo., Ky. 59.00
Ala., Ga. 51.00
N. J. 62.00

Low Heat Duty

Pa., Md., Ohio 51.00

Malleable Bung Brick

All bases 75.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press 42.00
Wire Cut 40.00

Silica Brick

Pennsylvania 65.00
Joliet, E. Chicago 74.00
Birmingham, Ala. 65.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.
Bulk 22.00
Bags 26.00

Basic Brick

Net ton, fob 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, fob shipping point in Ill., Ky., net ton, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

Ferroalloy Prices

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140 fob cars, Pittsburgh (where Carnegie-Illinois Steel Corp. is producer); add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.55c; regular, 21.05c; medium, 15.75c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Contract, carlots, bulk 0.0605c, packed 0.063c, tons 0.0655c, less 0.068c, eastern, freight allowed; 0.063c, 0.0655c, 0.0755c and 0.078c, central; 0.066c, 0.0685c, 0.0855c and 0.088c, western; spot up 0.25c.

Ferrotungsten: Spot 10,000 lb or more, per lb contained W, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V 35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb. contained Mo, fob. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.65c, ton lots 13.10c, smaller lots 13.50c; 80-90% c.l. 10.35c, ton lots 10.85c, smaller lots 11.35c; 75% c.l. 9.40c, ton lots 9.95c, smaller lots 10.45c; 50% c.l. 7.90c, ton lots 8.50c, smaller lots 9.10c. Prices are fob shipping point, freight allowed. per lb. of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%. Deduct 0.85c for bulk carlots.

Ferro-Boron: (B 17.50% min., Si 1.50% max., Al 0.50% max. and C 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.

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 up 10 cents.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 15.05c, ton lots 15.55c; central zone, add 0.40c and 0.65c; western zone, add 0.5c and 1.85c; **high carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c, add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points. **Low carbon, high nitrogen:** Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C about 5-7%): Contract, lump, packed, eastern zone, freight allowed, c.l. 15.60c, ton lots 16.10c, less than ton 16.75c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.85c for smaller lots. Deduct 0.55c for bulk carlots.

S. M. Ferrochrome, high carbon (Cr 60-65%, Si, Mn and C 4-6% each): Contract, lump, packed, eastern zone, freight allowed, c.l. 16.15c, ton lots 16.65c, less ton 17.30c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.85c for smaller lots. Prices are per lb of contained chromium; spot prices 0.25c higher. Deduct 0.55c for bulk carlots.

S.M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 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, 20.50c, 20.95c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb. Cr, packed, eastern zone, c.l. 9.50c, ton lots 9.80c, less than ton 10.10c, central zone, add 0.3c for c.l. and 0.5c for smaller lots; western zone, add 0.70c for c.l. and 2c for smaller lots. Deduct 0.30c for bulk carlots. Prices per lb. of briquets; spot prices 0.25c higher.

Chromium Metal: 97% min. chromium, max. 0.50% 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; fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 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.

Calcium metal; cast: Contract ton lots or more $1.35, less, $1.60, pound of metal; $1.36 and $1.61 central, $1.40 and $1.65, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb. of alloy. Contract, carlots, lump 13.00c, ton lots 14.50c, less 15.50c eastern, freight allowed; 13.50c, 15.25c and 16.25c, central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, 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% Si and max. 2% Fe, 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, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb. Mn and about ½ lb. Si, eastern zone, bulk, c.l. 5.80c, ton lots 6.35c; central zone, add 0.25c for c.l. and 1c for ton lots; western, add 0.55c for c.l. and 0.20c for ton lots. **Ferrosilicon,** weighing about 5 lb. and containing exactly 2 lb. Si, or about 2½ lb. and containing exactly 1 lb. Si, packed, eastern zone, c.l. 3.90c, ton lots 4.15c, less ton lots 4.45c; central zone, add 0.15c for c.l. and 0.40c for smaller lots; western zone, add 0.30c for c.l. and 0.45c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.30c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 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: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance), per lb of alloy. Contract, 5 tons or more, $1.90, 1 ton to 8 ton, $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.

Borosil: 3 to 4% B, 40 to 45% Si, $6.25 lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 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 0.25c.

Silvaz Alloy: (Si 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 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 0.25c.

SMZ Alloy: (Si 60-55%, Mn 5-7%, Zr 5-7% and Fe 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 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 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 0.25c.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c, 12.50c and 13.00c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up 0.25c.

Zirconium Alloy: Zr 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 up $5 per ton.

Zirconium Alloy: Zr 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 up ¼c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) contract basis fob Niagara Falls, N. Y., lump per lb 5.88c; ton lots 6.38c; less 6.88c. Spot up ½c.

Siminal: (Approx. 20% each Si, Mn, Al) Contract, freight not exceeding St. Louis rate allowed, per lb alloy; carlots 8c; ton lots 8.75c; less-ton lots 9.25c.

Tungsten Metal Powder: Spot, not less than 97%, $2.50-$2 60; freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% NA_2O; or air dried, 83-85% V_2O_5 and 5.15% NA_2O. $1.10 per lb contained V_2O_5, fob plant, freight allowed on quantities of 25 lb and over to St. Louis.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. 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. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(Fob 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 Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstripped Motor Blocks	17.50
Stove Plate	19.00

BOSTON:

(Fob shipping points. Boston differential 99c higher, steelmaking grades; Providence, $1.09 higher)

No. 1 Heavy Melt. Steel	$14 06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.31
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

BUFFALO:

(Delivered consumers' plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
No. 1 Cast	20.00
Low Phos.	21.75

PITTSBURGH:

(Delivered consumers' 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	17.00
Mach. Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	•20.00
Heavy Breakable Cast.	•16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
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	22.00

• Shipping point.

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	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Heavy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17 00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD:

(Delivered consumer's plant)

Machine Shop Turnings	$15.00

CINCINNATI:

(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
Machine Turnings	10.50-11.00
Shoveling Turnings	12.50-13.00
Cast Iron Borings	11.50-12.00
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-22.00
Scrap Rails	20.50-21.00
Stove Plate	18.50-19.00

DETROIT:

(Delivered consumer's plant)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19 82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

CHICAGO:

(Delivered consumer's plant; cast grades fob shipping point; railroad grades fob tracks)

No. 1 R.R. Heavy 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.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn.	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22 25
Cut Rails, 18-inch	23.50
Rerolling Rails	22.25
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

ST. LOUIS:

(Delivered consumer's plant; cast grades fob shipping point)

Heavy Melting	$17.50
No. 1 Locomotive Tires	21.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17 00
Machine Turnings	10 50
Shoveling Turnings	12.50
Rerolling Rails	21.00
Street Car Axles	24.50
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Cupola Cast	20.00
Charging Box Cast	19.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.50
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	11 00
Cast Iron Borings	13.00
Iron Car Wheels	20.00

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Dlr. Bundles	12.00
Machine Turnings	5.50
Mixed Borings, Turnings	5.50
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$17.00
No. 2 Heavy Melt. Steel	17.00
No. 1 Busheling	17.00
No. 1, No. 2 Bundles	17.00
No. 3 Bundles	9.00
Machine Turnings	7.00
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate 1 ft and under	18.00
Alloy-free Turnings	7.00
Tin Can Bundles	14.50
No. 2 Steel Wheels	21.50
Iron, Steel Axles	24.00
No. 2 Cast Steel	20.50
Uncut Frogs, Switches	18.00
Scrap Rails	18.50
Locomotive Tires	20.50

SEATTLE:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.50
No. 2 Heavy Melt. Steel	14.50
Heavy Railroad Scrap	15.50

(Fob shipping point)

No. 1 Cupola Cast	20.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 14.37½c, del. Conn.; less carlots 14.50c, refinery. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 14.12½c, refinery, 20,000 lb or more; 14.37½c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 15.25c; 88-10-2 (No. 215) 18.50c; 80-10-10 (No. 305) 18.00c; No. 1 yellow (No. 405) 12.25c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis; high grade 9.25c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 8.10c, chemical 8.20c, corroding, 8.20c, E. St. Louis for carlots; 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 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 12.75c; No. 12 foundry alloy (No. 2 grade) 12.62½c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 14.37½c; grade 2 (92-95%) 13.25c; grade 3 (90-92%) 12.00c; grade 4 (85-90%) 11.37½c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 27.50c, carlots; 29.50c 100 lb to c.l.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 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% max. 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 fob 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.; 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%, fob 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.

Mercury: Open market, spot, New York, $98-$100 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.25 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.30.

