STEEL

The Magazine of Metalworking and Metalproducing

VOL. 118, NO. 3 JAN. 21, 1946

NEWS

TECHNICAL

FEATURES

MARKETS

NEXT WEEK...

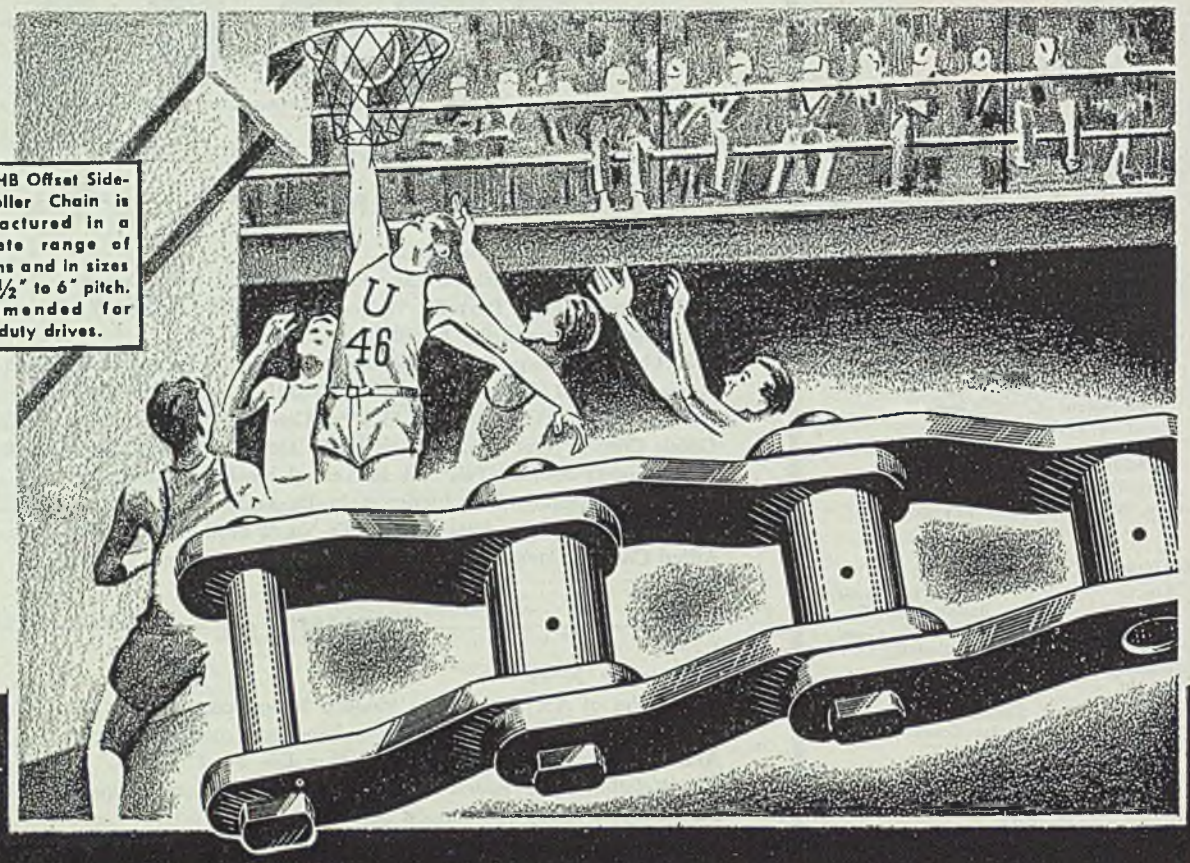
Precision Casting by the "Lost Wax" Method

Dual System for Cleaning Blast Furnace Gas

Metal Powders for Electrical Contacts

Standardization of Color Finishes for Machines

Preview—Twenty-Seventh National Metal Congress



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As the EDITOR VIEWS the NEWS

Better Trouble-Shooting

Sometimes one wonders whether the managers of American industry—on the average—are devoting adequate attention to the problems of labor relations. Does the typical industrial executive give as much time and thought proportionately to insuring harmonious relations between employer and employees as he does to making sure that his production and sales departments function smoothly and efficiently?

Assume that a company is seeking orders in an attractive market that it has served successfully for years. Assume further that all of a sudden the sales department fails to land an important contract it had expected to get. Assume that increasing sales resistance is felt all along the line. The reaction in top executive circles is immediate and decisive. Something is wrong. It may be the product, poor selling or any one of a dozen things. The company turns the entire power of its trouble-shooting facilities onto this problem until it has licked it thoroughly.

Again imagine a case of major trouble in production. One vital operation is lagging behind others, rejects on account of lack of uniformity in heat treating mount to an alarming figure or a situation develops where too much hand fitting in final assembly has become necessary. When anything of this kind occurs, management is quick to ferret out the cause of the trouble and to correct it promptly.

In most organizations there is sufficient manpower, skill and experience on tap at all times to meet these occasional emergencies intelligently. There is a well-established routine for getting the bugs out of sales and production quickly.

But are most industrial corporations equally well prepared to deal with the bugs in labor relations? When a foreman has trouble with some of his men or with the shop steward, does the company scent the incipient stoppage of work promptly enough to avert it or does it let matters take their course. Is there a sufficient managerial backing-up of the foreman to cope with the shop committee, business agent, local union officials and national agent—all of whom stand ready to back up the shop steward?

Industry might profit tremendously by putting the same thought into organizing for effective labor relations as it has put into organizing for effective sales and production. Obviously much work stoppage at present is beyond the control of even the best management, but in the long run better organization for labor relations would reduce sharply the number of hours lost through unnecessary disputes.

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PROGRAM DISCREDITED: Paul G. Hoffman, chairman of the Committee for Economic Development, has issued a report to the effect that employment is at the highest peacetime level in history, despite current strikes. Estimates, based on reports by CED regional managers and government statistics, place employment at the beginning of 1946 at 52 million persons. Unemployment was believed to not exceed 2 million.

These estimates, which seem to tie in plausibly with other data on employment, indicate clearly that the CIO union leaders and the White House economic advisers who "sold" the President on the idea that wholesale unemployment would engulf the nation before the end of 1945 were lamentably poor prognosticators. The fact that these dire predictions have been proved wrong now subjects almost all of President Truman's pet legislative program to doubt and suspicion. No wonder Congress is not taking the President's Jan. 3 public slap on the wrist too seriously.

In his appeal on that date to the public over the heads of Congress he asked for support on full employment, minimum wage, broader social security

(OVER)

and similar legislation because it is necessary to offset the effect of expected unemployment, loss of pay and diminished purchasing power.

The CED figures, coupled with corroborating government statistics, constitute impressive evidence that the President's program is unrealistic and largely unnecessary. —p. 51

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NEW RESEARCH TOOLS: Due largely to progress made during the war, new tools now are available which permit research metallurgists to more accurately evaluate service stress conditions. The supersonic reflectoscope, magnetic particle testing, the electric strain gage used in conjunction with the recording oscillograph, high-speed photography, stroboscopic viewers, the electron microscope and numerous other aids promise to extend the horizons of postwar metallurgy tremendously.

This is fortunate because in spite of the great progress made during the past few decades there still are many blind spots in our knowledge of the behavior of metals. Industry constantly is confronted with failures in the performance of materials and parts that cannot be explained satisfactorily on the basis of present experience.

These new facilities—particularly those permitting extensive investigation on non-destructive tests —should sharpen the perception of metallurgists appreciably and help them to penetrate some of the unsolved mysteries confronting their profession. —p. 90

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STEEL FOR GERMANY: Behind the decision of the Allied Control Council for Germany to limit that unfortunate nation's steel capacity to 7,500,000 tons and its production to 5,800,000 tons annually are significant differences in the attitudes of the victorious nations.

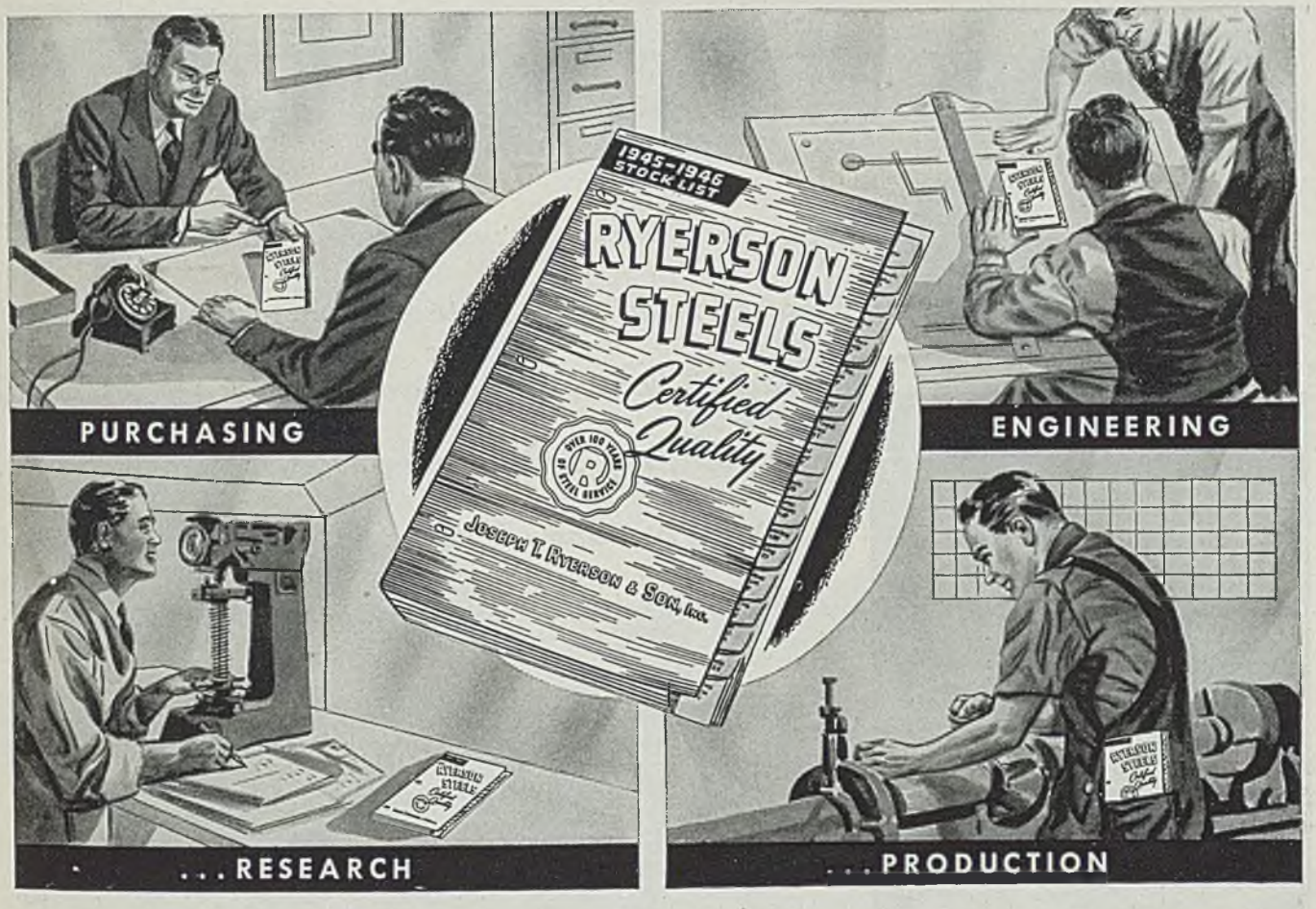
Russian representatives wanted to limit German steel capacity to 3,000,000 tons, which would be slightly less than the capacity of American Rolling Mill Co. at the outbreak of the war. British representatives were willing to limit German capacity to 10,500,000 tons, which is slightly more than the present capacity of Republic Steel Corp. French and American representatives favored limitations between the Russian and British extremes. The final decision is subject to annual review by the council.

It will be interesting to watch the progress of a program that keys Germany's development to a steel supply that is roughly equivalent to the combined capacity of Youngstown Sheet & Tube Co. and Inland Steel Co. and which demotes her to fifth place or lower among the steelmaking countries of the world. —p. 77

SIGNS OF THE TIMES: In a supplemental report to "Steel Expansion for War" to bring that study up to date as of June 30, 1945, Civilian Production Administration announces (p. 61) a 300,000-ton annual increase in privately financed sheetmaking capacity. This would permit a sheet steel production of about 16 million tons annually. . . . Surplus Property Administration has decided that the Big and Little Inch pipe lines should continue to be utilized for the transportation of oil and petroleum products. The decision (p. 62) seems to please eastern railroads, coal producers and coal miners union but it disappoints those who had hoped these lines would be employed to convey natural gas to eastern metropolitan areas. . . . An upward turn in employment in California in December (p. 63) is encouraging observers to believe that the Pacific Coast area has turned the corner in reconversion. . . . The new Kaiser car, scheduled for production at Willow Run by summer time, will be equipped with torsion bar suspension (p. 65), a springing idea adapted from the French Citroen automobile. Another innovation is front wheel drive, with a 6-cylinder Continental engine as the principal feature of a packaged power unit. . . . Russia is working hard to expand her iron and steel capacity. European observers predict Russia will be producing 20 million tons of steel ingots annually within five years (p. 68) and Marshall Stalin is said to be considering two five-year plans which would insure the nation a capacity of 60 million tons in the next decade. . . . Carnegie-Illinois Steel Corp. points out that more than 364,000 welders were at work in war plants at the peak of production—not far below the 427,000 carpenters employed throughout the United States at the same time. The corporation believes that its system of site-welded steel frame farm buildings (p. 70) gives prospect of many new peacetime jobs for people who became welders during the war and who now seek peacetime employment. . . . Manufacture of steel products from billet-size ingots attained increased importance during the war. Many persons will be surprised to know that as many as eight or ten companies adopted billet-size steel pouring practice (p. 88) during recent years and have found that it has certain definite advantages. . . . Disposal of most of the government's war surpluses (p. 56) will be handled by the Office of Surplus Property of RFC.

E. L. Shaner

EDITOR-IN-CHIEF



Are You Using this Steel Guide?