Cobalt: 97-99%, $1.50 lb, for 550 lb (bbl.); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y. 90.12½c per ounce.

Platinum: $81.50 per ounce.

Palladium: $24 per troy ounce.

Iridium: $125 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 14.37½c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 25.81c; yellow brass 23.67c; commercial bronze, 95% 26.14c, 90% 25.81c; red brass, 85% 24.98c, 80% 24.66c; best quality 24.38c; phosphor bronze, grade A 4% or 5%, 43.45c; Everdur, Duronze or equiv., hot rolled, 30.88c; naval brass 28.53c; manganese bronze 31.99c; muntz metal 26.78c; nickel silver 5% 32.38c.

Rods: Copper, hot rolled 22.16c, cold drawn 23.16c; yellow brass 18 53c; commercial bronze, 95% 25.83c, 90% 25.50c; red brass, 85% 24.67c; 80% 24.35c; best quality 24.07c; phosphor bronze, grade A 4% or 5% 43.70c; Everdur, Duronze or equiv. cold drawn, 29.82c; naval brass 22.59c; manganese bronze 25.93c; muntz metal 22.34c; nickel silver 5% 34.44c.

Seamless Tubing: Copper 25.85c; yellow brass 26.43c; commercial bronze 90% 28.22c; red brass 85% 27.64c, 80% 27.32c; best quality brass 26.79c; phosphor bronze, grade A 5% 44.70c.

Copper Wire: Bare, soft, fob eastern mills, carlots 19.89c, less carlots 20.39c; weatherproof, fob eastern mills carlot 22.07c, less carlots 22 57c; magnet, delivered, carlots, 23.30c, 15,000 lb or more 23.55c, less carlots 24.05c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb 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 11.25c; cut sheets 11.50c; pipe 9.90c, New York, 10.00c Philadelphia, Baltimore, Rochester and Buffalo, 10.50c Chicago, Cleveland, Worcester and Boston.

Zinc Products: Sheet fob mill, 13.15c, 36,000 lb and over deduct 7%. Ribbon and strip 12.25c, 3000-lb lots deduct 1%, 6000 lb 2%, 9000 lb 3%, 18,000 lb 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lb 12.50c; 100-500 lb 13.00c; under 100 lb 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 lb to 1 ton 17.75c; under 400 lb 18.25c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval over 15 in., 25.125c; curved, 20.375c; round oval straight, 19.375c; electro-deposited, 18.875c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels 20.50c.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls 34.00c, fob, Niagara Falls.

Sodium Cyanide: 96%, 200-lb drums 15.00c; 10,000-lb lots 13.00c fob 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 lb and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb bbls 39.00c fob Grasselli, N. J.; 100-lb kegs 39.50c.

Sodium Stannate: 100 or 300-lb drums 36.50c, del.; ton lots 35.50c.

Zinc Cyanide: 100-lb kegs or bbls 33.00c fob Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lb fob shipping point. Add ⅝c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	12.000	12.000	11.250
Yellow brass	9.875	9.625	9.125
Commercial bronze			
95%	11.250	11.000	10.500
90%	11.125	10.875	10.375
Red brass			
85%	10.875	10.625	10.125
80%	10 875	10.625	10.125
Best quality (71-79%)	10.500	10.250	9.750
Muntz metal	9.250	9.000	8.500
Nickel silver, 5%	10.500	10.250	.....
Phos. br., A, B, 5%	12.750	12.500	11.500
Naval brass	9.500	9.250	8.750
Manganese bronze	9.500	9.250	8.750

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are fob shipping point; add ¾c for shipment of 60,000 lb of one group and ½c for 20,000 lb of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper and copper borings 11.50c; No. 2 copper wire and mixed heavy copper, copper tuyeres 10.50c.

(Group 2) Soft red brass and borings, aluminum bronze 10.75c; copper-nickel solids and borings 11.00c; lined car boxes, cocks and faucets 9.50c; bell metal 17.25c; babbitt-line brass bushings 14.75c.

(Group 3) Admiralty condenser tubes, brass pipe 8.75c; muntz metal condenser tubes 8.25c; old rolled brass 8.25c; manganese bronze solids: (lead 0%-0.40%) 8.00c; (lead 0.41%-1%) 7.00c; manganese bronze borings, 7.25c.

Aluminum Scrap: Price fob point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb, 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50c, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb borings and turnings one cent less than segregated.

Lead Scrap: Prices fob point of shipment. For soft and hard lead, including cable lead, deduct 0.75c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.75c, fob point of shipment, add ½c for 10,000 lb or more. New die cast scrap 4.95c, radiator grilles 4.95c, add ½c for 20,000 lb or more. Unsweated zinc dross, die cast slab 5.80c, any quantity.

Nickel, Monel Scrap: Prices fob point of shipment; add ½c for 2000 lb or more of nickel or cupro-nickel shipped at one time and 20,000 lb or more of monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 23.00c; 90-98% nickel, 23.00c 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 20.000c; solder sheet 18.00c.

Sheets, Strip . . .

Mills seek to limit CC rated tonnage to regular customers but expect added tonnage burden

Sheet & Strip Prices, Page 138

New York — Sheet sellers are going to make every effort to restrict acceptance of CC preference tonnage to their regular customers and believe they have support in this policy in the wording of the regulations covering reinstatement and amplification of these ratings. Many believe, or at least are hopeful, that tonnage already scheduled for next quarter will absorb a substantial amount of the preference business that will come their way. Nevertheless they feel that they will wind up with a sizable additional burden, which will mean that customers, not engaged in housing and agricultural requirements, will receive less than now on schedule.

Scarcity in electrical sheets is as pronounced as ever, with demand heavy and with the additional facilities which had been counted on for early this fall not likely to get into operation, with possibly an exception or two, until late in first quarter.

Cincinnati — Sheet mills are operating near capacity although lack of scrap reserves in some cases may force a lower level. One interest has revised rolling schedules to expand output of electrical sheets. Despite heavy pressure for deliveries, and for greater tonnage allotments, mills are trying to hold fourth quarter schedules within such bounds that carryover into next year will not be abnormal.

Cleveland — Shipments of flat-rolled products to most customers have not increased as much as the rise in steel ingot production would indicate. This is attributed to a combination of several factors.

In the first place, the actual tonnage of steel available to sheet mills has not risen in direct proportion to the operating rate. While many large producing units have all or practically all of their furnaces lighted, some are operating only five turns a week. In some instances operations are hampered by lack of electrical equipment and in others by shortage of scrap.

Mills have been unable to ship promised tonnages to some customers because part of this output has been diverted to other users under CPA warehouse and veterans' housing directives. The export directive, effective Sept. 1, likely will divert additional tonnages. The carryover from second quarter was heavier than had been anticipated by many companies and has taken up a substantial portion of the current quarter's output.

Chicago — Soon after Sept. 1, sheetmakers expect to have a line on what priorities will do to their schedules in fourth quarter and will be in a position to advise customers as to how much tonnage will be allocated to them in this period. It is a foregone conclusion that many customers will find their quotas cut. Long range guessing is that carryovers at the end of the year will be substantial and that mills will be able to take on only relatively small fill-ins to close-up first quarter. No producer in this area is accepting business for first quarter, although certain known directed tonnages will have a place in those schedules. Customers are pressing insistently to find out where they stand in order to plan for their own production.

Pittsburgh — Mill production schedules are constantly being juggled to meet certified tonnage obligations and directives. This has resulted in many customers having to be content with substantially less tonnage than formerly promised for this quarter, and no improvement is indicated in the confused delivery situation for fourth quarter with restoration of CC ratings. At present mills do not know where they stand in respect to how much steel will be needed to meet rated orders or directives through the rest of this year and therefore are at a loss in telling many customers when to expect tonnage already on mill books. About 40,000 tons of cold-rolled and hot-rolled pickled sheets and some galvanized are expected to be placed soon for 1947 delivery under MM ratings for construction of caskets for return of war dead. The estimated 185,000 tons of sheets that will be rolled from the 205,000 tons of sheet bars to be supplied four nonintegrated mills is not too imposing in comparison with overall output, but it does represent a sizable proportion of light gage sheets currently being produced.

Philadelphia — Some sheet sellers by virtue of having pared down their third quarter quotas sharply, believe their carryovers Oct. 1 will not be heavy. In other words, the sellers, while not having supplied their customers with anything near as much as requested, will at least not be greatly behind on current commitments at the beginning of fourth quarter. Some producers ascribe this probability to the fact that they did not set up their current quarter quotas until the last minute and had been able to make a fairly good estimate as to what their burden would be under Direction 12, which expires Sept. 30, to be succeeded by the revived and expanded CC rating system. Others, especially some who have not employed the quarterly quota system, will not be in as good position as far as actual arrearages are concerned and will make their adjustments later, possible their major adjustments in fourth quarter in an effort to clean their slates for the new year.

Meanwhile, sheet producers are waiting to see what develops with respect to rated tonnage for fourth quarter. The deadline for applications was scheduled for Aug. 15, although a number of consumers apparently were not able to get their applications in promptly, but mills have not been able to appraise the extent of this business.

Steel Bars . . .

Mills in dark on preference needs for fourth quarter and books are filled to end of year on most sizes

Bar Prices, Page 138

New York — Although deadline for applications for CC ratings for fourth quarter closed Aug. 15, carbon bar sellers assert that they have not yet received any CC orders and at present are still much in the dark as to what they can expect in the way of priority tonnage in the closing three months of the year. Undoubtedly a substantial portion of the CC tonnage they will be called upon to supply will involve steel already scheduled for rolling. However, on the other hand, they will probably have to accept a certain amount of tonnage, which will be at the expense of non-preference bookings. Where this is the case the work supplanted will be pushed back into next year in most instances.

This will be particularly true in all sizes of hot-rolled carbon bars, both flats and rounds, as mills are sold out for 1946 on the basis of direct orders and quota obligations, to say nothing of arrearages on current commitments. In cold-drawn tonnage a little capacity is still available for December for some of the larger sized rounds. One large drawer, for instance, can still accept rounds 5/8-inch and larger for that position, although he is sold out completely on all sizes of flats.

On an average, with respect to bar sizes, it would appear that most producers of hot carbon material are behind about 60 days or so on current commitments, with some in even a worse position. Producers generally are far behind on small rounds and flats, although they are catching up on the large sizes.

The situation in large sizes has resulted in some speculation to the effect that they will be the first to reflect any softening in the delivery situation. Some consumers, it appears, already have fairly good stocks and if there were any indications of a general loosening up in steel supply, they might be tempted to cancel at least a certain portion of the unfilled orders they may have with mills. This, in turn, would eventually result in an easing in schedules on smaller sizes, as mills engaged in rolling larger bars took up some of the burden of the smaller mills.

However, in the opinion of some producers, consumer inventories of large bars for the most part are not heavy, for the reason that all along, at least until recently, relatively good delivery promises could be had on large sizes and that consumers therefore have been conservative in their purchases.

Boston — Rated tonnage for carbon bars, fourth quarter, centers heavily in smaller sizes, the range in which congestion is already greatest. Rescheduling will be forced on mills to greater degree than expected and the objective of most producers to get more steel to manufacturing consumers next quarter may encounter snags. Mills are confronted by heavy carryovers and are unwilling to consider firmly consumer estimates for next year. Despite the tightness in carbon stock, consumers up to now, have managed to hold production at fairly high levels, although some planned increases have not materialized.

Philadelphia — Hot carbon bar consumers report that while mills still are well behind on commitments, tonnage is coming in steadily increasing volume. As a result manufacturing consumers are able to increase operations to the highest level since January and in some scattered instances are able to establish a peak for the year. This is especially true of builders of agricultural implements, who have been favored in the current quarter under Direction 12.

Difficulty in placing additional ton-

nage, however, is perhaps greater than at any time this year, as the new year is now only a little more than four months away, with mill schedules jammed and producers have not yet opened books for 1947. Until recently at least some larger sizes of hot-rolled rounds and flats could be placed for late 1946 delivery but this now is out of the question. A little tonnage in large cold-drawn carbon sizes can still be placed, but not as much as recently. The only bar product in free supply over the remainder of the year is hot-rolled alloy. Some large producers are covered until well into fourth quarter but others can accept substantial tonnage for October and beyond and in some instances can schedule a little business for late September.

Cleveland — Lagging shipments of steel to finishing mills are keeping bar mill operations well below capacity and, therefore, is preventing producers from increasing deliveries to consumers. In addition, GI housing and warehouse directives are diverting a substantial tonnage from previously scheduled channels. Presure on sellers now originates chiefly with producers of consumer goods whose operations are increasing and who are attempting to gain more favorable positions on rolling schedules. Generally they can not be accommodated and may have to accept still later delivery if fourth quarter directives involve large tonnages. Users of cold-finished bars appear to be receiving better shipments than those of hot-rolled.

Seattle — Rolling mills are refusing 1947 business and will not consider first quarter orders until late in the year. Rolling schedules are full for four months and much tonnage has been refused, although an effort is being made to serve regular customers. Production averages 90 per cent in spite of labor turnover and lack of skilled personnel. Demand for merchant bars is larger than prewar levels and reinforcing bar needs are larger than for merchant quality.

Steel Plates . . .

Production increasing but mills are sold for year and into next; demand for light gages heavy

Plate Prices, Page 139

New York — Although production at some eastern plate mills is still badly crippled by lack of pig iron and scrap, the general trend among platemakers for the past several weeks has been slightly upward, trade observers believe. During first half, plate production averaged around 288,000 to 290,000 tons per month. In June, however, the last month of the period, production was above average by almost 30,000 tons and in July, it is estimated, output got up to around 350,000 tons.

Meanwhile plate production should be stepped up at the Geneva, Utah, plant, beginning next month. Consequently, some producers expect to see plate production in last half exceed the output of around 1,730,000 tons in first half by at least 400,000 to 500,000 tons; and in the light of present pressure for plates this increase will be most welcome. As the situation stands

now, plate producers are behind two to three months, and in one or two instances even more. Most eastern plate producers, in fact, regard themselves as being sold through most of first quarter of next year, if not sold through that period completely.

Boston — Demand for light welding-quality plates for small tanks shows no abatement and fabricators are hampered by inability to place additional tonnage; considerable volume is already overdue and inventories are light. This is reflected in heavy demands on warehouse for stock ½-inch and under. In heavier gages weldments take up substantial volume. Not only are straight carbon schedules filled into second quarter, but mills have also booked all orders carrying extras that they can handle through this year and beyond; floor plates are an exception, but for the most part producers are accepting fewer orders, notably mills shipping to this territory experiencing production handicaps.

Structural Shapes . . .

Inquiry slackens as delivery is deferred; fabricators working against heavy backlogs

Structural Shape Prices, Page 139

Pittsburgh — With mill deliveries far extended, volume of new structural inquiry continues well below indicated requirements. Fabricators report top-heavy backlogs but work on these projects is expected to show improvement as a result of heavier mill shipments in recent weeks. Leading producer here expects to increase production of structurals soon at its Geneva plant, which should ease the delivery situation somewhat for eastern consumers. A significant structural project recently approved by CPA involves $607,100 for miscellaneous repairs at the Pittsburgh plant of Jones & Laughlin Steel Corp.

Chicago — Inquiry for structurals in this area has almost dried up. Fabricators already have booked all the tonnage they can handle with limited supply of steel and present manpower. No easing is in sight in mill allocations of plain shapes to fabricators, for it is a foregone conclusion that the balance of this year will see more lighter sections going to the railroad freight car program under a preferential program. Already smaller section are under heaviest pressure.

Philadelphia—Under pressure of various demands shape production shows improvement. During first half, due principally to strike interruptions, monthly production did not average much more than 230,000 tons. However, since then the trend has been appreciably upward, with possibility that this month may see an output of 350,000 tons. Unless restricted indefinitely by shortage of pig iron and scrap, production may reach 390,000 to 400,000 tons before the year is over, as there is a disposition to divert, if possible, more raw steel to shape production.

New York — Structural inquiry is substantially lighter, reflecting in part the government's latest restriction on non-housing construction. This is the 65-day moratorium on all government work, which has affected not only various federal projects, but state and civic work

where government aid has been promised. For instance, this has tied up considerable state bridge and road work on which fabricators in this district would otherwise be requested to bid.

However, no little amount of bridge and road work has been held up for some time because contractors did not care to figure jobs under the rigid terms insisted upon by public commissioners. For instance, escalator clauses have not been permitted in connection with much of this work, and contractors in many instances have hesitated, but refused to take a chance on quoting on a job wherein there was no provision for possible higher prices on material and labor once the work got under way.

Birmingham — Shapes are not in quite the persistent demand of a few months ago, largely because of scarcity of other building materials, which has resulted in delay of some projects. Considerable tonnage, however, would be taken subject to future developments were it available.