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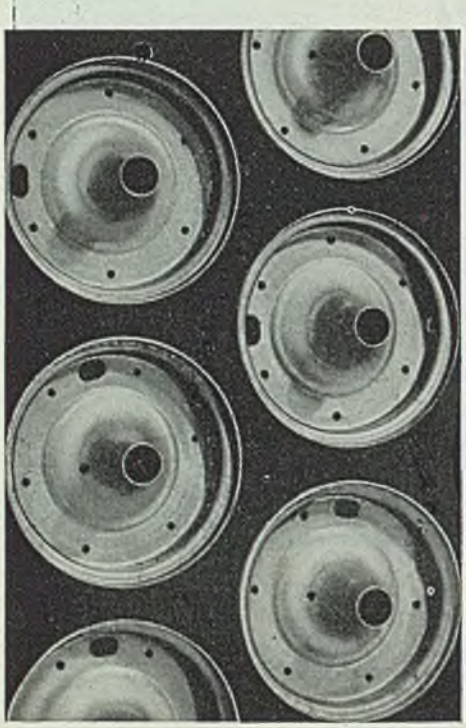
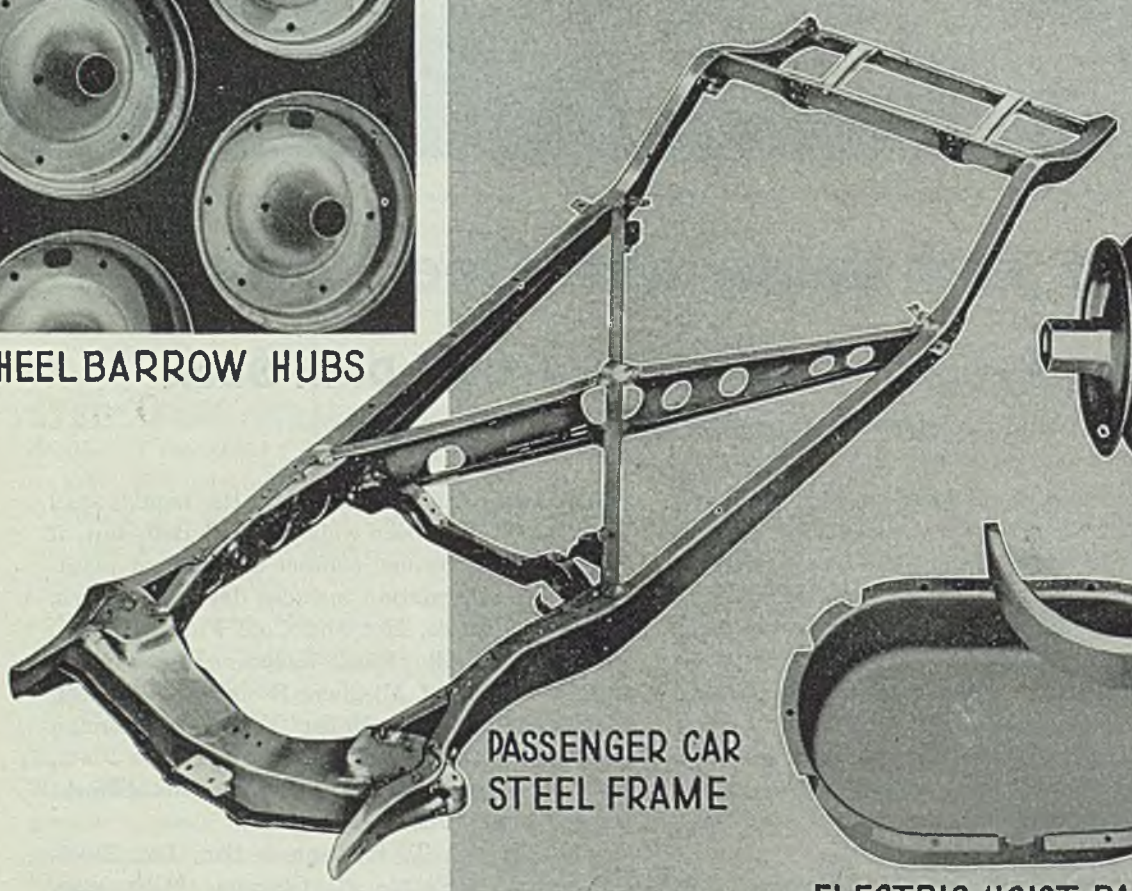


WHEELBARROW HUBS



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STEEL
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Philip Murray, left, president of the United Steelworkers, John Snyder, center, reconversion director, and Benjamin F. Fairless, president of United States Steel Corp., appear in a jovial mood as they meet at the White House to discuss the steel industry's wage and price problem

Wage Spiral Gains Momentum

Administration's policy of expediency in handling steel and other major industrial disputes seen bringing widespread demands for further wage and price increases. Observers doubt peace thus bought will be lasting. Inflationary results feared

WHITE HOUSE policy in attempting to settle actual and threatened strikes by the expedient of buying off organized labor with substantial wage increases and industry with compensatory price advances emphasizes the essentially political nature of government wage and price control.

(President Truman late last week made a proposal for settling the steel wage dispute to President Benjamin F. Fairless of United States Steel Corp. and President Philip Murray of the United Steelworkers, after the latter had failed to agree at a series of White House conferences. Details of the President's proposal were not revealed immediately but were to be taken under advisement by Messrs. Fairless and Murray and their respective organizations.

(Prior to Mr. Truman's proposal, it was reported that Mr. Fairless had offered the steelworkers an increase of $1.20 a day and that Mr. Murray was insisting on $1.56 a day, or the 19½ cents an hour increase suggested by the fact-finding panel in the General Motors case.

(Administration officials earlier had indicated they would grant a $4 a ton increase in finished steel products.)

While many observers at week's end believed this policy sooner or later would be successful in settling existing disputes, they also were convinced that for every strike the government thinks it is buying off by this procedure it is buying itself several score more for future delivery.

These observers point out that if wage advances of, say $1.50 a day, are granted to the approximately two million workers involved in the present major disputes, similar demands will be advanced in time by the 50 million other workers in the country. First will come demands from the other organized workers who will insist on the same settlements granted the steel and auto workers. Eventually the higher wages will sift down to the often-forgotten unorganized workers.

Should all the 52 million civilian workers obtain an advance of $1.50 a day, the nation's total payroll will be increased by approximately $20 billion.

During the time these adjustments are being made the resulting rising prices will be reflected in a rising cost of living. Probably before the wage increases are achieved by the less well organized workers, the better organized workers will be demanding new increases to off-

set the rising living costs.

Observers subscribing to this theory believe we soon may be caught in the long-feared inflationary spiral, with every wage increase resulting in a rise in prices that will give rise to demands for further wage increases.

As the administration's latest policy, or rather expedient, for settling current disputes developed, it became increasingly clear that the steel wage case was to supply the pattern for settling other disputes. Administration leaders were confident that once the steel dispute was settled, the automotive, electrical and other cases would be resolved on similar lines.

The steel wage increase offered, it is estimated, would cost basic steel producers between $150 and $200 million annually and would further increase the share of the steel sales dollar that would go to wages, continuing a trend that prevailed throughout the war as steel prices remained frozen at prewar levels while average wage rates increased from 84.2 cent an hour in 1939 to $1.22 in November, 1945.

In the table showing steel wages, prices, output and wages per ton of steel produced, in STEEL, Jan. 14, page 52, payroll figures used in calculating wages per ton for 1945 included salaries, while those for preceding years included wages only, thus distorting wages per ton figures for 1945. Excluding salaries, wages took $21.78 per ton of steel produced in the first 11 months of 1945, or about $5 more than in 1940.

Nonintegrated Steelmakers View Price Proposals with Concern

Tight position of small mills reflected in decision of Parkersburg Iron & Steel Co. to liquidate. Across the board increase on carbon steels products would further narrow profit margins of nonintegrated interests

CRITICAL position of the nonintegrated steel producers as a result of increasing raw material supply deficiency and inflexible price ceilings, last week was emphasized by the announcement that the stockholders of the Parkersburg Iron & Steel Co., Parkersburg, W. Va., had voted to liquidate the company.

The move, it was said, was prompted by inability of the company to compete for business because of high production costs and uncertain sheet bar supply prospects. In making the announcement, John F. Budke, president of the company, said the action was not taken because of present labor conditions in the industry.

During the war the Parkersburg company operated on a premium price basis.

Nonintegrated steel producers point out that if proposed steel price increases are applied across the board uniformly on carbon steel products, at $4 per ton to illustrate, they will be confronted with further narrowing of profits. By being forced to pay more for their semifinished steel supply and at the same time not being permitted to raise the price on their finished product more than their increased cost of semifinished, they will receive no price assistance at all. In fact, their profit range will be cut further due in part to scrap loss.

Smaller companies thus far have not embraced favorably the OPA suggestion of premium prices, for while a sellers' market may continue for some months to enable them to dispose of finished products at premium prices, most interests fear dislocated customer relationships might follow a return to more normal distribution. However, if the price rise is on a uniform basis more sellers might be forced to resort to higher premiums for temporary relief. An alternate would be to increase maximum prices for finished products an additional amount thus increasing the differential of nonintegrated mills to avoid premiums.

Semifinished in Short Supply

Shortages of semifinished are now endangering operations. Other factors attending semifinished supply are tied in with application of price advances. If high enough, integrated mills would sell at a profit to non-producers of semifinished making possible a potential increase in supply. On the other hand if a smaller price rise is permitted on semifinished than on finished products, the flow of semifinished to detached mills would probably be further reduced. There is no indication whether increases will be uniform across the board or that an average will be struck by OPA on varying price rises for individual steel products, but the method of application is of vital importance to the industry.

With respect to the Parkersburg company it is reported its facilities were put up for sale without success during the past 60 days. One current rumor is that one prospective buyer considered taking over the plant for production of aluminum sheets. The company's facilities include: Three continuous sheet mill heating furnaces, five standard box type annealing furnaces and two galvanized pots. Annual rolling capacity is about 36,000 net tons.

For some time past the production of galvanized sheets has been restricted,

Placards spell the demands of striking CIO United Electrical workers as employees of General Electric Co. and Westinghouse Electric Corp. hold a mass meeting on the town green at Bloomfield, N. J. NEA photo

many producing interests avoiding this type of tonnage due to the high cost of zinc. One producer has not booked galvanized sheets 18 gage and lighter for over a year.

Nonintegrated steel companies in the Pittsburgh area have been hard pressed in obtaining adequate semifinished steel since the sale of Carnegie-Illinois Steel Corp.'s Farrell Works to Sharon Steel Corp. Many of these interests have not booked any new finished steel tonnage the past six weeks and are gradually working off their order backlogs. None of these companies yet has been forced to shut down, however.

A number of interests are no longer shipping certain products far distant from production points because of the high freight absorption involved.

CED Survey Shows Payrolls, Wages Only Slightly Below War-Time Peaks

Employment at highest peacetime level in history, despite work stoppages. Fifty-two million gainfully employed while only about two million are without jobs. Reconversion has progressed more rapidly than anticipated

EMPLOYMENT is at the highest peacetime level in history, despite current strikes. Nearly 52 million workers now hold productive civilian jobs and unemployment is only a fraction of that officially predicted at the conclusion of hostilities with Japan. This reflects more rapid reconversion than anticipated; in many areas reconversion is 90 per cent complete.

Payrolls and individual earnings are near the war-time peaks.

These conclusions are contained in a report by Paul G. Hoffman, chairman of the Committee for Economic Development and president of Studebaker Corp. Mr. Hoffman's statements are based on reports by CED regional managers and government statistics.

With 52 million workers employed in productive jobs at the beginning of the year, the number of unemployed was only about 2 million, judging from the figures of the U. S. Census Bureau, Mr. Hoffman said. The Census Bureau estimated unemployment in November was 1,710,000; in October, 1,550,000; and in September, 1,650,000.

Contrary to contentions by labor leaders that the postwar reduction in take-home pay, caused largely by a reduction in the work-week and loss of premium overtime rates had caused a heavy reduction in mass purchasing power, the CED head asserted that payrolls and individual earnings are now only slighly below the wartime peak.

Total Income Down 5 Per Cent

"Total income payments to individuals continue close to their highest wartime levels. From July to October, total income payments (seasonally adjusted) declined about 5 per cent and private wage and salary payments dropped about 10 per cent. Part of the decline in income payments reflects the reduction in hours of work. Average weekly earnings in manufacturing fell from $45.45 in July to $41.02 in October, or 10 per cent, partly from reduction in war employment and partly from reduction of overtime. But the decline in income payments since the end of the war has been less than was expected, and an upturn has developed earlier than had been anticipated.

"In industry the greatest impact of cutbacks has been felt by manufacturing and mining. Production in these two fields combined has fallen by about 20 per cent since July. But when we eliminate war production from this total, the

(*Please turn to Page* 153)

Present, Past and Pending

■ REYNOLDS METALS BUYS ALUMINUM EXTRUSION PLANT

CHICAGO—Reynolds Metals Co., Richmond, Va., has leased for 5 years the $6,750,000 government-owned aluminum extrusion plant in Grand Rapids, Mich., subject to approval by the Surplus Property Administration and the United States attorney general.

■ CATERPILLAR OFFERS 10 PER CENT WAGE INCREASE

CHICAGO—Caterpillar Tractor Co. has offered a general wage increase of 10 per cent, effective Jan. 28, and will negotiate a further increase in connection with a new contract with the union.

■ MOTION TO REPORT FACT-FINDING BILL DEFEATED

WSHINGTON—A motion to report the President's Fact-Finding bill without subpoena power and without the 30-day waiting period was defeated by the House Labor Committee last week.

■ FRANCE PLACING $100 MILLION FREIGHT CAR ORDERS

NEW YORK—American Car & Foundry Co. has received orders for 8750 box cars and 4000 gondolas from the Railway Purchasing Commission of the French Supply Council. This constitutes part of a $100 million freight car purchasing program being arranged with American manufacturers.

■ BARIUM STEEL PLANS TO BUY REPUBLIC INDUSTRIES INC.

CANTON, O.—Barium Steel Corp. plans to acquire control of Republic Industries Inc., manufacturer of stampings, airplane and marine engines, permanent adjustable jacks, and aircraft and hydraulic equipment.

■ CEILING PRICES RAISED ON CERTAIN PLUMBING ITEMS

WASHINGTON—Manufacturers' ceiling prices have been increased 9 per cent over the Oct. 1, 1941, prices for brass plumbing fixture waste fittings and trimmings, and from 5 per cent to 25 per cent for supply fittings and trimmings. Profit factors of 3.7 per cent and 5.7 per cent, respectively, have been established for these two types of fittings and trimmings.

■ CEILING RETAIL PRICES SET FOR FIVE 1946 CARS

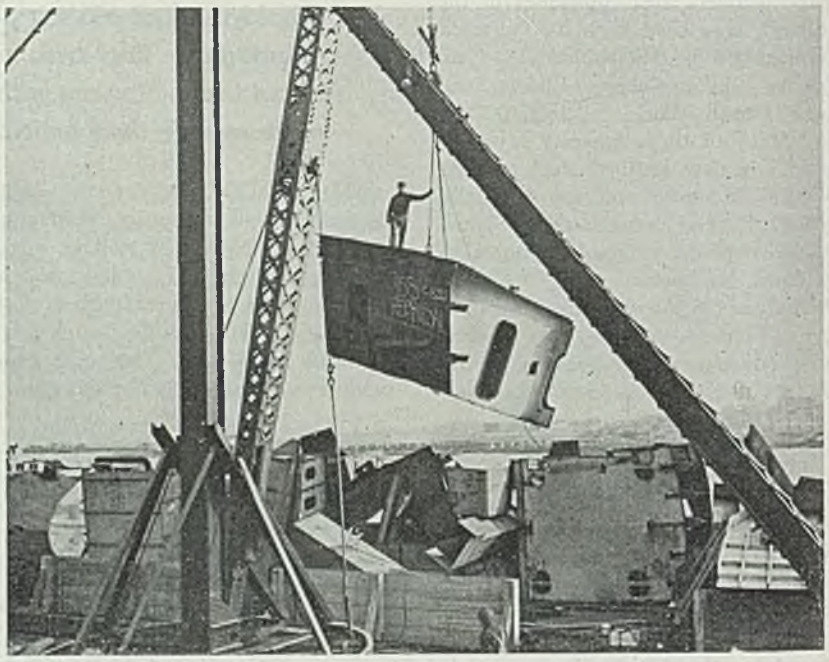
WASHINGTON—Ceiling retail prices were established last week for 1946 model Plymouth, Dodge, De Soto, Chrysler and Ford passenger automobiles, reflecting an absorption by dealers of 2.5 per cent of prewar profits. Ceilings range up to 3.5 per cent over 1942 models. In addition, allowances are provided for engineering improvements.