Seattle — Fabricating shops have ample backlogs and are refusing offered business because of scarcity of steel. Allocations are insufficient for current demand and deliveries are slow. Many small orders are offering but deliveries cannot be guaranteed. Pacific Car & Foundry Co., Seattle, has taken 200 tons for the Zellerbach paper mill at Camas, Wash.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 139

Pittsburgh — Sales of producers east of the Rockies increased further last month to about 75,000 net tons, due principally to ability of a large eastern producer to take on additional tonnage. July sales compared with 52,000 tons in June and 93,000 in like 1945 period. Most sellers are operating under substantially restricted production quotas and some are not accepting new orders. Shortage of rerolling rails prevent rerollers from substantially increasing operations. More than $37 million worth of highway construction in Pennsylvania, including most of the Penn Lincoln Parkway, may be held up by a freeze of federal funds, which action was taken both as an antiinflationary measure and because of uncertain price and supply situation on structural and reinforcing steel. Negotiations by Carnegie-Illinois Steel Corp. and other United States Steel Corp. subsidiaries for license to manufacture and sale of the Inland hi-bond reinforcing bar for concrete construction have been completed.

Boston — Reinforcing bar sellers are reluctant to commit ahead on larger tonnages and contractors meet increasing difficulty in filling requirements. Stocks are low, production light and outlook for tonnage over balance of this year is uncertain; this is notably the case in smaller sizes of billet steel bars. Inquiries frequently bring out no bids except on small lots and several thousand tons are awaiting placement. For the Maine Turnpike bridges and roads only one tender was received for 2735 tons, which Bethlehem Steel Co. will furnish through Bancroft-Martin Rolling Mill Co., Portland, Me.

Chicago — While inquiries for small lots of reinforcing steel are numerous, large projects have virtually disappeared. Lone exception to the latter is the South

Side intercepting sewer on which the Sanitary District of Chicago has advertised for bids Sept. 12. It is estimated that this job will require a total of 2750 tons of reinforcing distributed over a number of months. Few suppliers will find themselves in a position to bid. Already overcommitted, and not optimsitic concerning the future, they pass up attractive business regularly.

Wire . . .

Wire Prices, Page 139

Chicago — Although output of wire and wire products is close to full capacity it fails to make a dent in the order backlog. Merchant products are particularly tight and jobbers claim they are not beginning to satisfy requirements of their customers. Chief among the short products are nails, barbed wire, fencing and bale ties.

Birmingham — Wire products probably are the most critically short in the district. The situation is especially true of nails which eases little, and to a somewhat less degree of wire fencing and drawn wire. Miscellaneous users of wire, especially for bed springs, press for supply but do not get even approximate requirements.

Tubular Goods . . .

Tubular Goods Prices, Page 139

Pittsburgh — Exceptionally heavy demand is expected to keep jobbers' inventories of steel pipe and oil country goods well below normal through remainder of this year. Limited production of tube rounds and skelp prevents full operations among nonintegrated pipe plants although some improvement in operations has been made recently. Most cast iron pipe producers have fallen well behind on delivery, due to pig iron shortage. Soil pipe producers are increasing operations as result of larger pig iron shipments under CPA certified tonnage.

Seattle — Cast iron pipe demand continues strong but sellers are handicapped by delayed delivery. Several large projects in this area are held back until shipments can be assured. At Pasco, Wash., Pacific States Cast Iron Pipe Co., Provo, Utah, was high on 200 tons, but received the contract because of more satisfactory delivery. The same firm was low at Wapato, Wash., for 475 tons, with award pending as alternate types are being considered.

Tin Plate . . .

Tin Plate Prices, Page 139

Pittsburgh — Continued shortage of freight cars, particularly box cars, has retarded tin plate shipments to a greater extent in recent weeks and unless remedied soon it is possible can manufacturers' production will be adversely affected for tin plate inventories are well below normal. Tin mill output currently is at the best level of year and production this quarter should exceed any previous quarter this year. However, interruptions to mill production during first half resulted in substantial carryovers of domestic tonnage which probably will not be made up through the remainder of this year. Fourth quarter export load of 136,000 tons is

believed unnecessarily large, and may have an important bearing on extent of expected revision in the present ratio of uncertified to certified tonnage shipped.

Pig Iron . . .

Shipments to foundries are small part of needs and melt reflects shortage of iron and scrap

Pig Iron Prices, Page 141

New York — While still too early to forecast with certainty, it appears that the foundry melt in his disrict in August will be down from the preceding month. Certainly that has been the trend so far, because of inability of various foundries to get not only pig iron but scrap in sufficient quantity. This decline has come despite the general suspension of foundry operations during the first week of July for vacations and inventory.

In general, pig iron production has increased, although in the case of the Troy, N. Y., furnace, which went into operation two or three weeks ago, it is still engaged in making low phosphorus iron, which does not help the local foundries. However, what gain there has been in foundry iron output, appears to have been offset by an increasing shortage of cast scrap.

Cleveland — Shipments of pig iron to foundries average only about 50 per cent of quotas since only a small tonnage used in this district is eligible for certification. With inventories at only about two weeks' needs, foundries are operating on a hand-to-mouth basis and plan to reduce operations by mid-September or early October unless pig iron deliveries improve. While a few castings producers have been able to draw on inventories accumulated during plant shutdowns earlier in the year, others are mantaining operations by switching to orders which carry least exacting specifications. In some instances, pig iron has been conserved by charging a larger amount of scrap obtained from customers and adding ferroalloys. Tightness is attributed in part to the fact that steel companies are using larger amounts of pig iron to counteract the shortage of scrap and to expansion in the foundry industry's capacity. One foundry in this district, for instance, is producing 50 per cent more castings than it did prewar and hopes to be able to produce 100 per cent more as soon as raw materials are available.

Chicago — Pig iron supply continues to limit output of foundries, and is expected to do so for some time. Allocations show no appreciable change over recent weeks and none appears likely. Foundries having work in housing and farm implements are getting what they need for these end uses under directives, but other lines suffer. Castings producers who are unable to benefit from priority regulations are obliged to balance their operations against iron receipts and press strenously when shipments are delayed in transit. Most iron made in this district is going as hot metal into steel. With 37 of the district's 41 blast furnaces in operation, there are no prospects at the moment for increase in merchant production.

Cincinnati — Modification of CPA

regulations on pig iron directives brought a renewal of southern iron shipments, but neither these nor shipments of northern iron are in volume to allow capacity foundry operations. The supply is particularly precarious for some small melters. Shutdowns are being avoided, but in some cases continually threatening.

Boston — Pig iron supply is critical with an increasing number of foundries; a limited few with certifications are getting more, but at the expense of others. Melt is on the decline and operations more uneven. Consumers in some cases were too late with certification applications for August, but will probably get tonnage next month. As there is no additional iron in sight for this area, this will further pinch most melters. Most larger consumers are without ratings for iron and are desperately short. The lake shipping strike has not enhanced the prospects of the district furnace resuming production.

Philadelphia — At least temporary easing in basic iron is developing as a result of two district furnaces having recently changed from foundry to steelmaking iron, one stack at Birdsboro, Pa., and the other at Swedeland, Pa. The latter switched over about Aug. 20 and is scheduled to keep up on basic until the end of this month. Late last week district furnaces had received no word as to what they will be called on to supply in the way of preference tonnage in September. Meanwhile, consumers not favored with preferences continue to appeal to Washington for relief. Foremost in their appeals are manufacturers of certain types of cookstoves and hardware not included among those whose productin is regarded by Washington, apparently, as essential to the housing program.

Buffalo — CPA's directive program had little effect here as it conformed to a considerable degree with delivery schdules already adhered to by leading merchant iron producers. Foundries continue to plead for increased shipments as plans to increase melt are upset by lack of iron. Although five barges loaded with iron left here during the week for the seaboard, there is no appreciable change in eastern consignments under the CPA program. Sellers report the railroad car situation is still a problem. Only one of the area's 16 stacks is idle.

Pittsburgh — No action was taken in Washington last week to extend CPA's certified tonnage program past its expiration date Sept. 30. It is pointed out some decision on this plan soon must be reached as foundries must have their requests in for October iron certification by Sept. 15 for allocation to specific producers. Discussion continues on bringing into operation certain idle blast furnaces, but no decision yet has been reached as to extent of subsidies necessary in specific instances or how adequate supply of iron ore and coke can be made available. Certified tonnage for September had to be increased 25,000 tons to about 185,000 to handle late applications considered essential. This means that about 55 per cent of the merchant iron produced for foundries next month will be channeled to the relatively few companies coming within the scope of the CPA program. In this district, for example, 10 per cent of the customers will obtain around 50 per cent of the foundry pig iron production. One foundry in this district already has been forced to shut down due to lack of iron and

many more will have to do likewise before Sept. 15.

Birmingham — Pig iron seems to grow somewhat tighter from week to week and merchant melters anticipate no worthwhile relief for several months. A considerable portion of local production is being channeled through certification, into essential uses, but foundries generally and miscellaneous users are hard pressed.

Seattle — Pig iron supply is tight and demand steady, the trade being unable to obtain wanted grades. Shipments are largely out of stock and foundries are forced to take what is offered. Scrap scarcity has increased demand for iron. The trade hopes Geneva Works will soon reach full production so that various analyses may be available. The recent price increase of $2 makes the price at Provo $26.50 for No. 2 foundry, which makes the Seattle delivered price about $36.50.

Scrap . . .

Gravity of shortage increases as furnaces are shut down: hoarding for higher prices continues

Scrap Prices, Page 142

Pittsburgh — It is estimated that about 30 open hearths through the country are shut down because of scrap shortage and further curtailment in ingot operations is indicated as mills continue to draw heavily on dwindling inventory. Leading consumers have urged principal consumers to ship through normal channels all available scrap to alleviate the tight situation. Much of this tonnage is said to be bypassing brokers and dealers, going directly to mills on a reciprocal basis. Despite statements by OPA that higher prices are not being considered, considerable tonnage is still being held back in hope of upward revision. Steel producers opposes higher scrap prices on the basis they cannot afford additional production costs under present price ceilings. Although well below normal, movement of scrap to mills here is somewhat better than at Chicago, Youngstown and eastern areas. Carnegie-Illinois Steel Corp. has shipped 24,000 tons of scrap from Pittsburgh to Chicago to ease the shortage there. Scarcity of pig iron prevents further increases in its use to offset scrap shortage at foundries and steel mills.

Philadelphia — The scrap situation shows no improvement and, in fact, appears slightly worse. Manufactured scrap is in little better volume but yard scrap is moving even less freely than recently and relatively little government surplus material is being offered. The recently announced OPA regulation permitting no buyer to pay above ceiling prices for prepared scrap, in effect extending ceiling prices to dealers, is designed to give consumers a chance to get a greater portion and get it more quickly. However, just what recognition various Navy yards will give to this ruling remains to be seen, as all along, it is claimed, there has been a disposition to sell their scrap to highest bidders, regardless of dealer or consumer status.

Adding to difficulties of consum-

ers in obtaining adequate scrap supply is competition of other districts, especially Pittsburgh. Bartering continues to increase with much costly cross hauling involved. Upgrading is still widely in evidence and other steps are being taken in various instances to get around OPA price restrictions. Meanwhile no action has been taken on dealers' latest appeal for a price increase, which would be the first since April, 1941.

Boston — Movement of steelmaking scrap to consumers and dealers is light, the former with small inventories barely maintaining melt. Some scrap is being withheld, but the overall supply situation is tight and remote material is not coming out at current prices. Cast scrap supply is small, but some foundries have slightly better inventories, built up during the OPA recess when premiums up to $10 brought out considerable tonnage.

Buffalo — Mills are cutting deeper into shrinking reserve stocks and depending more on iron capacity. Railroad and industrial lists offer little relief because of the limited tonnage. Dealers report supply sources, in some instances, are holding material in anticipation of higher prices, but the aggregate amount is small. Dealers' yard stocks have reached a low point. Even if no overall increase in scrap ceilings is authorized, dealers expect to be compensated to some degree for additional processing costs. Leading mill consumers have suffered a drastic blow in the sharp falling off in water receipts of scrap. Receipts to date this season are running about 25,000 tons, compared with approximately 85,000 tons in the same period a year ago. Mills were depending on water scrap to replenish stockpiles for the winter.

Chicago — Flow of scrap to mills has improved somewhat, but not to the point where receipts balance consumption. It is still necessary for steelmakers to dip into inventories, which is unhealthy considering that this is the season when inventories should be building up for winter. There is still disagreement over whether material is being withheld from market for possible higher prices. One large steelmaker has moved 24,000 tons of scrap from the Pittsburgh district in a three-week period, and while this is not large volume as far as scrap goes, it has provided considerable relief in maintaining near capacity operations.

Cincinnati — There is no improvement in scrap supply. Restoration of OPA failed to bring out tonnage held back in hope of higher prices. However, some material may still be hoarded, on speculation. One indication of the genuine shortage is slowing of tonnage from customary sources. Some mill and foundry scrap reserves are gone, and operations depend on current shipments.

Birmingham — Far from showing improvement, scrap becomes increasingly scarce. Some railroad scrap is moving and that is about all except for trading being done between scrap sources and soil pipe producers, now rather widespread in this district. The deal usually is 25 tons of pipe for about 100 tons of scrap. Such dealing with steel mills, however, is not reported here. Tennessee Coal, Iron & Railroad Co., because of the nature of its operations, is relatively well off for scrap and anticipates no interference with its production rate on that account.

Seattle — Steel scrap offerings are below current needs and mills are using from inventory. Shipments are below expected volume, attributed mainly to narrow profit margin for dealers under high labor costs. Shippers are holding back in some cases in hope of better prices. Shipyard surplus is practically exhausted but prewar sources would be ample if conditions were more atractive.

OPA Forbids Dealers To Pay Over Ceilings on Scrap

Office of Price Administration has broadened control of ceiling prices on prepared iron and steel scrap to lessen hoarding or violation of ceiling regulations. By Amendment No. 7 to Maximum Price Regulation No. 4 no person may buy or sell prepared iron or steel scrap at prices higher than the applicable ceiling. Previously such a regulation had applied only to consumers or their brokers, but sales to dealers were exempt. Sales of unprepared scrap do not come under this changed regulation.

The reason behind this change is that under pressure for material dealers are bidding over ceilings for prepared scrap, which they cannot sell at as high a price as their cost. Since this causes a loss to the dealer OPA believes either he will violate ceiling or will hold the scrap from the market in the hope of a higher ceiling. Should this amendment result

in down grading prepared scrap to unprepared status further amendment is likely to be made.

OPA also ruled on mixed shipments, requiring physical segregation in the shipping vehicle and weighing each grade separately.

Rails, Cars . . .

Heavy buying by roads and government plan for new program reflects severe need

Track Material Prices, Page 139

New York — While the Office of Defense Transportation would like to see 42,000 domestic freight cars finished in the final five months of this year, so acute is the shortage in freight transportation facilities, it appears that this schedule cannot be fulfilled because of lack of steel.

Actually, it is said, the 171,930 tons of plates, shapes and bars required for finishing these cars have been placed, some long ago, for a number of cars were placed as early as last August; however, 76,000 tons of this amount, according to reliable information, have not as yet been scheduled, and it appears that the Civilian Production Administration is not inclined to give this tonnage special preference, as mills are badly jammed and housing and agricultural requirements are scheduled to continue to take priority.

To complete the 42,000-car schedule, as desired, the mills should roll, in round figures, 50,000 tons of plates, shapes and bars in August, 57,000 tons in September, 47,000 tons in October and 17,000 tons in November. Some mills believe they will be able to ship on schedule such orders for car steel as they have, but others, obviously, are not in such good position.

As of Aug. 1 there were 57,225 domestic freight cars on order in commercial car and railroad shops, all for delivery by the end of next May. Since then additional substantial orders have been placed, so that cars on order are now estimated to total around 65,000. Incidentally, of the 57,225 at the beginning of this month, 13,350 were on schedule in railroad company shops.

Deliveries during the first seven months of this year have been heavily retarded by shortage of materials and as recently as last month only 2500 units were completed during the period, all of which helps to account for the present shortage in freight cars. Light construction during the first seven months of this year can be ascribed in particular to the strikes in the steel and coal industries, which limited supply of steel. Shortage in lumber also was a factor, although recently this situation has eased, leaving steel as the real bottleneck. There is ample car capacity, but there is not the available steel.

In spite of the heavy carryover of car orders likely at the end of this year, the Office of Defense Transportation is said to still be considering a government financed program of 50,000 freight cars for production in the first few months of next year. Since this proposal was first made there has been much more active buying by railroads, with a result that recently there was talk of the program having been reduced by at least 10,000 cars, if it went ahead at all. However, the matter is still up in the air, with 50,000 the nominal figure and all of these to be box cars. It has been estimated that these 50,000 box cars would require approximately 900,000 tons of steel, including wheels and axles and miscellaneous castings, as well as plates, shapes, sheets and bars.