■ MOONEY ELECTED HEAD OF WILLYS-OVERLAND MOTORS INC.

TOLEDO—James D. Mooney, formerly associated with General Motors Corp., has been elected president and chairman of the board of Willys-Overland Motors Inc., this city. Charles E. Sorenson was elected vice chairman of the board; Ward M. Canaday, chairman of the finance committee.

Congress Gets Antistrike Proposals

Legislation affecting labor given right of way. Stormy debate on President's fact-finding panel bill expected. Authority of Wage Stabilization Board alarms industry



SWORDS INTO PLOWSHARES: This 10-ton section of what was to have been the aircraft carrier *U. S. S. REPRISAL* is unloaded at the Bethlehem Steel Co.'s Elizabeth, N. J., scrap yard for remelting into steel for new automobiles and other peacetime products eventually to be made. Construction of the 27,000-ton carrier was halted when the Japanese surrendered

PROPOSALS for antistrike legislation had the right of way when Congress reconvened Jan. 14. The Senate Education & Labor Committee at once resumed consideration of the President's request for a law to clothe his labor disputes fact-finding panels with subpoena powers, and the House Labor Committee agreed to resume work on the companion bill on Jan. 22.

Thrown into the hopper in the House on the opening day was a resolution by Rep. Clare Booth Luce (Rep., Conn.) calling on the Ways and Means Committee to complete studies it inaugurated several years ago of all existing profit sharing systems. The purpose, explained Mrs. Luce, is to encourage more general adoption of profit sharing as an antidote to allay strike fever. Rep. Clare E. Hoffman (Rep., Mich.) introduced a bill which would force public utility workers to file 60-day strike notices under penalty of losing their status under the Wagner act.

Senator Harry F. Byrd (Dem., Va.) announced his intention to introduce an omnibus bill under which labor unions would register with the SEC and report on all their affairs; it is to embody penalties intended to prevent abuses by the unions. There were indications of a stormy debate in the Senate over the President's fact-finding panel bill, with the threat that reintroduction of the proposal to create a permanent Fair Employment Practices Commission might be resorted to in order to postpone labor legislation for a few weeks.

Demands General Wage Increases

In the meantime, no matter what action Congress may take under the head of labor legislation, the administration seems to have set itself up quite effectively.

In the first place, the administration has a strong labor policy as of the present time. In line with the speeches that President Truman made on Aug. 18, Oct. 30 and again on Jan.. 3, the administration insists on general wage increases. It makes no bones whatever about giving every help it can to the labor unions in their demands.

In the second place, the administration has a setup for bringing strong pressures to bear upon employers who refuse to grant increases high enough to satisfy the union leaders. As a matter of fact, capitol observers are beginning to believe that stronger pressures are about to be exerted than even during the war period. The administration has had a lot of experience in sicking one government agency or another to harrass industrialists. Using the regular authority of established government agencies, and resorting to the large grants of authority conveyed by the First and Second War Powers Acts, the administration can make life miserable for businessmen opposing its policies.

An example of the sort of procedure which is seen ahead was the action taken by the National Labor Relations Board after General Motors Corp. had refused to consider the recommendation of the President's fact-finding panel for a 17.4 per cent wage increase. The NLRB lost no time in summoning General Motors Corp. to answer to UAW-CIO charges that the company had failed to bargain in good faith.

Washington does not expect the NLRB to deal with General Motors Corp. any more sympathetically than the fact-finding panel. This corporation is not expected to get any kindly treatment from government agencies as long as it continues at odds with the administration on wage policy.

In the administration's postwar labor setup insufficient publicity has been given to the new Wage Stabilization Board organized to serve as a successor to the War Labor Board. Last fall it was made to appear that the coming liquidation of the WLB was due, at least in part, to the administration disposition to terminate war controls as rapidly as possible, leaving it to employers and labor, as President Truman told the Labor-Management Conference last November, to settle their own differences as far as possible.

At that time it was generally believed that the contemplated new Wage Stabilization Board would be a sort of nominal organization, set up in the Labor Department under the Secretary of Labor to administer the Stabilization Act of 1942 during the remainder of its life.

But as the Wage Stabilization Board has taken form under the President's

executive order of Dec. 31, it is anything but a nominal organization. Set up under Title 1 of the first War Powers Act, as well as under the Stabilization Act of 1942 as amended, its authority is such as to cause alarm among many Washington representatives of industrial and business interests.

Its grant of authority is defined as follows in the President's order:

"The board shall have all the present powers, functions, and responsibilities of the National War Labor Board. . . . relating to the stabilization of wages and salaries for the purpose of carrying out the objectives authorized and directed by the Emergency Price Control Act of 1942, as amended, and the Stabilization Act of 1942, as amended, in accordance with the policies and procedures provided by Executive orders and regulations pursuant to these Acts."

Under currently effective orders and regulations, the most important function of the Wage Stabilization Board is that in reference to wage increases requiring price increases. Under the President's orders, an employer is free to grant wage increases without any approval; indeed, he is encouraged to do so. In all cases, an employer may go to the OPA six months after he has increased wages and request an increase in prices.

WSB Approval Required

But when an employer needs a price increase to enable him to pay an increase he must obtain Wage Stabilization Board approval before the OPA is authorized to act on his request for a price increase.This holds good even in cases where an employer grants an increase in pay on the recommendation of one of the President's fact-finding boards.

However, the employer must watch his step and not take anything for granted—for the WSB will not entertain an application for approval of a wage increase which is contingent upon compensating price relief from the OPA. When the WSB approves a wage increase, the employer must pay that increase. The only concession made by the WSB under this policy is that it permits the employer to hold up payment of the wage increase until such time as the OPA has made a decision on the request for a price increase. After the OPA has made its decision, the employer must at once begin paying the increased wages—and do so whether the OPA decision is favorable or unfavorable to the employer.

Another feature of the WSB policy in regard to deciding on price increase requests based on wage increases should be understood by all employers. In many cases employers agree with their workers or the unions representing them that wages should be increased by a certain amount. When an employer needs a price increase to meet the wage increase, and goes to the WSB for the necessary approval before approaching the OPA, he can encounter trouble. Where an employer has agreed, say, to an increase of 10 cents an hour, and the WSB decides to give its approval only to 5 cents increase, then the employer can seek OPA price relief only on the basis of 5 cents advance in wages.

Thus, under no circumstances is the employer safe in increasing wages without full WSB approval beforehand.

Another function of the WSB is that its approval is required for all decreases.

The WSB, incidentally, has jurisdiction over all cases involving wages and salaries up to $5000 yearly, excepting the salaries of professional, supervisory and administrative employees.

Another WSB function which is of importance to employers is that of enforcing penalties for violations of its own orders or those of its predecessor organization, the War Labor Board. The WSB has inherited about 10,000 cases in which employers unlawfully raised wages prior to the end of the war. In its processing of these cases the WSB can deal harshly or gently with the culprits at its pleasure. The Wage Stabilization Act provided that total wages paid, including the unapproved increases, "may" be disallowed by the government as an expense for income tax purposes. However, the Office of Stabilization, in interpreting the law, ruled that the War Labor Board might set a lesser amount than the total wages.

While the policies outlined above apply to industry and business generally, they do not apply to the building construction field. All increases, as well as decreases, in wages in this field continue to require approval.

WSB will continue the Steel Commission it inherited from the War Labor Board, but only for the purpose of finishing the job for which it was created. In the basic steel wage decision, the WLB ordered the employers to correct inequities in their wage structures and provided that there might be an average increase not to exceed 5 cents an hour for this purpose. The Steel Commission approves all agreements reached under this order, and it also is empowered to decide disagreements. One change is that all the decisions of the Steel Commission now are final; previously they were subject to appeal to the War Labor Board.

The WSB has three other functions. It will appoint an arbitrator when the parties to a dispute make a joint request and agree to abide by the arbitrator's decision. The approval of the WSB is needed for any changes in wages or working conditions in plants under government seizure. And the WSB now receives the 30-day strike notices which formerly went to the WLB.

Individual Company Price Adjustment Provision of Order 133 Liberalized

OFFICE of Price Administration last week announced it will in the future give consideration to hardship claims of individual companies involving one or more of their operating units.

This liberalization of the price adjustment policy of OPA is limited in its effect, however, because many price regulations already contain "liberal provision for price adjustments" under which many companies already have been granted relief.

The eligibility provision of supplementary order 133 formerly required an applicant to show that failure to receive a price adjustment would compel him to conduct his entire business operations at a loss, presumably even though his total business operations might comprise several separate plants, companies or corporations.

Under the order as originally written, OPA said, one of several plants or corporations under common ownership occasionally had to be denied relief because (due to unusually profitable operation of the other plants or corporations) the owners could not show overall loss. In some cases to deny the request has seemed out of line with the general transition adjustment policy, OPA said.

The adjustments will be considered by OPA only "where the applicant affirmatively shows that adjustment of, or failure to adjust, prices of the separate plant will not affect the operations, costs, or operating profits of any other business establishment having common ownership or other affiliation."

Order 133 is applicable to manufacturers of certain commodities covered by specified regulations, including the following: Iron and steel products, No. 6; pig iron, No. 10; steel castings and railroad specialties, No. 41; by-product and retort gas coke, No. 29; beehive oven coke, No. 77; ferromanganese and manganese alloys and metals, No. 138; bolts, nuts, screws and rivets, No. 147.

November Steel Shipments Total 4,779,628 Tons

Gain 119,391 tons over October. Most of increase made in hot and cold-rolled sheets and bars

FINISHED steel shipments in November totaled 4,779,628 net tons, compared with 4,660,237 tons in October and 5,686,527 tons in November, 1944, according to figures by the American Iron & Steel Institute, New York.

Most of the gain was made in hot and cold-rolled sheets and bars, most other products showing a slight drop. Plates, standard rails, cold-drawn bars and drawn wire were shipped in less volume than in October. Hot-rolled sheets increased from 569,056 tons to 589,713 tons, cold-rolled sheets from 301,333 tons to 309,908 tons, hot-rolled strip from 136,822 tons to 144,442 tons and hot-rolled bars from 750,587 tons to 763,312 tons. Galvanized sheets, in contrast to other sheets, dropped from 145,151 tons to 140,542 tons. Plate shipments in November totaled 393,601 tons, compared with 415,032 tons in October. Standard rails dropped from 191,905 tons to 189,897 tons, cold-drawn bars from 118,723 tons to 105,883 tons and drawn wire from 172,322 tons to 169,777 tons.

During November 413,061 tons were shipped to other members of the industry for conversion into further finished products, compared with 593,060 tons in October and 525,117 tons in November, 1944.

Total shipments for the year to Nov. 30 were 57,509,257 tons, against 63,761,216 tons in the comparable period in 1944. Shipments to other members of the industry for conversion in 11 months of 1945 totaled 5,208,054 tons, compared with 6,134,299 tons in the like period in 1944.

Figures in the accompanying tabulation are from companies that in 1944 represented 99 per cent of total output of finished rolled products, as reported to the institute.

December Unemployment Up, Census Bureau Reports

Unemployment increased 300,000 between November and December and reached a total of slightly more than 2 million during the first week of December, according to J. C. Capt, director, Census Bureau, Department of Commerce.

The December estimate of unemployment, 2,020,000, compares with 1,710,000 in November and 830,000 in August. These figures include those persons who did not work but were looking for work.

Employment, estimated at 51,810,000 in December, remained virtually at the November level. However, the number of persons 14 years of age and over outside the labor force increased substantially. The December figure of 44,210,000 for the group is about a million higher than the corresponding figure for November. This increase reflects in part the seasonal withdrawal of agricultural workers.

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS

Period NOVEMBER - 1945

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.	51	1	xxxx	xxxx	xxx	328,545	163,991	xxxx	xxx	6,504,358	1,985,918
Structural shapes (heavy)	11	2	9,580,550	326,802	44.0	323,958	xxxx	3,222,006	39.0	3,217,582	xxxx
Steel piling	4	3		19,856		16,692	xxxx	199,961		196,547	xxxx
Plates (sheared and universal)	27	4	17,841,320	420,760	28.7	393,601	26,983	6,772,335	41.5	6,624,107	510,335
Skelp	6	5	xxxx	xxxx	xxx	55,221	20,707	xxxx	xxx	682,240	344,186
Rails—Standard (over 60 lbs.)	4	6	3,669,000	201,545	66.8	189,897	xxxx	2,064,819	61.5	2,033,633	xxxx
—All other	5	7	512,000	13,164	31.2	14,310	xxxx	153,061	32.7	156,398	xxxx
Splice bars and tie plates	12	8	1,745,960	61,568	42.9	63,739	xxxx	699,311	43.8	721,684	xxxx
Track spikes	10	9	349,400	14,805	51.5	14,309	xxxx	144,688	45.2	149,281	xxxx
Hot Rolled Bars—Carbon	38	10	xxxx	661,587	xxx	523,304	73,543	7,663,215	xxx	6,093,660	943,282
—Reinforcing—New billet	13	11	xxxx	87,436	xxx	86,904	xxxx	656,002	xxx	668,017	xxxx
—Rerolled	14	12	xxxx	7,719	xxx	8,712	xxxx	72,073	xxx	78,802	xxxx
—Alloy	25	13	xxxx	176,674	xxx	144,392	11,726	2,474,243	xxx	1,821,388	209,544
—Total	46	14	22,381,700	933,416	50.7	763,312	85,269	10,865,533	53.0	8,661,867	1,152,826
Cold Finished Bars—Carbon	23	15	xxxx	111,708	xxx	105,883	xxxx	1,520,705	xxx	1,505,384	xxxx
—Alloy	25	16	xxxx	19,257	xxx	16,981	xxxx	347,702	xxx	310,335	xxxx
—Total	32	17	3,015,910	130,965	52.8	122,864	xxxx	1,868,407	67.7	1,815,719	xxxx
Tool steel bars	17	18	273,010	8,117	36.1	8,116	xxxx	114,409	45.8	114,256	xxxx
Pipe & Tubes—Butt weld	16	19	2,232,520	124,005	67.5	126,938	xxxx	1,416,083	69.3	1,394,359	xxxx
—Lap weld	9	20	830,200	37,507	54.9	34,704	xxxx	462,495	60.9	473,838	xxxx
—Electric weld	11	21	1,570,900	73,889	57.2	62,048	xxxx	912,884	63.5	807,100	xxxx
—Seamless	16	22	3,377,700	209,452	75.4	180,595	xxxx	2,617,018	84.7	2,085,950	xxxx
—Conduit (cap. & prod. incl. above)	7	23	xxxx	xxxx	xxx	8,563	xxxx	xxxx	xxx	80,350	xxxx
—Mech. tubing (cap. & prod. incl. above)	12	24	xxxx	xxxx	xxx	41,091	xxxx	xxxx	xxx	620,881	xxxx
Wire rods	27	25	7,266,670	382,029	63.9	108,314	34,250	4,129,672	62.1	1,198,448	411,054
Wire—Drawn	41	26	5,664,690	292,048	62.7	169,777	9,962	3,207,855	61.9	1,896,019	107,764
—Nails and staples	19	27	1,253,360	53,309	51.7	52,623	xxxx	549,472	47.9	552,838	xxxx
—Barbed and twisted	15	28	539,610	19,881	44.8	20,882	xxxx	215,859	43.7	215,843	xxxx
—Woven wire fence	16	29	1,113,860	35,743	39.0	35,879	xxxx	341,604	33.5	339,753	xxxx
—Bale ties	12	30	149,700	6,631	53.8	7,145	xxxx	68,392	49.9	75,860	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	85,038	721	xxxx	xxx	549,948	4,803
—Chemically treated	8	32	465,000	13,971	36.5	11,576	xxxx	113,917	26.8	102,626	xxxx
Tin and Terne Plate—Hot dipped	10	33	3,793,850	142,357	45.6	141,226	xxxx	1,832,201	52.8	1,914,942	xxxx
—Electrolytic	10	34	2,231,850	67,368	36.7	67,445	xxxx	807,716	39.5	797,904	xxxx
Sheets—Hot rolled	30	35	19,197,320	1,272,210	80.5	589,713	46,967	12,629,604	71.9	6,237,721	436,922
—Cold rolled	12	36	7,131,460	445,779	76.0	309,908	xxxx	4,305,826	66.0	2,589,065	xxxx
—Galvanized	16	37	2,915,130	136,334	56.8	140,542	xxxx	1,568,655	58.8	1,576,821	xxxx
Strip—Hot rolled	24	38	7,055,390	217,363	37.4	144,442	24,211	2,422,635	37.5	1,507,117	254,242
—Cold rolled	35	39	3,119,850	106,508	41.5	108,170	xxxx	1,243,505	43.5	1,171,241	xxxx
Wheels (car, rolled steel)	5	40	319,400	24,267	92.3	23,510	xxxx	267,402	91.5	267,665	xxxx
Axles	6	41	408,170	12,004	35.7	11,951	xxxx	132,902	35.6	136,925	xxxx
All other	5	42	190,490	2,960	18.9	2,984	xxxx	41,509	23.8	38,371	xxxx
TOTAL STEEL PRODUCTS	152	43	xxxx	xxxx	xxx	4,779,628	413,061	xxxx	xxx	57,509,257	5,208,054
Effective steel finishing capacity	152	44	67,310,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	152	45	xxxx	xxxx	xxx	78.8%	xxxx	xxxx	xxx	84.9%	xxxx

Steel Production Capacity Cut 11.4 Per Cent in Pittsburgh Area

Carnegie-Illinois Steel Corp. retires certain outdated units. District's rated capacity now estimated at 18,107,090 net tons against 20,447,090 year ago and 17,933,220 at beginning of 1941

DROP of 11.4 per cent in Pittsburgh district steel ingot production facilities as of the first of this year has resulted from the decision of United States Steel Corp. officials to retire and dismantle primary steelmaking units at Carnegie-Illinois Steel Corp.'s Homestead, Edgar Thomson and Duquesne plants. Retirement of these units represents a drop of 22 per cent in the company's ingot production facilities in the Pittsburgh area.

The district's annual ingot capacity is now estimated at 18,107,090 net tons, againt 20,447,090 at the beginning of 1945 and 17,933,220 on the comparable date in 1941.

As a result of the recent retirement of steelmaking units, Carnegie now represents about 45 per cent of the district's total capacity. This compares with 51 per cent last year and 46.7 at the start of 1941.

At Homestead Works the company has retired its No. 1 and 2 open-hearth shops. These are said to be old, high cost units. Present annual capacity at this works is now placed at 3,973,000 net tons, of which 1,700,000 tons is government owned. A year ago this plant had a rated capacity of 4,732,000.

The company has withdrawn four bessemer units from its capacity at the Edgar Thomson plant, rated at 672,000 net tons annually, and reduced the works' annual capacity to 1,690,000 tons from 2,297,000. These bessemer units will continue to be used for the making of scrap.

The No. 1 open-hearth shop at the Duquesne Works has been retired, reducing ingot operating facilities to 1,172,800 net tons annually from 2,146,800.

Carnegie-Illinois Steel Corp. abandoned its Mingo Works at Mingo Junction, O., early last year and sold its Farrell Works to Sharon Steel Corp. in December. To date Wheeling Steel Corp. has not yet taken up its option on the Mingo Works, with the result that ingot capacity for the Wheeling district of 3,320,000 is somewhat below the prewar stated capacity of 3,737,120 net tons.

The accompanying table shows steel ingot capacities for the companies in the Pittsburgh and Wheeling districts as of Dec. 31, 1940, 1944 and 1945.

ANNUAL INGOT CAPACITY
(Net Tons)

	Dec. 31 1940	Dec. 31 1944	Dec. 31 1945
PITTSBURGH DISTRICT			
Allegheny Ludlum Steel Corp.	375,020	394,860	394,860
American Locomotive Co.	103,040	103,000	103,000
American Rolling Mill Co.	705,600	591,000	591,000
American Steel & Wire Co.	782,000	842,000	842,000
Babcock & Wilcox Tube Co.	.....	50,400	50,400
Braeburn Alloy Steel Corp.	20,730	20,730	20,730
Carnegie-Illinois Steel Corp.			
Clairton	805,000	805,000	805,000
Duquesne	1,881,800	2,146,800	1,172,800
Edgar Thomson	2,172,000	2,297,000	1,690,000
Homestead	3,111,500	4,732,000	3,973,000
Vandergrift	403,000	500,000	500,000
Total	8,373,300	10,480,800	8,140,800
Colonial Steel Co.	5,800	7,020	7,020
Crucible Steel Company of America			
La Belle	3,920	3,780	3,780
Midland	795,740	1,034,400	1,034,400
Park	160,380	181,500	181,500
Total	960,040	1,219,680	1,219,680
Edgewater Steel Co.	84,000	140,170	140,170
Firth Sterling Steel Co.	12,700	17,540	17,540
Heppenstall Steel Co.	42,560	42,560	42,560
Jessop Steel Co.	16,000	50,000	50,000
Jones & Laughlin Steel Corp.			
Aliquippa	1,724,800	1,764,000	1,764,000
Pittsburgh	2,218,950	2,233,500	2,233,500
Total	3,943,750	3,997,500	3,997,500
Latrobe Electric Steel Co.	12,000	12,000	12,000
Mesta Machine Co.	102,320	105,000	105,000
National Tube Co.	1,200,000	1,200,000	1,200,000
Pittsburgh Steel Co.	1,072,000	1,072,000	1,072,000
Union Electric Steel Corp.	21,380	25,200	25,200
United Engineering & Foundry Co.	40,470	.....	.....
Universal-Cyclops Steel Corp.	50,680	54,120	54,120
Vanadium Alloys Steel Co.	5,600	11,910	11,910
Vulcan Crucible Steel Co.	4,230	9,600	9,600
Total	17,933,220	20,447,090	18,107,090
WHEELING DISTRICT			
Carnegie-Illinois Steel Corp.	672,000	.....	.....
Follansbee Steel Corp.	141,120	126,000	126,000
National Steel Corp.	1,580,000	1,850,000	1,850,000
Wheeling Steel Corp.			
Benwood	336,000	336,000	336,000
Steubenville	1,008,000	1,008,000	1,008,000
Total	3,737,120	3,320,000	3,320,000

Road Builders Told 1946 Building Program To Lag

The housing shortage will get worse before it improves, and construction of all kinds in 1946 will fall far short of established goals, Maj. Gen. Philip B. Fleming, Federal Works Agency administrator, said last week addressing the forty-third annual convention of the American Road Builders' Association in Chicago.

General Fleming listed shortage of skilled labor and uncertainty of materials costs as the building industry's chief stumbling blocks. Contractors will make contracts only at exorbitant prices, he said, because they do not know what labor and materials may cost by the time a project actually gets under way.

He said the Federal Works Agency has cut its 1946 public construction program from $2.1 billion to $1.9 billion and further cuts to $1.7 billion or lower may be expected.

Slezak Retires as Chief, Chicago Ordnance District

Announcing his retirement as chief of the Chicago Ordnance District last week, Col. John Slezak stated the district is nearing its final goal of complete settlement of all contract termination cases.

Colonel Slezak, who has headed up the district since June, 1944, pointed out that out of 1249 termination cases on hand as of Sept. 1, 1945, less than 100 now remain to be settled and in all but nine cases inventories have been submitted by contractors.

Although production on most contracts was stopped on V-J Day or shortly thereafter, the district still has 12 contracts on which production has been continued. These contracts, amounting to approximately $1,000,000 will be completed within two or three months. In addition to these contracts, a total of $6,112,317 has been obligated for future research.

Goods Costing Nearly $25 Billion To Be Declared Surplus by June 30

Bulk of disposal will be handled by Office of Surplus Property of the Reconstruction Finance Corp. Plants and industrial real property will account for nearly $8 billion of total; $3½ billion will be production material and plant equipment

GOVERNMENT surplus property which originally cost $24,383,700,000 will be acquired by disposal agencies in the 1946 fiscal year ending June 30, 1946, the Surplus Property Administration estimates.

By June 30, 1947, the agencies will have acquired an additional $12,537,400,000 worth of surplus property, the SPA predicted.

All but $1,353,800,000 of the prospective total acquisitions for the 1946 fiscal year will be handled by the Office of Surplus Property of the Reconstruction Finance Corp. Plants and industrial real property will account for $7,756,300,000 of prospective RFC acquisitions, production material and plant equipment for $3,445,000,000 and consumer goods for $2,790,000,000.

The estimates, based upon data furnished by the War and Navy departments and other owning agencies, were prepared jointly by the SPA and the disposal agencies. The figures admittedly are rough estimates only, inasmuch as postwar requirements of the Army and Navy have not yet been firmly established. Actual acquisitions to date have caused a downward revision of $8,300,000,000 in the August, 1945, estimate of $32,624,000,000 for the current fiscal year.

Based on Original Cost

All of the estimates are in terms of original acquisition cost. In many instances, such as aircraft, only a fraction of this may be realized upon sale of the property. The estimates include only surpluses located in the continental United States and U. S. territories and possessions.

Total declarations of surplus property to the end of 1945 reached $12,431,040,000. Of this amount, $4,643,660,000, or 37 per cent, was aircraft considered probably not salable, while other property accounted for the balance of $7,787,380,000.

All disposals through December, 1945, total $1,245,189,000, exclusive of nonsalable aircraft, which amounted to $1,093,650,000. Original cost of all surplus property other than nonsalable aircraft sold through December, 1945, was $1,219,966,000. Total amount received from these sales was $611,024,000. The $25,223,000 difference between total disposals of $1,245,189,000 and reported cost of $1,219,966,000 of property sold consisted of abandonments, donations, and transfers without reimbursement.

The entire surplus inventory at the end of 1945 totaled $10,092,201,000. Nonsalable surplus aircraft accounted for about 35 per cent of this, or $3,550,010,000, while plants and industrial real property comprised roughly another 25 per cent or $2,498,662,000. The $10,092,201,000 inventory figure includes $145,033,000 of property on lease.

Acquisitions Continue Downward

During December, government-owned property originally costing $1,660,829,000 was declared surplus. Acquisitions of property as surplus during December continued the relatively slight decline commenced after October's record postwar declarations. Since the end of the war, however, monthly declarations totals have stayed far above any prewar month, four-fifths of the declarations in 1945 having occurred in the last third of the year.

December disposals (excluding nonsalable aircraft) continued the steady rise begun in mid-1945, reaching the total of $274,130,000, as compared with $180,925,000 for November. This rise was the result largely of significant increases in disposals of plants and industrial real property, production materials and plant equipment, and property overseas. Most disposals were sales. In December, property reported to have cost $269,147,000 was sold for $109,358,000, while in November property reported to have cost $172,305,000 was sold for $72,412,000.

Consumer goods disposal declined from the $51,307,000 (reported cost) in November to $45,778,000 in December, the second highest monthly disposal figure in 1945 for this class of surplus. In December, consumer goods reported to have cost $44,092,000 were sold for $17,396,000 as compared with November totals of $48,052,000 and $16,266,000, respectively.

The nation's stockpile of surplus consumer goods on Dec. 1, 1945 totaled $1,007,174,000. Confirmed inventory of consumer goods amounted to $561,773,000 and inventory in transit account totaled $445,401,000. Declarations of consumer goods as surplus in the first half of 1946 are expected to triple the $900 million of the last half of 1945. Estimated total sales of surplus consumer goods through December, 1945, amounted to $509,000,000. Chief disposal agency for all surplus consumer goods is the Reconstruction Finance Corp., Office of Surplus Property, Consumers Goods Division.

Regional Sales Offerings Rise

To increase the disposal of surplus commodities, SPA said that formal national sales are being minimized and regional sales offerings are being stepped up. "On the spot sales" aimed at closing out smaller installations are being put into widespread use. Meanwhile, improved liaison at depots, camps and other major stockpile locations and at SPA regional offices are being set up with both Army and Navy to streamline the declaration of additional surplus materials. Special declarations on items listed as critical by the Civilian Production Administration are beginning to be released by the Army as the result of investigations by the Surplus Committee of the War Department headed by Gen. Courtney Hodges, it was reported. Plans to assure equitable distribution on surplus consumer goods have been established by the allocation division of the Office of Surplus Property.

The Dec. 1 confirmed inventory of consumer goods consisted of the following: Machinery, $47,405,000; motor vehicles, $78,778,000; auto parts, accessories and equipment, $35,335,000; hardware, $51,330,000; plumbing, heating, air conditioning and electrical, $28,810,000; general products, $66,291,000; furniture, $6,063,000; office machines and appliances, $2,342,000; paper products and office supplies, $15,817,000; medical

and surgical, $28,305,000; textile and wearing apparel, $164,048,000; and residual products, $37,249,000.

To clear surplus aircraft components and parts out of Army, Navy, and RFC warehouses throughout the country, streamlined procedure has been set in motion, the RFC announced.

Many of the warehouses formerly were used for manufacturing and other industrial purposes, and the RFC is making an intensive effort, in co-operation with the Army and Navy, to clear these as promptly as possible so that they can be put back into civilian use.

Best sellers of the government's surplus warplanes at a West Coast airfield are these Cessna aircraft lined up by hundreds. Sale price is $8500 each. Sale there of 2000 planes is one of 50 being held at fields throughout the United States. NEA photo

Task forces operating out of Washington are in the field working closely with similar Army and Navy crews and with RFC agency offices to expedite clearance of the warehouses.

Aircraft parts and components and other aeronautical property which can be used in civil aviation or which can be sold for other purposes are being segregated by the field crews and arrangements made for prompt shipment to sales points. Material manufactured for tactical types of planes and other specialized purposes and not suitable for civil aviation use or for nonaviation purposes is being sold as scrap.

Border-line material which is not definitely known to be unusable is inspected by citizens' committees composed of persons having special knowledge of possible uses for the material. If these committees advise the RFC that the surplus parts may have further uses, sales are held on the spot at the warehouses. If the committees' advice is to the contrary, the material is offered as scrap.

As material definitely known to be salable is segregated, it is shipped directly to manufacturers, distributors, and others who are acting as RFC agents for the sale of surplus aircraft parts and components. There now are more than 40 of these agents under contract to the RFC, and another 21 contracts are being negotiated. Applications have been received from an additional 48.