Domestic freight car buying in July was by far the heaviest for any month this year, involving 15,236 cars, which was only a few thousand short of equaling all the orders placed during first half of this year. In other words, and taking into account revisions in the monthly totals during first half, the July figure compared with 18,892 cars for the first six months. It brought the total for the first seven months up to 34,128. Orders placed in July in railroad shops, involving 4150 cars, were the heaviest for any one month so far this year, exceeding 3110 cars awarded to railroad shops in March.

Awards so far this month have exceeded those for any full month this year, except July, and at present some substantial lists are pending, including among the more recent lists, 1500 box for the Gulf, Mobile & Ohio; 1000 miscellaneous for the Nashville, Chattanooga & St. Louis; and 1000 for the Southern Pacific. In view of the emphasis now being placed on box cars, it is interesting to note that the three above mentioned lists, include a total of 3000

box cars. Also there were a substantial number of box cars included in orders placed in the past few weeks, all of which lend support to the opinion, which still exists in many quarters, that if the government does decide to bring out a program, it will not be for as many as originally proposed and still apparently under tentative consideration.

In view of the pressure for freight cars for domestic operations, export car demand is being forced to take a back seat. Some work is going ahead on export cars, which had long been on order and for which some steel is on hand. For instance, the 36,000-car program for the French is expected to get off to a moderate start next month in the assembly of some cars. But, in general, foreign demand is attracting relatively little interest, notwithstanding certain new inquiry including 2950 small freight cars for Turkey, which is also in the market at present for 60 steam locomotives.

Following is a comparative table covering monthly awards of cars for domestic operation placed in both commercial and railroad shops. Monthly totals during first half of this year have been revised.

	1946	1945	1944	1943
Jan.	2,050	7,200	1,020	8,365
Feb.	2,403	1,750	18,240	350
March	4,516	2,500	6,510	1,935
April	3,764	1,120	4,519	1,000
May	3,025	1,528	1,952	870
June	3,334	670	1,150	50
July	15,236	3,500	795	4,190
Aug.	....	7,240	3,900	6,747
Sept.	....	12,840	400	6,820
Oct.	....	1,320	2,425	5,258
Nov.	....	1,650	1,065	870
Dec.	....	4,116	16,245	2,919
Total	....	45,432	53,221	41,355

Iron Ore . . .

Iron Ore Prices, Page 140

Consumption of Lake Superior iron ore in July totaled 6,423,035 gross tons, compared with 4,994,936 tons in June and 6,532,273 tons in July, 1945, according to the Lake Superior Iron Ore Association, Cleveland. Cumulative consumption to Aug. 1 was 30,665,323 tons, compared with 46,878,576 tons in the comparable period last year.

Ore on hand at furnaces and on Lake Erie docks Aug. 1 totaled 30,428,615 tons, compared with 29,485,221 tons at the same date last year. Blast furnaces depending principally on Lake Superior ore in blast Aug. 1 numbered 167, compared with 156 a month earlier and 165 on Aug. 1, 1945. The steel strike in Canada caused all furnaces but one to be banked, a loss of five from July 1, or the total active would have been that much higher.

Refractories . . .

Refractories Prices, Page 141

Pittsburgh — Producers at St. Louis and east of the Mississippi recently raised refractory brick prices $2 to $5 to offset increased production costs resulting from higher coal prices, increased freight charges, and the advance in wages not compensated for by 11 per cent increase in refractory brick prices granted by OPA last spring. Super duty fire clay brick, high heat duty, and intermediate heat duty are now quoted at $81, $65,

and $59 per 1000, respectively, fob shipping point in Pennsylvania.

Sellers state shortage of railroad cars is hampering shipments somewhat. Deliveries on standard items are available within 6 to 8 weeks, but special shapes are extended 4 to 6 months. Most producers are operating at capacity although the heavy demand makes it impossible to make much headway against order backlogs. Coke oven expansion programs will be a major factor in the demand situation through the remainder of this year, while many blast furnaces, open hearths and coke ovens are badly in need of relining. Prospect of bringing into operation, on a subsidy arrangement, some high cost blast furnaces to help meet pig iron requirements for housing and farm equipment programs, is seen adding to overall demand.

Warehouse . . .

Warehouse Prices, Page 140

Philadelphia — Warehouse business is slightly improved as tonnage from mills is being received more freely. Some jobbers expect August bookings to exceed those for July. Small bars, sheets and light shapes continue in outstanding demand.

Boston — Warehouse inventories of alloys and larger cold-drawn bars are generally well balanced, but distributors are still losing inventory in smaller sizes of carbon products, despite heavier mill deliveries. Shapes and plates approach lighter flat-rolled products in scarcity and fabricators, unable to get wanted deliveries from mills, are substantial buyers. Bars in small sizes are short with demand heavy. Relatively small ratio of heavier tonnage being taken in by warehouses goes into stock except slower moving items.

Cleveland — Shipments of steel to warehouses are spasmodic and likely will be sharply lower in fourth quarter. One distributor here, for instance, reported that an urgently needed tonnage that had been promised for early August delivery but had been postponed to a late August position has been postponed now to the first week in September at the earliest. The mill explained that while the steel operating rate based on the number of open hearths in operation has risen to a high level, actual production of steel has not improved proportionately. Due to heavy order backlogs coupled with necesity of making provision for certified and rated orders, most mills are not accepting any warehouse orders for fourth quarter. However, CPA may issue a mill directive calling for delivery of certain tonnages to warehouses. Third quarter directive called for tonnages equivalent to those of fourth quarter of last year. While July shipments showed marked improvement, they have fallen off this month, resulting in further drying up of inventories. Warehouse stocks are not more than 30 per cent normal and consist chiefly of heavy material. Stocks of flat-rolled products, structurals, strip, small angles and channels are depleted.

Metallurgical Coke . . .

Coke Prices, Page 139

Pittsburgh — OPA granted a price increase late last week to beehive oven coke operators, retroactive to May 17. The market is now quoted on the basis of $8.75 per net ton, Connellsville, fur-

nace, and $9.35 for operators of hand-drawn ovens using trucked coal. Operators had been forced to raise wages about $1.85 per day. In addition, the cost of coal is up 51 cents per ton, and it takes about 1.6 tons of coal to make one ton of coke.

Some independent operators banked their ovens early last week just prior to authorization of the price increase. No adverse effect to pig iron production as a consequence of these shutdown is expected, since production will be resumed at the higher price level. Major steel firms draw a reserve supply of coke from independent firms to supplement output of their own operations.

Shipments of Soil Pipe Resumed After Price Relief

A price increase of $1.75 a ton has started soil pipe moving again out of the Birmingham district, major producing area.

Producers withheld shipments after the revived Office of Price Administration rolled soil pipe prices back to the June 30 level. Under Amendment 7 to Revised Price Schedule 100, OPA allowed a price increase of $1.75 a ton, which industry spokesmen said "takes production out of the 'red' by a slim margin."

Fire Clay, Silica and Ladle Brick Prices Rise

Leading producers of refractories have advanced prices of fire clay brick, malleable bung brick, and silica brick an average of about $4.16 per thousand while producers of ladle brick have advanced prices $5.55 to $5.85 per thousand.

Net prices, fob shipping point, are now as follows for brick produced in Pennsylvania, Missouri and Kentucky: Fire clay brick, super duty, $81; high heat duty, $65; intermediate duty, $59. Malleable bung brick is quoted $75, all bases; ladle brick, $42 dry press and $40 wire cut, Pennsylvania, Ohio, West Virginia, and Missouri; silica brick, $65 Pennsylvania and Birmingham, Alabama; $74 Joliet, Ill.

Magnesite and basic brick prices remain unchanged.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4500 tons, 40 bridges, Maine Turnpike, Kittery-Portland, to American Bridge Co., Pittsburgh; Lane Construction Co. and Snodgrass Construction Co., general contractors; Howard, Tammen, Needles & Bergendorff, New York, engineers; Bethlehem Steel Co., Bethlehem, Pa., awarded 1200 tons steel sheet piling.

700 tons, plant, Carbide & Carbon Chemicals Co., Texas City, Tex., to Austin Bros., Dallas, Tex.

474 tons, bridge, Stratford, Iowa, for state, to Pittsburgh-Des Moines Steel Co., Pittsburgh; Ben Cole & Son, Ames, Iowa, contractor; bids April 30.

350 tons, sheet piling, extension to power station, Havana, Ill., for Illinois Power Co., to Bethlehem Steel Co., Bethlehem, Pa.