Surplus material which cannot at present be absorbed by the agents will be shipped to a central sales depot now being established at Cleveland. The former Fisher Body Plant No. 2, located at Cleveland airport, will be used for this purpose. The depot has approximately a million square feet available for storage and sale of aircraft parts and components. That depot is expected to be in operation by Feb. 1, and will act as a direct sales center and as a distribution point to supply RFC agents with material as they need it for resale.

It has been estimated that of the many hundreds of millions of pounds of parts and other aircraft material in surplus, only from 2 to 5 per cent can be used in civil aviation. A small percentage of the remainder may have some nonaviation use and it will be made available for any purposes which may be developed.

In analyzing the surplus disposal problem, the SPA said that America's peacetime aircraft industry can utilize only about one-third of the airframe plants and one-sixth of the engine plants built by the government during the war. The SPA pointed out, however, that aircraft plants can readily be adapted to the needs of other industries and if disposed of quickly can make a particularly important contribution to employment and reconversion.

Under the SPA disposal policy, the aircraft industry will receive no blanket preference in the disposal of the 350 government-owned aircraft plants which cost more than $3,800,000,000, but on formal request of the Army or Navy special treatment may be granted to insure that certain plants essential to the national security be maintained in aircraft production.

While the SPA report placed greatest emphasis on sales, it recognized that leases would be necessary in certain instances and suggested percentage leases as a means of adapting disposal terms to the requirements of certain users and as an encouragement to the final sale of facilities. Co-ordinated disposal of plant and equipment was advocated, and acceptance of old plants as a partial payment on new ones was recommended wherever this would result in a net gain in the disposal program.

Recent disposal of plants by the RFC includes the sale of the Army Ordnance bomb fuse plant at St. Paul to Brown & Bigelow Inc., of that city, and sale of a government-owned one-story factory building at 9117 St. Catherine Ave., Cleveland, to the Snell Tool & Engineering Co., Cleveland. Both sales are subject to the priority right of governmental agencies. Sale price of the St. Paul plant, which originally cost $272,874, was $185,728. Sale price of the Cleveland plant was $18,000.

Newly-announced offerings of plants include:

Radio Condenser Co., Camden, N. J., 23,500 sq ft, and equipment.

Panther-Panco Rubber Co., Chelsea, Mass., 122,280 sq ft, and equipment.

Cross Co., Detroit, 19,200 sq ft, and equipment.

Pratt & Whitney Division of United Aircraft Corp., East Longmeadow, Mass., 378,314 sq ft, and equipment.

Buckeye Ordnance Works, Ironton, O., 500,000 sq ft, and equipment.

M. B. Mfg. Co. Inc., New Haven, Conn., 18,000 sq ft, and equipment, and 25,620 sq ft, and equipment at East Haven, Conn.

Models Inc., North Bergen, N. J., 5400 sq ft, and equipment.

Blaw-Knox Co., Pittsburgh, 109,000 sq ft, and equipment.

Pittsburgh Coke & Chemical Co., Pittsburgh, 10,800 sq ft, and equipment.

Symington-Gould Corp., Rochester, N. Y., 59,000 sq ft, and equipment.

Rheem Mfg. Co., Williamsport, Pa., 80,000 sq ft.

Kilgore Injects Conservatism Into New Science Program Bill

Measure embodying compromises with views expressed by leading scientists in a long series of hearings has strong backing, and present indications are that it will be the one that will be submitted to Senate and House

THE NATIONAL Science Foundation Act on which Sen. Harley M. Kilgore now hopes to get congressional action within the next few months will be much more conservative than the measure he originally drafted and introduced in July, 1945. A redraft of this bill which he introduced on Dec. 21 embodies a number of sharp compromises with views set forth by leading scientists during a long series of hearings by his Subcommittee on War Mobilization, and particularly with the program formulated by Dr. Vannevar Bush, director of the Office of Scientific Research and Development.

Senator Kilgore plans to "call in representative groups of scientists to go over in final detail this new draft of the bill;" he contemplates holding informal closed conferences rather than public hearings, and after these conferences are over he will make his final report to the Senate Military Affairs Committee.

Present indications are that the Kilgore bill, as finally amended and approved by the full committee, will be the one submitted to the Senate and, later on, to the House. In the first place, it is admittedly a compromise in the direction of "right." Secondly, it has strong backing, being co-sponsored by Senators Johnson, Pepper, Fulbright and Saltonstall. Thirdly, the proponent of the alternate bill which won highest commendations from the scientists, Sen. Warren G. Magnuson, is holding his hand for the present.

Senator Magnuson's bill embodied the Bush program which would place the country's science program under the control of a board of leading scientists rather than under a government administrator, and which would leave it to the discretion of a director selected by the board rather than by the President whether a research organization working on a government project would have to assign resulting patent rights to the government. Whether Senator Magnuson introduces a revision of his bill will depend on two factors—the extent to which the final Kilgore bill departs from its original restrictive features, and the kind of legislation Senator Magnuson thinks can get necessary support.

The new Kilgore bill, S. 1720, retains the stipulation that the proposed National Science Foundation shall be directed by a single administrator selected by the President with the approval of the Senate. But the revised bill provides that the administrator "shall consult and advise with a National Science Board. . . .on all matters of major policy or program or budget." To be composed of nine scientists, the board would elect its own chairman and appoint and prescribe the duties of an executive secretary of its own selection. It would have unique powers directly defined in the bill.

"The board," the bill directs, "shall continuously survey the activities and management of the foundation, and shall periodically evaluate the achievements of the foundation in accomplishing the objectives of this act. The board shall. . . . make appropriate recommendations and reports relating to its duties and findings. The board. . . .shall have full access to all information in the possession of the foundation. The board may. . . . .make such recommendations to the President and the Congress as in its opinion will further the objectives of the act. The administrator shall. . . .publish and disseminate widely any recommendations or reports prepared by the board or such committee. The annual report (of the administrator) shall include whatever dissenting opinions may be submitted for that purpose by individual members of the board."

Cites Main Provisions

This language, in the opinion of Senator Kilgore, accomplishes three things: 1. It satisfies the demand of the Bureau of the Budget for a single, full-time, responsible administrator; 2. it permits running of the show by the scientists, and 3. it permits part-time employment of scientists selected to compose the board.

"Under the revised bill," says a spokesman for Senator Kilgore's War Mobilization Subcommittee, "no administrator could run the proposed National Science Foundation without thoroughgoing and continuous contact with the board of scientists. Any administrator who fell into disagreement with the board would immediately find himself in the public spotlight. As the bill now stands, the board could break an unsympathetic or unresponsive or incompetent administrator."

Not only would the administrator have to keep his peace with the National Science Board, but he also would have to

FREES PATENTS: Stuart Symington, left, head of the Surplus Property Administration, announces the Aluminum Co. of America has granted the government free use of all its patents for extracting aluminum from bauxite. The Reconstruction Finance Corp. now has the right to license the patents to lessees of government-owned plants. Pictured with Mr. Symington is Frank W. Wilson, vice president of Alcoa. NEA photo

satisfy the directors of a number of divisions of the National Science Foundation, and the scientific committees identified with these divisions.

The divisions specifically designated in the bill would have to do with mathematical and physical sciences, biological sciences, social sciences, health and medical sciences, national defense, engineering and technology, scientific personnel and education, and publications and information. The bill authorizes the establishment of additional divisions, not to exceed three in number, as the administrator may consider warranted.

Each of these divisions is to have a supervisory committee of not less than five and not more than 15 members appointed by the administrator with the approval of the board, except that the Division of National Defense would be run by a committee to consist of "not more than 40 persons, of whom at least half shall be civilians appointed by the administrator, and the remaining members shall be divided equally between such chiefs of services or divisions of the War Department and such chiefs of bureaus and offices of the Navy Department as the Secretary of War and the Secretary of the Navy, respectively, may from time to time designate."

Freedom of Action Assured

The bill does not attempt to classify the subject matter that shall be assigned to each division. It makes no attempt to define such terms as "social sciences," "health and medical sciences," "national defense," etc. All such definitions and questions as to the divisions to which individual research subjects shall be assigned are left to the judgment of the scientists composing the board and the divisional committees.

The scientists on the board, and those serving on the divisional committees, incidentally, would receive $50 for each day spent on business of the foundation, plus travel and other necessary expenses. The administrator would receive $15,000 per year and he would be provided with a deputy at $12,000. The administrator would have large powers to create other committees and engage the services of scientists, with compensation up to $50 for each day of service plus expenses.

The new Kilgore bill mentions no definite amount of money to be appropriated but specifies that not less than 15 per cent shall be expended on national defense and not less than 15 per cent on health and medicine. It further specifies that not less than 25 per cent of the total shall be apportioned among the states, two-fifths in equal shares and the remainder in proportion to their population—and this distribution includes the territories of Alaska, Hawaii and Puerto Rico. The bill also carries some stipulations requiring patronage of nonprofit organizations.

In revising the patent rights section of his bill, Senator Kilgore has made a compromise with the ideas of Dr. Bush. He defines the broad policy as: "All rights in inventions, discoveries, or patents now or hereafter owned by or vested in the United States or any government agency shall be freely dedicated to the public, and any invention, discovery, patent right, or finding hereafter produced in the course of federally financed research or development shall be freely dedicated to the public." But he allows for exceptions over a wide range as follows: "The head of any government agency financing by contract, or otherwise administering, federally financed research and development activities. . . . may, by stipulation in the contract or by other advance agreement. . .provide for the retention by the contractor or by the inventor, or by their assignees, of such patent rights as the head of such agency deems fair and equitable and consistent with the national interest."

Unfortunately, this patents right section is unduly long and repetitive, so that there always is the chance that agency heads seeking to conform to it may suffer some mental confusion as to just how liberal they could afford to be in permitting contractors to retain patent rights resulting from government-financed research. In fact, such treatment of contractors is frowned upon in one provision which necessitates that when there is a choice of prospective contractors the contract should go to the party "which requires no retention or least retention of commercial rights."

The new bill retains the feature under which the National Science Foundation administrator would conclude agreements with foreign governments for exchange of scientific information, or for participation in international research projects. It would authorize him to encourage American attendance at international scientific congresses, both by government men and representatives of privately owned business. The President is given power to declare secret any information held vital to the national defense.

The bill also retains a section providing for an Interdepartmental Committee on Science, so as to co-ordinate research programs of the various departments wherever possible and avoid duplication. It empowers the National Research Foundation administrator to acquire materials and facilities but prohibits his operation of "any laboratories, pilot plants, or other such scientific or technical facilities which he may acquire."

HOUSING: A model showing how war buildings were reconverted into suitable living quarters to help ease the housing shortage was displayed in connection with the government's housing exhibit at Silver Springs, Md. Viewing the model are, left to right: Phillip Klutznick, Federal Public Housing Authority commissioner; Wilson Wyatt, housing expediter; Raymond Foley, Federal Housing Administration commissioner; John B. Blanford Jr., National Housing administrator; John Fahey, Federal Home Loan Bank administrator; and Brig. Gen. John Russell Young, District of Columbia commissioner. NEA photo

CPA Reports 300,000-Ton Rise In Annual Steel Sheet Capacity

Supplement to "Steel Expansion for War" says that new facilities will relieve scarcity in sheets, particularly lighter gages, when manpower shortages and other retarding factors are eliminated. Increase in pig iron capacity also reported

ANNOUNCEMENT of a 300,000-ton annual increase in privately financed steel sheet making capacity highlights the Civilian Production Administration's supplemental report on "Steel Expansion for War" for the year ended June 30, 1945.

The additional sheet making capacity came from facilities installed to promote full utilization of existing equipment or to increase production required by changing trends of war, CPA said.

The original "Steel Expansion for War" report issued on June 14, 1945, described the expansion in government financed and privately financed steel facilities for the period from November, 1940, through June 30, 1944, which lifted the country's steel ingot capacity 15 million tons annually to a record capacity of 95 million tons annually at a total expenditure of $2,584,944,018.

According to the supplemental report, the newly installed equipment raised sheet steel production approximately 2 per cent annually to a total of approximately 16 million tons yearly. The latter is about 25 per cent of total finished steel production.

Increased Sheet Supply Seen

When manpower shortages and other retarding factors allow full use of the new facilities the scarce supply of sheet steel, particularly in the lighter gages, will be relieved considerably, CPA said. Light gage sheet steel is in particularly heavy demand for consumers' durable goods, such as refrigerators and automobiles.

Other steel capacity increases mentioned in the supplemental report included a 326,000-ton increase in pig iron capacity to bring total increase in this product to 15,738,064 tons annually. A 30,000-ton increase in steel ingot capacity lifted total gains in steel ingot to 15,353,522 tons annually in the period from November, 1940, through June, 1945.

Private industry sharply outdistanced government in new expenditures for steel facilities in the year ended June 30, 1945, with a $86,960,732 expenditure against $9,620,276 for government financed projects. In addition, the steel industry during that period spent $48,538,000 for postwar projects which were constructed without priority assistance.

In the November, 1940, through June, 1944 period, government was virtually matching private industry dollar for dollar on new steel expansion. The original "Steel Expansion for War" report covering this period listed government expenditures at $1,311,742,652 as compared with $1,272,201,356 for private industry.

Other facilities for critical war programs completed during the 12-month period ended June 30, 1945, which were financed largely by private industry included forging and gray iron foundry equipment for the Army truck program, tire bead wire drawing equipment for the truck tire program, forging facilities for the increased shell program, and tubing facilities for the rocket projectile program.

Bill Would Aid Precious Metal Mines To Resume Production

Money to finance rehabilitation of precious metal mines would be advanced by the Reconstruction Finance Corp. under a bill drafted by Sen. Pat McCarran (Dem., Nev.).

Sums advanced would be repayable, without interest, in the form of a 5 per cent royalty on future production.

Owners of precious metal mines would be entitled, under Senator McCarran's bill, to advances based upon a formula which would take into account the normal prewar production of the mine and the length of time it was closed under the terms of the War Production Board's limitation order which shut down all gold and silver mines in the U. S.

The formula requires computation of each mine's average monthly production over the five-year period ending Dec. 31, 1941, and multiplies this figure by a fixed percentage (tentatively 10 per cent) and then by 33, representing the number of months the gold mine closing order was in effect.

"All the producing gold mines of the country," Senator McCarran said, "have suffered substantial damage as a result of Order L-208. With no work being done, in some cases openings in these mines have caved, with a consequent loss of ore bodies which will require heavy expenditures for reopening. Water has seeped into many mines. Some are completely flooded. In others the timbering has rotted away or fallen.

"Many of these mines," Senator McCarran declared, "have been so greatly damaged as a direct or indirect result of the WPB closing order, that they do not present good security today, from a banker's standpoint. However, if they are given advances of enough money to get back into production, they can repay those advances out of production."

FHA Seeks To Speed Building Of Houses for Veterans

First consideration of the Federal Housing Administration will be to expedite construction of housing costing under $10,000 and to be occupied by veterans under the priority system for scarce building materials which went into effect Jan. 15, FHA Commissioner Raymond M. Foley declared.

Application forms for priorities for building materials presently in critical short supply will be available at all 71 of FHA's field offices for individual veterans who want to build a home of their own as well as builders who want to erect one or more dwellings either for sale or rental for which veterans of World War II will be given preference.

The Civilian Production Administration, through the National Housing Agency, has delegated to the FHA the task of processing and issuing the new HH preference ratings under which it is anticipated that about half of the critically short materials produced in 1946 will be made available for construction of homes for veterans.

Mr. Foley made it clear that the $10,000 sales price, which includes land and improvements, or an $80 a month rental are maximum figures and that every effort will be made to get a volume of construction at lower levels.

The materials to which priorities will apply include common and face brick, clay sewer pipe, structural tile, gypsum board, gypsum lath, cast iron soil pipe and fittings, cast iron radiation, bathtubs, lumber, and millwork.

Export-Import Bank To Make $25 Million Loan to Greece

A credit and loan agreement between Kingdom of Greece and the Export-Import Bank of Washington has been approved by the bank.

The arrangement provides for a $25 million credit to finance purchase in the United States of specified materials, equipment and services for restoration of productive facilities in Greece.

Decision that "Inch" Lines Should Continue To Carry Oil Approved

Eastern railroads, coal producers, and miners' union warmly receive Surplus Property Administration recommendation that government-owned pipe lines remain in petroleum service rather than be converted for transportation of natural gas

DECISION by the Surplus Property Administration that the Big and Little Inch pipe lines should continue to be utilized for the transportation of oil and petroleum products has been warmly received by eastern railroads and by coal producers and the miners' union, but much less enthusiastically by manufacturers of many types of equipment used in handling and consumption of gas.

The decision goes counter to the report of Ford, Bacon & Davis Inc., consulting engineers, who advised the disposal agency, the Reconstruction Finance Corp., that the best economic procedure from an overall standpoint would be to convert the lines to the transportation of natural gas.

Such conversion would entail an expenditure of $20 million to $25 million, largely for compressing and dehydrating plants to replace the present oil pumping equipment. In addition, it would lead to wide adoption of gas as the fuel for many uses at industrial and other establishments in the New York-Philadelphia area. The substitution trend would be mainly at the expense of coal, for oil always in normal times has been available at comparatively low delivered prices along the eastern seaboard due to the low rates incidental to delivery by coastwise tankers.

The Surplus Property Administration's decision was revealed in a report to Congress under date of Jan. 4 which stated that "in the disposal of the government's oil-carrying pipe lines, first preference will be given to continuing the Big and Little Inch in petroleum service . . . . If the Big Inch and Little Inch cannot be disposed of for the movement of crude oil and petroleum products from the Southwest to the East Seaboard, they should be disposed of for service to interior points."

The report stated that disposal, by sale or lease, to private interests will be given preference and that all segments of the petroleum industry, particularly small independent operators, will be given the opportunity of acquiring the lines.

If a private buyer or lessee cannot be found, however, the SPA administration recommends government operation on oil. "Public operation on a full-cost basis may have to be considered if all efforts to dispose of the lines to private industry should fail," the report says.

"Disposal for conversion to natural gas," the report goes on, "will be favored only if it proves impossible to keep the lines in petroleum service and the national security is otherwise adequately protected."

Six government-owned lines are involved in the program: 1—The 24-inch line extending 1340 miles from Longview, Tex., to the New York-Philadelphia refinery area, having a capacity of 300,000 barrels daily; 2—the 20-inch line extending 1475 miles from the Texas Gulf Coast refinery area to the New York area, with capacity for 235,000 barrels of gasoline daily; 3—the 154-mile line from Refugio, Tex., to Houston, Tex.; 4—the 200-mile line across Florida from Carrabello to Jacksonville; 5—the 179-mile line from Greensboro, N. C., to Richmond, Va.; 6—the 82-mile line from Tiffin, O., to Doylestown, O. All are now out of service except the Ohio line.

A feature of the report which perhaps may have some influence over decisions by the oil companies as to whether they will rely on pipelines or tankers to bring oil to the East in the future has to do with costs. Pipeline costs should be competitive with tanker costs, the report says.

NEW NAVY STAFF: Members of the Navy General Staff created recently by Presidential order are, seated, left to right: Vice Admiral D. C. Ramsey, vice chief of naval operations; Fleet Admiral Chester W. Nimitz, chief of naval operations; Secretary of Navy James V. Forrestal; Assistant Secretary of Navy John L. Sullivan; and Admiral C. P. Snyder, naval inspector general. Standing, left to right: Rear Admiral E. W. Burrough, head of Navy's general planning group; Vice Admiral F. P. Sherman, deputy chief of naval operations; Vice Admiral W. H. P. Blandy, deputy chief of naval operations for special weapons; Vice Admiral L. E. Denfeld, deputy chief of naval operations for personnel; Vice Admiral W. S. Farber, deputy chief of naval operations for logistics; Vice Admiral R. L. Conolly, deputy chief of naval operations for administration; and Vice Admiral A. W. Radford, deputy chief of naval operations for air. NEA photo

Allocation Controls Over Cadmium May Be Resumed

A proposal to reinstitute modified controls on the distribution of cadmium has been approved by the Cadmium Industry Advisory Committee. Officials of the Civilian Production Administration have indicated that distribution would be based on a percentage of 1941 use. Government stocks of cadmium have declined progressively from 1,261,300 pounds on July 1, 1945, to 908,500 pounds on Dec. 1 and to 846,300 pounds on Jan. 1. A continuation of the present rate of consumption, based on present production, would deplete the entire government stockpile in less than a year unless controls were imposed.

California's Employment Up In December

Number of wage earners in manufacturing shows first gain since fall of 1943. Aircraft plants add workers

SAN FRANCISCO

MEASURED by industrial employment, California has turned the corner in reconversion.

This is indicated in a report by the State Department of Industrial Relations which shows the number of manufacturing wage earners increased in December. The gain was the first since a steady decline in employment began in the autumn of 1943. This increase last month, moreover, was made in the face of a "normal" decline which usually occurs seasonally in December.

According to Paul Scharrenberg, director of the industrial relations department, the December upturn in workers totaled 1000 to an aggregate of 405,000 for the state's manufacturing industries. While this rise is small, Mr. Scharrenberg emphasized the significance of a rise of 7000 workers, to 227,000, in durable goods industries.

Largest of the December gains was in aircraft industry, chiefly in Southern California, which increased its employment 11 per cent last month, with an addition of 10,000 new wage-earners.

In nondurable goods lines, December employment was slightly higher, although the food products group showed its usual seasonal decline. Total employment, after reflecting the food reduction, was 178,000 in nondurable industries, against 185,000 in November.

In the San Francisco Bay area, the total number of production workers declined 2000 to 83,000, largely as a result of food processing retractions. However, this decline is considered to be much smaller than had been expected because of the current machinists' strike and other labor disturbances.

STRIKE-BOUND: More than 500 trolley and motor busses were taken to parking spaces at various yards at Seattle when drivers went on strike there. Pictured above are more than 150 coaches that were idle while retail business slumped, school attendance dropped, and returning Pacific veterans were slowed on their homeward journey. NEA photo

Grace Line Assigns Ships To Latin American Trade

SAN FRANCISCO

Plans for postwar foreign trade, an important factor in the future economic growth of the West Coast, are proceeding rapidly. Latest development is announcement by the Grace Line that it will assign a minimum of five C-2 cargo vessels to the Pacific Coast-Latin America service.

The vessels have a capacity of 10,000 tons, with ample refrigeration space. They will sail in regular service between Canada, the Pacific Northwest, San Francisco, Los Angeles and ports in Latin America.

Industrial Growth Sets Record in Los Angeles Area

LOS ANGELES

An all-time high mark in industrial growth was registered in Los Angeles County during 1945, with total investments in land, buildings and equipment reaching $83,647,000 and providing jobs for 20,090 new workers.

In announcing the official figures, the industry department of the Chamber of Commerce in Los Angeles disclosed that 228 new factories were constructed or are in process of construction. There were 334 expansions of factories of established plants.

Investment of private funds set new records in the county's history, the report showed, with a sizable portion of such funds spent by eastern firms establishing branches in the Southern California area.

Kaiser Receives Steel Orders from China, France

SAN FRANCISCO

Kaiser Co. Inc., has announced a contract with China for purchase of steel plates, although tonnage was not disclosed. This shipment will be the first from the West Coast to China since outbreak of the war, the company said.

Kaiser Steel also announced an additional order for 43,000 tons of steel plates from the French government. It follows a previous French purchase of 55,000 tons of billets to be delivered over a four-month period. The Fontana plant will start delivery on the new order shortly.

Search for New Oil Wells Slackens Since End of War

LOS ANGELES

The oil industry has slackened its search in California for new oil wells since the war ended.

Between Aug. 18 and the end of 1945, notices to drill new wells in California declined to 659 from 850 in the similar period of 1944. As a result of this reduction, the aggregate for 1945 was reduced to 2132 drilling intention notices from 2279 in 1944. Well-drilling, of course, was abnormally active during the war period when the need for petroleum was great.

Contrary to the trend of new well drilling, however, is the increase in deepening and redrilling activity as the oil companies moved to tap hitherto untapped reserves in old fields. From V-J Day to the end of the year, 343 notices of redrilling jobs were filed compared with 268 in the like 1944 period, bringing the total for last year to 889 against 868 in 1944.

NASTY BUSINESS for a bearing

Tying two Kilkenny cats together by their tails is just an innocent pastime compared to the brutal way bearings are tortured in heavy construction machinery like power shovels, derricks and cranes. Not just the ton loads, the violent shocks, the dirt, nor the long hours. Good ball bearings can take all that and more . . . coming or going. But when they've got to come and go, both at the same time, in spots like the cable drums where one drum's taking up on a shaft that's letting down . . . going two ways at once . . . anything might happen but mustn't.

When inner and outer races of the bearings are going at different speeds, either in the same direction or in opposite directions, the going gets really tough. The various bearing elements are subjected to abnormal speeds and operating conditions. That's nasty business for a bearing.

Fafnir's answer is the "Maximum Type" design for brute-size bearings. It has a maximum *number* of balls for its size, giving it the greatest capacity. They're tough as the toughest jobs.

Still more important to any machine designer, maker or user is Fafnir's out-in-the-field point of view. The Fafnir Bearing Company, New Britain, Connecticut.

MOST COMPLETE LINE IN AMERICA

FAFNIR BALL BEARINGS

mirrors of MOTORDOM

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

Torsionetic springing to be used on new Kaiser car is modern adaptation from Citroen. System was used on tanks and other combat vehicles during war. Body and chassis will form single unit, making possible considerable reduction in weight

DETROIT

TORSION bar suspension—or torsionetic springing as the company calls it—will be a feature of the new Kaiser car scheduled for production at Willow Run by summer. This will mark the initial application of this principle of springing to passenger cars, although the system was used widely on military tanks and other combat vehicles. Springing action derives from the torsional properties of heat treated steel bars, anchored on one side of the car and extending across its width to connect with wheels through short arms. A similar arrangement was used on the French Citroen car, and the Kaiser in fact is described as a "modern adaptation" of principles used on this foreign car.

Along with the novel type of springing, the Kaiser will have a front wheel drive with the 6-cylinder Continental engine located ahead of the front wheels and together with clutch, transmission and final drive assembly, forming a packaged power unit which can be readily removed for servicing. Engine is rated at 85-horsepower.

Body Weight Reduced

Body and chassis form a single unit, there being no conventional type of frame. This is the type of construction used in the Nash 600 model and permits a considerable weight reduction. The Kaiser will weigh around 2700 pounds, or about 20 per cent below the weight of a Chevrolet. Wheelbase is 117 inches. The body is almost identical with that to be used on the Frazer model, being characterized by low silhouette and a single unbroken sweep from front to rear fender. This type of styling probably will be reflected in many of the 1947 models which are now in the early tooling stage. In this respect, Kaiser-Frazer will have a one-year jump on the rest of the industry, but of course starting from scratch this was possible since there was no carryover of tooling from any earlier model.

Union contract signed by Kaiser-Frazer has been described as embodying an "incentive" plan in the form of a $5 per car bonus to be distributed to employees at the end of the year. The UAW has been quick to deny this, declaring the trust bonus plan is simply a provision for company security against wildcat strikes and unauthorized work stoppages. The $5 per car paid by the company provides a fund, not controlled by the company, and payable annually by the trustees to each employee who has not been found guilty by an impartial umpire of engaging in a wildcat strike or slowdown and who has been on the job for 90 per cent or more of his assigned hours of work during the year.

The UAW naturally feels the payment of a bonus for not participating in unauthorized work-stoppages is a much more acceptable method for preventing these "wildcat" strikes than, for example, the Ford proposal to assess fines against the strikers. Whether or not other companies will follow the K-F trust bonus plan remains to be seen, but as far as wages at the Willow Run plant are concerned they will match those of the Ford Rouge plant, plus whatever may be the final agreement between the union and General Motors in the present wage dispute.

Union shop and checkoff provisions of the contract call for two checkoffs of dues assessments in the period of one year, at whatever level is decided upon by the next international convention of the union, which will begin March 23. It is considered probable the present $1 per month dues may be raised, since the union is now running in the red and has suffered a serious postwar decline in membership.

Basis of representation of workers in the plant is the same as in the General Motors contract, but union committeemen are given new titles of chief stew-

K-F GENERAL MANAGER: Edgar Kaiser, left, eldest son of Henry J. Kaiser, has been appointed vice president and general manager of the Kaiser-Frazer Corp. Here he is shown being congratulated by Joseph Frazer, president, and his father. NEA photo

CALLS FOR HUMAN ENGINEERING: Henry Ford II, left, chats with W. J. Davidson, General Motors Corp., at the annual dinner of the Society of Automotive Engineers in Detroit. Ford called for management initiative to develop better relations with labor. NEA photo

ards, with one assigned for each 250 men and an alternate to function when the chief steward is absent. The bargaining committee provision is standard, and has the president of the local union as a member of the committee. An unusual provision is that a shift vice president will be elected by each shift. Chief stewards are allowed two hours per day time paid by the company for handling grievances, and the shift vice presidents and the bargaining committee are allowed four hours a day each, the time being cumulative during the week.

Seniority rules are by occupational group, plant-wide; new employees have to work 90-days to get on the seniority list. A veterans' seniority clause provides that a veteran of World War II who is hired shall be credited with his period of service in the armed forces as soon as he goes on the seniority list. Further, the company has agreed to group certain machines and jobs that can be handled by disabled veterans and elderly employees. This will involve some extra cost due to the fact some light jobs will be removed from their normal place in the production sequence and set aside for this special occupational group.

Grievance procedure is streamlined, the course of a grievance being from the workman to his chief steward who takes it up with the foreman. The second step is by the chief steward and the shift vice president to the labor relations representative. Third step is by the bargaining committee to the company's personnel director, and the fourth step is before an impartial umpire whose decision is final and binding on both parties. The umpire also will determine the guilt or innocence of employees charged with participating in strikes and work stoppages.

Handling of funds in the trust bonus will be by three trustees, one named by the company, one by the union and a third party acceptable to both. They will operate under a set of by-laws drawn up by themselves. If an individual is disqualified for a share in the bonus, his share remains in the fund and thereby increases the shares of other workers. If a participant dies, his estate receives his accrued bonds.