350 tons, sheet piling, extension to power station, Havana, Ill., for Illinois Power Co., to Carnegie-Illinois Steel Corp., Chicago.

250 tons, plant for Piasecki Helicopter Co., Lansdowne, Pa., to Lehigh Structural Steel Co., Allentown, Pa.

224 tons, two 112-ton bridges, Ionia, Iowa; and Union Grove, Wis., for Chicago, Milwaukee, St. Paul & Pacific railroad, to American Bridge Co., Pittsburgh.

200 tons, Zellerback paper plant, Camas, Wash., to Pacific Car & Foundry Co., Seattle.

170 tons, sheet piling, refinery expansion, Whiting, Ind., for Standard Oil Co. of Indiana, to Inland Steel Co., Chicago; Lummus Co., New York, contractor.

150 tons, two bridges at Toledo, O., for New York Central, to American Bridge Co., Pittsburgh.

150 tons, beam span, bridge R-209, Lawler, Iowa, for Chicago, Milwaukee, St. Paul & Pacific railroad, to American Bridge Co., Pittsburgh; bids March 25.

137 tons, bridge, Jefferson, Iowa, for state, to Pittsburgh-Des Moines Steel Co., Pittsburgh; Ben Cole & Sons, Ames, Iowa, contractor; bids April 30.

125 tons, beam spans and repairs in Iowa, for Chicago, Milwaukee, St. Paul & Pacific railroad, to American Bridge Co., Pittsburgh; bids May 21.

60 tons, steel grill decking for Montlake bridge, Seattle, to Irving Steel Co., New York.

STRUCTURAL STEEL PENDING

1900 tons, addition to Herald Tribune building, New York; bids asked; Lockwood Greene Engineers Inc., 10 Rockefeller Plaza, that city, in charge.

975 tons, underpass, Idlewild Municipal Airport, New York, bids Aug. 26.

670 tons, woolen mill, Dublin, Ga., for C. M. Guest & Sons.

325 tons, building, Orange, Tex., for E. I. duPont de Nemours & Son Inc.

300 tons, additions to duPont plant at Edgemoor, Del.

300 tons, pulp dryer building, Moorehead, Minn., for American Crystal Sugar Co.

300 tons, boiler house, Milwaukee, for Joseph Schlitz Brewing Co.; Kulgian Engineering Co., Philadelphia, engineer-contractor.

270 tons, bridge, Braymer, Wis., for Chicago, Milwaukee, St. Paul & Pacific railroad.

200 tons, alterations at Margaret-Orthodox station, Department of City Transit, Philadelphia; bids Aug. 31.

185 tons, two Washington state highway bridges; bids to Olympia Sept. 4.

149 tons, bridge, Sec. 1-F, McLean county, Ill., for state; Illinois Steel Bridge Co., Jacksonville, Ill., low on bids Aug. 9; bids rejected, new bids Aug. 27.

120 tons, bridge, Sec. 45-F, Pike county, Ill., for state; Illinois Steel Bridge Co., Jacksonville, Ill., low on bids Aug. 9; bids rejected, new bids Aug. 27.

116 tons, Cedar river bridge, Covington, Iowa, for Chicago, Milwaukee, St. Paul & Pacific railroad; bids June 5.

Unstated, plant for Willard Storage Battery Co., 150 x 360 feet, Portland, Oreg.; general contract to D. M. Drake, Portland.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2735 tons, bridges and highways, Maine Turnpike, Kittery-Portland, to Bancroft-Martin Rolling Mills Co., Portland, Bethlehem Steel Co., Bethlehem, Pa., to finish steel; Lane Construction Co. and Snodgrass Construction Co., general contractors; Howard, Tammen, Needles & Bergendorff, New York, engineers.

250 tons, radio material school, Great Lakes, Ill., for Great Lakes Naval Training Station, to Joseph T. Ryerson & Son Inc., Chicago; Henry Ericsson Co., Chicago, contractor; bids June 25.

250 tons, gas storage container, East Chicago,

Ind., for Northern Indiana Public Service Co., to Bartlett Hayward Division, Koppers Co. Inc., Baltimore.

REINFORCING BARS PENDING

2750 tons, South Side intercepting sewer, Contract No. 2, Chicago, for Sanitary District of Chicago; bids Sept. 12.

110 tons, Washington state bridges; bids to Olympia, Sept. 4.

Unstated, concrete warehouse, 100 x 100 feet for Grays Harbor Port Commission, Aberdeen, Wash.; Lamb Construction Co. contractor.

PLATES . . .

PLATES PLACED

4000 tons, gas storage container, East Chicago, Ind., for Northern Indiana Public Service Co., to Bartlett Hayward Division Koppers Co. Inc., Baltimore.

PIPE . . .

CAST IRON PIPE PLACED

200 tons, various sizes, Pasco, Wash., to Pacific States Cast Iron Pipe Co., Provo, Utah.

CAST IRON PIPE PENDING

475 tons; various sizes for Wapato, Wash.; Pacific States Cast Iron Pipe Co., Provo, Utah, low.

RAILS, CARS . . .

RAILROAD CARS PLACED

Southern Railway, 140 streamlined coaches; 76 to Pullman-Standard Car Mfg. Co., Chicago; 41 to Budd Co., Philadelphia; 23 to American Car Foundry Co., New York; Pullman-Standard award included 71 sleepers and five mail-baggage cars; and Budd award 26 coaches, nine diners and six lounge coaches; American Car award, 11 coaches, four baggage-dormitory cars, three lounge-bar cars, three mail-baggage cars and four diners. Of cars placed with American Car 18 will be of aluminum.

RAILROAD CARS PENDING

Baltimore & Ohio, 1000 fifty-ton box cars.

Gulf, Mobile & Ohio, 1500 box cars, pending.

Nashville, Chattanooga & St. Louis, 1000 freight cars, comprising 500 fifty-ton box cars, 300 fifty-ton hopper cars and 200 fifty-ton gondola cars, bids asked.

Seaboard Air Line, 150 seventy-ton hopper cars, bids asked.

Southern Pacific, 1000 fifty-ton steel sheathed box cars, bids asked; this is in addition to 4050 freight cars placed by the railroad within the last year and a half.

Turkish Purchasing Commission, Washington, 2950 miscellaneous freight cars, including 1500 twenty-ton four-wheel box cars and 1000 twenty-ton four-wheel high side gondola cars, contemplated.

LOCOMOTIVES PLACED

Erie, 20 diesel-electric switch engines, including nine 1000-horsepower, six 660-horsepower and one 380-horsepower unit, placed with American Locomotive Co., New York, and two 1000-horsepower and two 660-horsepower units, placed with Baldwin Locomotive Works, Eddystone, Pa.

LOCOMOTIVES PENDING

Argentine State Railways, 5 to 30 steam locomotives, bids asked.

Turkish Purchasing Commission, Washington, 60 steam locomotives, comprising 40 of the 2-10-0 type and 20 of the 2-12-0 type, contemplated.

CONSTRUCTION AND ENTERPRISE

ALABAMA

MONTGOMERY, ALA.—Hazel-Atlas Glass Co., Wheeling, W. Va., will start construction soon of a glass container plant and box plant for manufacturing corrugated boxes for shipping.

CALIFORNIA

GLENDALE, CALIF.—M. W. Baird, architect, Bank of America Bldg., is preparing plans for a machine shop and factory for a client, 140 x 250 feet, to cost about $180,000.

LOS ANGELES—Quality Screw Products Co., 1842 West Valley Blvd., has permit for factory building at 6036 Ferguson Dr., covering 1800 square feet, to cost about $5600.

LOS ANGELES—Fiat Metal Mfg. Co., 1205 Roscoe St., Chicago, has permit for a plant building at 3449 Flower St., covering 15,000 square feet, to cost about $68,000.

LOS ANGELES—William Modglin, 3225 San Fernando Rd., has permit for a machine shop at that address, 40 x 150 feet to cost about $43,200.

LOS ANGELES—Hydraulic Press & Engineering Co., 5543 Alba St., has let contract to Miller-Saunders Co., 4426 Kingswell Ave., for a machine shop 75 x 116 feet, to cost $27,000.

LOS ANGELES—H. Kramer & Co., 2460 Enterprise St., is taking bids on a two-story 130 x 200-foot warehouse and foundry and 50 x 104-foot laboratory and office building, with two 10,000-gallon oil storage tanks.

SAN BERNARDINO, CALIF.—Converse Rubber Co., Malden, Mass., plans a rubber products plant for the Central Manufacturing District, to cost over $1 million. Anderson Nichols Associates, 210 West Seventh St., Los Angeles, are engineers.