The Warren, O., plant through which J. W. Frazer first entered the Graham-Paige management and subsequently the Kaiser-Frazer organization has been sold by the Navy Department to Federal Machine & Welder Co. at a figure reportedly equivalent to about 25 cents on the dollar of the plant's original cost. Warren City Mfg. Co., organized by Frazer to operate the plant, apparently will be dissolved and all operations transferred to the Willow Run plant. The company's equity in the plant was small, the operation being owned practically lock, stock and barrel by the Navy.

At one time it was thought that the Warren facility might eventually be used to manufacture a line of farm implements to be sold with the forthcoming Graham-Paige tractor. Recently the plant was supposed to be fabricating components for presses being built by Bliss for installation at Willow Run, thus speeding up delivery of the equipment. It appears doubtful this work will be transferred to Willow Run.

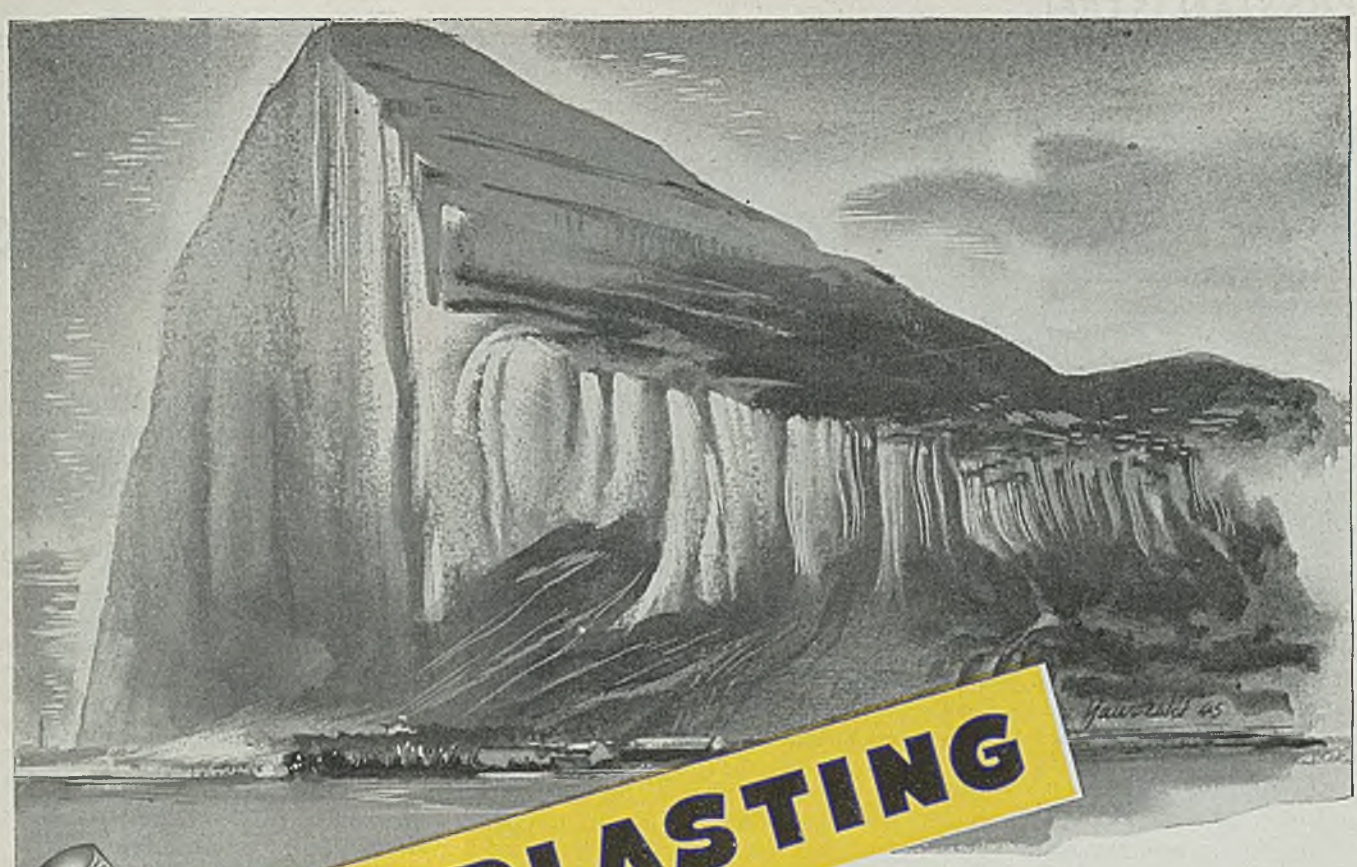
Ford's offer of a 17½ cents per hour increase in wages, subsequently rejected by the UAW-CIO because "we don't want a wage increase offer tied in with 10,000 other things," would have the Rouge plant average hourly rates at $1.385 or 26½ cents an hour more than the present GM rate. And it would be 7 cents an hour more than the average GM rate even though the company should agree to the recommendations of the President's fact-finding committee. Actually, about the only qualifying condition of the Ford offer was that the new rate would not take effect until production in volume is achieved, estimated by the company as possible within the next two months.

Savings Ebb Away

Meanwhile, General Motors workers continue to see their savings ebb away after 60 days of idleness, and it is estimated that even with a substantial increase in rates, it will require 18 months of work before they can make up the equivalent of wages lost during the strike. The union's acceptance of the fact-finding committee's recommendation of a 19½ cents per hour increase, in the face of its demand for a 30 per cent raise, was explained by Walter Reuther by its being based on a production level equivalent to that prevailing in 1941, whereas the union demand had been based on a production level 50 per cent higher. At the same time, the union attempted to put further pressure on the corporation by stating its acceptance of the proposal was good for only one week, and by threatening to instruct its members in tool and die shops to cease work on all GM material.

Cessna Aircraft Bringing Out New Metal Planes

Cessna Aircraft Co., Wichita, Kans., is introducing the first two models of a new line of personal planes, the Cessna 120 and 140. Both models will be in production by March and two more metal planes, the 170 and 190, will be ready by late summer. The Cessna line of personal planes are two place, high winged metal planes. They are metal planes constructed of heat treated 24 ST, an aluminum alloy.



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Russia Emerges from War as World's No. 2 Producer

Great strides made by Soviet government in expanding industry. Invasion by Germany spurred development in the Urals and other eastern sections. Mills rebuilt or rebuilding in the West. Stalin envisages capacity of 60 million tons within decade

SECOND position among world steel producers is being assumed by Russia, which is moving into the lead position in Europe vacated by defeated Germany, now limited to 5,800,000 tons annually (see page 77).

Continental observers predict Russia's production may reach 20 million gross tons within the next five years; output in 1945 is estimated at 15 million tons, against 18.5 million tons in 1939.

Marshall Stalin has indicated that the U.S.S.R. will boost its capacity a great deal more and has mentioned two five-year plans to be instituted to raise capacity to 60 million tons in the next decade. A study of the Russian steel production over the past 15 years reveals great strides have been made. In 1930 Russia had only one large iron and steel producing region—the Donbas and Dnieper region. Since then many new areas have sprung into prominence, all of them to the east.

Of the new plants, perhaps the most publicized are at Magnitogorsk, the magnetic mountain, a town which was nonexistent in 1928 but soon had a quarter of a million inhabitants and was reported in 1941 to be producing one-third of all Russian steel. These plants compare roughly with the facilities of Inland Steel at Indiana Harbor, Ind., but are located on an open deposit of iron ore of excellent grade. Although the area has only one available record of production, that for 1938 of 1,535,000 tons of pig iron, 1,490,000 tons of steel and 1,200,000 of rolled steel, only 12 open hearths and 10 rolling mills were operating. In 1941 operations had expanded with 16 open hearths and 12 mills in production.

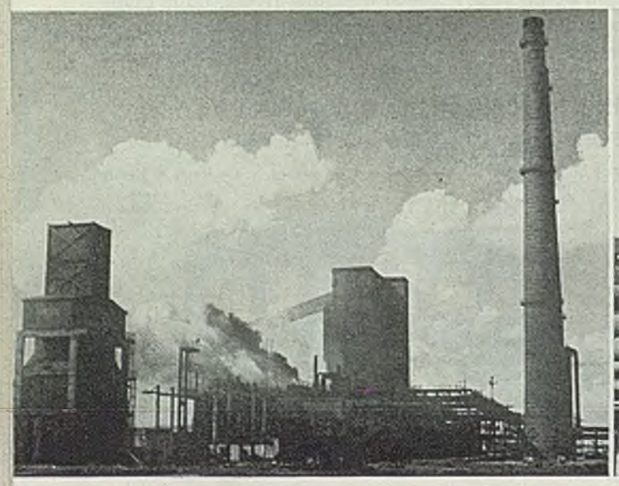
Careful planning is evident in the location and design of all the plants which have been built recently. They were, for the most part, built on sites convenient to all the essentials for iron and steel production, and their construction was completed by economizing in the use of such building materials as were scarce or not easily accessible. An example of this ingenuity is found in a plant at Uzbekistan, Central Asia, which embodied the use of reinforced concrete for supporting pillars effecting an economy of 52 per cent in iron as compared with a conventional all-metal job. Timber being scarce, thin arched roofs of brick were widely used.

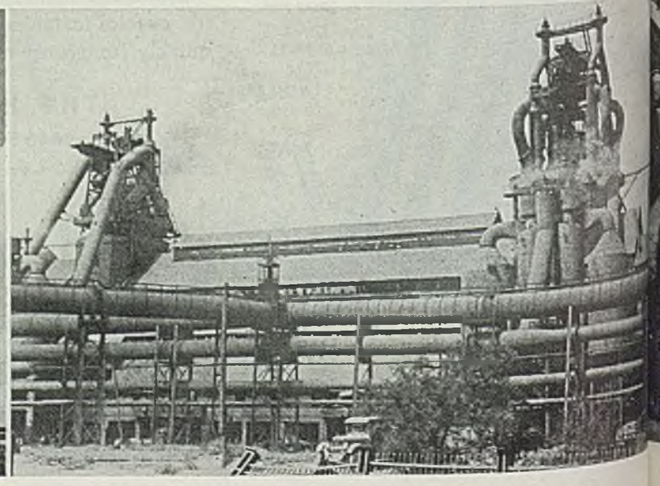
Steel mills have been built at Petrousk-Zabaikalsk, near Chita, and Komsomolsk, in the Far East, with output expected to be 700,000 tons of pig iron annually. Two other plants, one at Vladivostock, the other at Irkutsk, are believed to be in operation. The Botom ironworks at Katia in the northeastern part of Siberia has been in production for some time, the last record of production being in 1941 of 250,000 tons of pig iron. The Kuznetsk Basin area in Western Siberia was said to be producing 2 million tons of steel annually in 1941.

Plants which were threatened by the German advance in the black days of the war were dismantled and relocated in the safety of the Urals; one plant, the Kirov works, profited by its move to the extent that the most recent figures show an increased production of 4½ times the 1941 rate.

As soon as the danger of invasion decreased, the task of rebuilding the industry in the West began in earnest, and in 1944 the Novokramatorsk Stalin Machine Building Plant, whose foundries had produced more than twice as much as the famed Krupp works in Germany, began operations again. The huge industry in the Ukraine is booming now, and a recent Soviet report announces the construction of five new blooming mills and two more in the offing. To supply these mills will require the round-the-clock operation of 10 blast and 150 open-hearth furnaces.

Blueprints of the new blooming mills show a number of unusual features, such as an automatic control said to be capable of increasing capacity 10 per cent while reducing electrical equipment by one-half; substitution of more than 500 roller bearings for the usual bearings; use of oxyacetylene flame on a moving surface of the ingot to clean it; automatic weighing of ingots; and shears capable of cutting ingots 16 to the minute instead of 6-10 as at present.





Huge cranes dominate the interior of the above shop in Chelyabinsk Iron & Steel Works, a part of Russia's vast industry in the Urals

Far left, the coke-chemical department of the Chelyabinsk Iron & Steel Works

Center left, blast furnaces Nos. 5 and 6 were built during the war at Stalin Iron & Steel Works, Magnitogorsk

Left, this turning lathe operator at Kirov Works has made many time and labor saving production suggestions. Sovfoto photos

Site-Welding of Farm Buildings May Make Jobs

Research program sponsored by Carnegie-Illinois Steel Corp. expected to develop employment for war-time welders

SITE-WELDING of steel frame farm buildings (see STEEL, Aug. 27, p. 91) gives prospect of many new peacetime jobs for people who became welders during the war and who now seek peacetime employment.

This prediction from Carnegie-Illinois Steel Corp., subsidiary of United States Steel Corp., is made as a result of research by the University of Wisconsin through a grant by Carnegie-Illinois.

One of the results of the studies is a new system of site-welded construction that makes steel farm buildings competitive with those built of other materials. This opens a broad new avenue of jobs for trained welders, the steel company asserted.

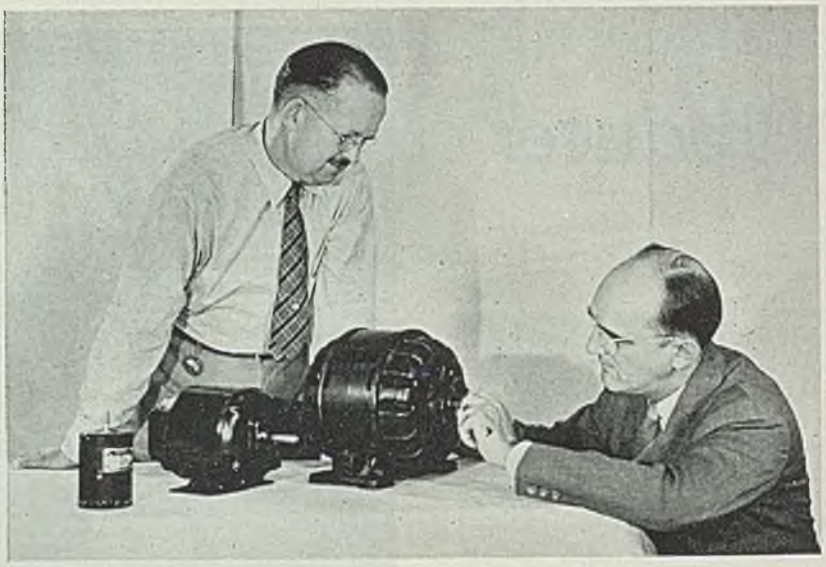
"With the war over, thousands of welders who were urgently needed and trained during the emergency in shipyards, war plants and the armed forces are seeking new industries in which to ply their trade," Carnegie-Illinois pointed out. "In addition to those in military service, more than 364,000 welders were at work in war plants at the peak of production—not far below the 427,000 carpenters employed throughout the United States at the same time, a number said by economists to be inadequate to serve the probable postwar building market.

"If the Carnegie-Illinois site-welded system of construction is widely adopted for farm buildings, welders will find opportunities for their skill in the small-building trade," the company said.

Form Company in Cleveland To Make Parts for Radios

Asco Corp., a new company for the manufacture of electronic, mechanical and electrical components for radio and television equipment, has been formed and is located at 874 East 140 St., Cleveland.

John Altmayer is president of the new company; E. E. Slabe, secretary and treasurer; L. J. Wurm is purchasing agent, and Lewis Southworth, production superintendent.