SAN CARLOS, CALIF.—Mathews Conveyer Co., 300 Seventh Ave., San Francisco, has let contract to Wagner & Martinez, 181 South Park St., San Francisco, for a one and two-story sheet metal manufacturing plant 100 x 317 feet, to cost about $140,000. Meyers & Evers, 1201 Kohl Bldg., San Francisco, are architects.

CONNECTICUT

NAUGATUCK, CONN.—United States Rubber Co. will erect a three-story mill building costing $1,500,000 as an addition to its rubber footwear plant. Mixing and grinding operations will be concentrated in the new plant. W. E. Bittle is factory manager.

NEW HAVEN, CONN.—United Illuminating Co., 128 Temple St., has let contract to C. W. Blakeslee & Sons Inc., 58 Waverley St., for a 75 x 200-foot generating station, to cost over $900,000.

STAMFORD, CONN.—Taylor Reed Corp., Glenbrook, Stamford, has plans by L. F. Caproni, 121 Chapel St., New Haven, for a one-story 80 x 350-foot and 80 x 80-foot plant, to cost about $200,000.

ILLINOIS

CHICAGO—Verson All Steel Press Co., 1355 East 93rd St., has let contract to Norman Bouchard, Western Springs, Ill., for a one-story 100 x 156-foot foundry building, to cost about $85,000.

INDIANA

FORT WAYNE, IND.—Salisbury Axle Division of Dana Corp., Bennett Rd., Toledo, O., has let contract to A. Bentley & Sons Co., 201 Belmont St., Toledo, for a one-story plant addition, estimated to cost over $300,000.

HAMMOND, IND.—LaSalle Steel Co., Ham-

mond, will let contract soon for steel plant additions to cost about $75,000.

MASSACHUSETTS

QUINCY, MASS.—Pneumatic Scale Corp., 65 Newport Ave., has let contract to George A. Fuller Co., 11 Beacon St., Boston, for a one-story 145 x 224-foot plant to cost about $250,000.

SOUTH WALPOLE, MASS.—Bird Machine Co. has let contract to Munroe-Langstroth Inc., 52 North Washington St., North Attleboro, Mass., for an 80 x 120-foot plant addition, to cost about $100,000.

SPRINGFIELD, MASS.—Monsanto Chemical Co., 812 Monsanto Ave., has let contract to Adams & Ruxton Construction Co., 1387 Main St., for a one-story boiler plant, to cost about $60,000.

SPRINGFIELD, MASS.—Package Machinery Co. has bought the war plant operated by Pratt & Whitney division, United Aircraft Corp., East Longmeadow, Mass., for $1,750,000. Automatic wrapping and bottle-hooding machinery will be produced, employing 1500 workers, compared with 640 now. The present Springfield plant will be offered for sale.

MICHIGAN

DETROIT—Acme Foundry Co., 2503 22nd St., has let contract to Bennage & McKinstrie Co., 4612 Woodward Ave., for a foundry building costing about $85,000.

OHIO

CINCINNATI—City, H. H. Kranz, city engineer, is building an incinerator plant at Hopple and Beekman Sts., to cost about $750,000.

CLEVELAND—Anneo Products Inc. has been incorporated to manufacture automotive parts, Kenneth F. Wilson, associated with Cleveland Pneumatic Aerol Inc., 3781 East 77th St.

CLEVELAND—A-Brite Plating Co. Inc. has been incorporated to do commercial plating and has bought a plant at 2287 Woodland Ave. and will expand business. John Shope is president of the new company.

CLEVELAND—Le Roi Co., Milwaukee, has bought a plant at 12500 Berea Rd. and will equip it for manufacture of rock drills, mining and road-building machinery. Russell Morgan, United Bank Bldg., is representative.

YOUNGSTOWN—An addition of 26,000 square feet, costing $75,000, is being built at the Mackenzie Muffler Co. plant in North Meridian Rd., to be occepied by the Buffalo Pressed Steel Co., a subsidiary, for manufacture of oil filters and other auto equipment.

YOUNGSTOWN—Great Lakes Carbon Corp., Robert F. Fahy, Baltimore, manager rock wool division, will build a plant covering 20,000 square feet for manufacture of rock wool insulation from steelworks slag, in North Meridian Rd., at cost of about $250,000.

PENNSYLVANIA

BRIDGEPORT, PA.—Tube Methods Inc. has let contract to D. L. Reiff, 15 East Airy St., Norristown, Pa., for a one and two-story 140 x 140-foot plant and office building, to cost about $100,000. G. A. Greeby, Montgomery Trust Bldg. Arcade, Norristown, is architect.

CORRY, PA.—Ajax Iron Works is expanding its plant by several additions to double capacity for gas pumping engines for oilfield use.

ERIE, PA.—American Sterilizer Co. plans a two-story plant addition 91 x 102 feet, to cost about $65,000, to allow production expansion. Herman Zwicker is plant superintendent.

MEADVILLE, PA.—National Bearing Division of American Brake Shoe Co., E. A. Williams, works manager, 4930 Manchester Ave., St. Louis, has let contract to Ragnar Benson Inc., 4744 West Rice St., Chicago, for a foundry 293 x 735 feet and 39 x 93-foot boiler house, to cost about $2 million.

NEW BRIGHTON, PA.—Boro, Sixth Ave. and Ninth St., is having plans prepared by Michael Baker Jr., Baker Bldg., Rochester, Pa., for a sewage disposal plant and auxiliaries, to cost $175,000 and incinerator costing $50,000.

TENNESSEE

CHATTANOOGA, TENN.—E. I. duPont de Nemours & Co., Wilmington, Del., announces a third plant here for manufacture of nylon yarn, estimated to cost about $20 million, on a 600-acre tract near Chattanooga. Application has been made for CPA approval.

CHATTANOOGA, TENN. — Columbian Iron Works is having plans prepared for a foundry plant to cost about $275,000.

HUMBOLDT, TENN.—City plans sewage treatment plant costing about $120,000. Hurt-Rosche, Hillsboro, Tenn., are engineers.

MEMPHIS, TENN.—Allis-Chalmers Mfg. Co., Gerald L. Malmo, branch manager, has zoning permission for a plant at Airways and Dunne Sts. for manufacture of industrial and agricultural machinery, to cost about $40,000.

TRENTON, TENN.—City plans a sewage treatment plant to cost about $115,000. Hurst-Rosche, Hillsboro, Tenn., are engineers.

TEXAS

EL PASO, TEX.—El Paso Natural Gas Co., El Paso, plans expansion of compressor station costing $200,000, gas purification plant over $200,000 and dehydration plant about $200,000.

GARLAND, TEX.—Modern Cotton Machine Co., Garland, plans a plant for manufacture of a cotton picking machine, estimated to cost $100,000. W. Payne, Garland, is engineer.

HOUSTON, TEX.—Mosher Steel Co., 3910 Washington St., has let contract to Bace-Marshall Co., 4009 Center St., for a plant to cost about $70,000.

PLANO, TEX.—Sure Heat Stove Co., 2124 North Harwood St., Dallas, Tex., plans a plant for manufacture of oil heaters, to cost about $55,000.

TEXAS CITY, TEX.—Carbon & Carbide Chemical Corp., Texas City, will add to chemical plant, including equipment building, three pump houses, compressor building, furnace building and electric control houses, to cost over $3 million.

WASHINGTON

ABERDEEN, WASH.—Grays Harbor Port Commission has let contract to Lamp Construction Co. for a 100 x 100-foot concrete warehouse structure.

ENUMCLAW, WASH.—H. I. Kyle, city clerk, will receive bids Aug. 27 for a municipal machine shop.

SPOKANE, WASH.—City has budgeted $525,000 for construction in 1947 of a pumping plant at Trent, Wash., involving several buildings and equipment.

TACOMA, WASH.—War Assets Administration has approved sale to Hooker Chemical Co. of the local anhydrous aluminum chloride plant which has been operated by the Hooker Electrochemical Co.

WHITE SALMON, WASH.—Klickitat County Public Utility District No. 1, E. E. Clouse, manager, will call bids Sept. 16 for material and equipment involved in the proposed 340-mile transmission and distribution line, total cost of which is estimated at about $400,000, in five schedules.

WISCONSIN

MILWAUKEE — Alfa Machine Co., 1305 North Fourth St., has let contract to W. W. Oeflein Inc., 5345 North Hopkins St., for a one-story 110 x 124-foot plant building, to cost about $50,000.

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