FORTY YEARS OF PROGRESS: These three Westinghouse motors are all ¼-horsepower units. The one on the right was designed in 1904; at left is a high-speed aircraft motor; in the middle is a modern general purpose motor. The 1904 model was obtained from a customer who wrote to the company asking for replacement parts

BRIEFS . . .

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

Tractomotive Corp., Chicago, has been formed to manufacture parts for industrial wheeled and treaded tractors. Its Chicago offices are located at 228 N. LaSalle St., and its plant and engineering offices are at 101 W. Sandusky St., Findlay, O.

—o—

Industrial Steel Treating Co., Jackson, Mich., has announced construction of a new plant at 1314 W. Ganson St., Jackson.

—o—

Crucible Steel Co. of America, New York, has moved its general purchasing offices from Chrysler Bldg., New York, to Oliver Bldg., Pittsburgh.

—o—

Abrasive Co., Philadelphia, has changed its name to Simonds Abrasive Co. and will continue manufacture of grinding wheels and other abrasive products.

—o—

Geometric Tool Co., New Haven, Conn., has appointed the following as distributors: Briggs-Weaver Machinery Co., Dallas, Tex.; Well Machinery & Supply Co. Inc., Ft. Worth, Tex.; Oliver H. Van Horn Co. Inc., Houston, Tex.; Alamo Iron Works, San Antonio, Tex.; Dixie Mill Supply Co., New Orleans and Shreveport, La.; and L. A. Benson Co. Inc., Baltimore.

—o—

Industrial Equipment Co., Chicago, has moved from 1737 West Howard St., to 315 North Ada St., Chicago 7.

—o—

National Radiator Co., Johnstown, Pa., has begun construction of an extensive addition to its New Castle, Pa., plant.

—o—

Atlas Steel Co., Baltimore, has equipped a large one-story building at 1260 Covington St., that city, for iron and steel fabrication.

—o—

Precision Welder & Machine Co., Cincinnati, has moved from English and Neave Sts., to 138 East McMicken Ave., Cincinnati 10.

—o—

Edward Valve & Mfg. Co. Inc., East Chicago, Ind., has changed its name to Edward Valves Inc. The company is a subsidiary of Rockwell Mfg. Co., Pittsburgh.

—o—

Estate Stove Co., Hamilton, O., has been sold to Noma Electric Corp., New York, which will continue production of the Estate line of heating and cooking equipment. Another recent acquisition

of Noma is K-D Lamp Corp., Cincinnati.

—o—

Helicoid Gage Division, American Chain & Cable Co. Inc., Bridgeport, Conn., has moved from Long Island City, N. Y., to 929 Connecticut Ave., Bridgeport, Conn.

—o—

Tin Mill Products Corp., Pittsburgh, has changed its name to Ft. Duquesne Steel Co. and has moved to 1200 Galveston Ave., Pittsburgh 12.

—o—

Commercial Metal Products Co., Chicago, has changed its name to Compco Corp.

—o—

I. Schumann & Co., Cleveland, smelters and refiners, has announced a $200,000 expansion program which will be completed about Mar. 15.

—o—

Crucible Foundry Co., Baltimore, has moved from 2615 Matthews St., to 5220 Pennington Ave., Baltimore.

—o—

Lempco Products Inc., Bedford, O., has opened an automotive division at 2953 E. 55 St., Cleveland 4.

—o—

Dow Chemical Co., Midland, Mich., has extended its Washington sales office district to include Virginia, North Carolina, South Carolina, Georgia and Florida.

—o—

Universal Fixture Corp., New York, has changed its name to Universal Steel Equipment Corp.

—o—

Radio Tube Division, Sylvania Electric Products Inc., Ipswich, Mass., has resumed peacetime production of radio tubes at its Johnstown, Pa., plant.

—o—

H. K. Porter Co. Inc., Pittsburgh, has sold the car wheel foundry of its subsidiary, Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., to Electric Auto-Lite Co., Toledo, O.

—o—

Penn Co., Baltimore, has moved from 8031 Philadelphia Rd., to 2828 Falls Rd., that city.

—o—

High Precision Products Co., Westfield, N. J., has been formed as consulting engineer and distributor for several Swiss manufacturers.

—o—

Monogram Mfg. Co., Los Angeles, has acquired Houston Corp., that city, and will continue to produce motion picture developing equipment.

—o—

Askania Regulator Co., Chicago, has opened a sales and service office at 818 Bessemer Bldg., 104 Sixth St., Pittsburgh 22.

—o—

H. V. Walker Co., Elizabeth, N. J., has developed a fast drying baking enamel, which, when applied to metal, gives a flexible porcelain-like finish.

—o—

DoALL Co., Des Plaines, Ill., has developed a small one-man machine shop, compact enough to be housed in a garage or basement.

—o—

Cincinnati Milling Machine Co., Cincinnati, has announced a $6 million fund to serve as a "cushion" during slack production periods.

—o—

Lombard Machine Co., Providence, R. I., has changed its name to Duesberg-Bosson of America Inc. and has moved to 351 Harris Ave., Providence.

—o—

A. F. & G. Tool & Die Co., Baltimore, has been organized to produce tools, jigs, etc., and is located at 611-613 William St., that city.

—o—

Precision Paper Tube Co., Chicago, has appointed John V. Muddle as New England representative. His address is 46 Main St., Ashland, Mass.

—o—

Stewart Industrial Furnace Division, Chicago Flexible Shaft Co., Chicago, has moved from 5600 Roosevelt Rd., to 4433 Ogden Ave., Chicago.

—o—

Maryland Bolt & Nut Co., Baltimore, plans to install additional cold heading and finishing machines, with work to be completed by next September.

New Engineering Company Organized at Detroit

A new engineering organization, Central States Engineering Corp., has been formed, with offices at 4612 Woodward Ave., Detroit 1.

Its organizers will be officers. They are: E. M. Beyma, president and general manager; John Allmen, vice president and chief engineer; and Frank Querry, secretary-treasurer. All of them had been associated with Pioneer Engineering & Mfg. Co., Detroit.

John S. Bartek, associated for the past six years with Pioneer Pump & Mfg. Co., Detroit, has joined the new organization as chief designer.

More than 50 engineers are on the staff of the new firm, which is prepared to assist manufacturers with designing of tools and equipment, setting up processes of manufacture, and product development.

Two Aluminum Plants Leased By Reynolds

Hurricane Creek and Jones Mill, Ark., plants boost Reynolds' alumina and ingot capacities greatly

REYNOLDS Metals Co., Richmond, Va., has taken another step toward becoming a ranking factor in the aluminum industry with the lease of two aluminum plants, Hurricane Creek, in Arkansas, the world's largest alumina plant and the aluminum reduction plant at Jones Mill, Ark., 20 miles from Hurricane Creek.

Under the terms of the lease, signed with Reconstruction Finance Corp. and with the approval of the Surplus Property Administrator and Attorney General Tom Clark, Reynolds takes over the two plants immediately, thus increasing its alumina productive capacity 8-fold. Hurricane Creek has a capacity of more than 1.5 billion pounds annually and coupled with Reynolds' Listerhill, Ala., plant gives its operator nearly half of the country's total alumina capacity.

The 72 million pound annual aluminum ingot capacity of the Jones Mill reduction plant, added to the 165 million pound capacity of Reynolds' two reduction plants at Listerhill and Longview, Wash., gives Reynolds a total ingot capacity roughly equal to three-fourths of the entire prewar ingot capacity of the country.

The lease on both plants runs for five years and contains an extension clause and a purchase option. Under its terms Reynolds has agreed to pay a rental during the five-year period ranging from $6 million to $12 million.

Federal Machine Buys Two Manufacturing Companies

Federal Machine & Welder Co., Warren, O., has purchased two widely diversified companies in its expansion program. These two companies, Helene Curtiss Chrome Co., Chicago, maker of furniture and fixtures for beauty parlors, and Sommer & Adams Co., Cleveland, machine tool builder, will now be operated as subsidiaries with executive management centered in Warren, O. The company is planning several new products on the basis of these recent acquisitions.

MEN of industry

J. M. MEAD

A. L. HARTLEY

WALTER BENDER

James M. Mead, manager, Philadelphia plant, Joseph T. Ryerson & Son Inc., Chicago, has been appointed manager of the company's New York plant at Jersey City, N. J. He will take the place of **Harry W. Treleaven,** resigned.

—o—

Albert L. Hartley has been elected vice president, Federal Fabricators Inc., and will have charge of engineering research and manufacture of its E. H. Worthington Mower Division. Mr. Hartley previously was affiliated with R. K. LeBlond Machine Tool Co., for the past 15 years, serving as chief metallurgist and plant engineer.

—o—

Walter Bender, vice president in charge of operations, General Fireproofing Co., Youngstown, has been elected president to succeed **George C. Brainard** who recently became president, Addressograph-Multigraph Corp., Cleveland. Mr. Bender joined the General Fireproofing company in 1918 as a clerk in the office of the plant superintendent, advancing through various positions until he became vice president of the company in 1936.

—o—

Richard Stevens has been appointed blast furnace superintendent, Warren district, Republic Steel Corp., Cleveland. Mr. Stevens is transferred to Warren from the company's plant in Youngstown where he has been employed since 1936 as superintendent of the coke works and later as assistant superintendent of blast furnaces.

—o—

Dr. Arthur H. Grobe has been appointed chief research metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa., formerly being associated with the Metals Research Laboratory of Carnegie Institute of Technology.

—o—

Fred J. Banfield recently has become associated with the Collier Co., Cleveland, as vice president. Mr. Banfield for 15 years was purchasing agent with the Cleveland Hobbing Machine Co., and for the past 2½ years has been with Cleveland Pneumatic Aerol and Cleveland Pneumatic Tool companies.

—o—

J. T. Llewellyn, formerly president, Chicago Malleable Castings Co., Chicago, has been appointed chairman of the board, and **W. L. Beaudway,** formerly executive vice president, has been named president. **L. J. Wise** has been promoted to assistant to the president; **L. F. Hartwig,** general manager and **O. P. Fahrenbach,** works manager.

—o—

J. C. Neemes, Jr., until recently alloy contact representative, Carnegie-Illinois Steel Corp., Pittsburgh, has been placed in charge of the Twin Cities technical section, Development & Research Division, International Nickel Co. Inc., New York. The Twin Cities section was established recently and its offices are in the Northwestern Bank Bldg., Minneapolis.

—o—

Edward Riley, vice president, General Motors Corp., Detroit, has been named group executive in charge of overseas operations, succeeding **James D. Mooney** who resigned recently. Mr. Riley has held various positions with General Motors' overseas operations since 1923 and was elected a vice president of the corporation in 1942.

—o—

Four new members of the research committee, Committee for Economic Development have been appointed. The new members are: **James F. Brownlee,** formerly deputy administrator in charge of prices, Office of Price Administration; **George L. Harrison,** president, New York Life Insurance Co.; **Thomas B. McCabe,** on leave of absence from his position as president, Scott Paper Co., Chester, Pa.; **Philip D. Reed,** chairman of the board, General Electric Co., Schenectady, N. Y. **Ralph E. Flanders,** chairman of the Federal Reserve Bank, Boston, is chairman of the research committee.

—o—

John M. Cage has been appointed manager, Industrial Electronics Division, Raytheon Mfg. Co., Waltham, Mass. From 1943 until his present appointment, Mr. Cage had been engaged in the organization of an industrial electronics group for Allis-Chalmers Mfg. Co.

—o—

J. Melvern Banjamin, Philadelphia, has been appointed sales representative for eastern Pennsylvania, southern New Jersey and Delaware, and **Paul B. Allen,** Detroit, has been named sales representative for the Detroit district, McInnes Steel Co., Corry, Pa.

—o—

Arthur L. Bushman has become associated with Firth-Sterling Steel Co., McKeesport, Pa., to serve in its New York and Philadelphia offices. Mr. Bushman, prior to his 40 months as lieutenant colonel with the Army Service Forces, had been with Crucible Steel Co.

HERBERT JOHNSON

C. L. SMITH

G. D. MOOMAW

of America for 17 years. **William H. Stenger** has been appointed Pittsburgh district manager, being transferred from the New England district.

—o—

Herbert Johnson, associated with Jones & Laughlin Steel Corp., Pittsburgh, since 1940, has been appointed assistant to the vice president in charge of sales. **Russell J. Greenly** has been placed in charge of personnel administration. **R. W. Campbell** becomes superintendent, Coke Division, Pittsburgh district with **F. L. McIntire** as superintendent, Pittsburgh coke plant and **J. J. Cavett**, superintenden, Aliquippa coke plant.

—o—

E. L. McIlhenny, for the past eight years with Detrex Corp., Detroit, has left that organization to join the research and field service staff, Ferro Enamel Corp., Cleveland.

—o—

Burke Bartlett recently resigned as head of the sales and advertising department, Eclipse Counterbore Co., Detroit, to form an industrial advertising agency, the Burke Bartlett Co., Detroit.

—o—

W. M. Walworth has been elected vice president and chief engineer, Mack Mfg. Corp., Long Island City, N. Y. Mr. Walworth has been acting chief engineer since March, 1945.

—o—

Fred Albrecht, treasurer and a director, Lodge & Shipley Machine Tool Co., Cincinnati, has retired from active duty due to ill health.

—o—

B. C. Colcord, who has been assistant vice president, operations, Pittsburgh, has been appointed general superintendent, Lorain, O., works, National Tube Co., and **L. F. Sattele** has been named assistant general superintendent of the plant. **E. G. Price** has been named general superintendent of the company's National works at McKeesport, Pa. He succeeds **R. M. Overton** who has been promoted to the staff of **B. H. Lawrence**, vice president in charge of engineering, United States Steel Corp. of Delaware, Pittsburgh.

—o—

Clarence L. Smith succeeds **Oscar A. Knight** as district manager at Detroit for the Grinding Machine Division, Norton, Co., Worcester, Mass. **George D. Seguin** has been appointed purchasing agent for the Norton company replacing **Marcus W. White** who has retired after serving the company more than 38 years. Mr. Seguin has been assistant purchasing agent for the past 15 years. **John L. Moser** has been named abrasive engineer to serve the northwestern Pennsylvania and southwestern New York territory. He succeeds **R. W. Crawford** who has become president, Erie Mfg. & Supply Co. **Harry A. Blackburn** becomes the company's refractories engineer for the Pacific coast with headquarters in Los Angeles. **Louis S. Weber Jr.**, assumes Mr. Blackburn's former territory, Ohio, Michigan and Kentucky, with headquarters in Dayton, O.

—o—

Harris Pruitt, recently released from service with the Navy, has returned to Salem Engineering Co., Salem, O., and will specialize in commercial freezing equipment.

—o—

L. L. Colbert has been made president of the Dodge Division, Chrysler Corp., Detroit, succeeding **H. L. Weckler**, who, in addition to being vice president and general manager of the corporation, has been president of the Dodge Division since 1943.

—o—

Alexander I. Stayman has been named by the Pittsburgh Screw & Bolt Corp. as manager of sales, Pittsburgh and southeastern districts, with headquarters in the company's general offices in Pittsburgh. **Percy D. Siverd** has become special representative in the company's Pittsburgh sales office.

—o—

G. D. Moomaw has been named general manager of the Rustless Iron & Steel Division, American Rolling Mill Co., and **C. R. Hook Jr.** is assistant to the general manager. **Frank Buffo** has been named manager of stainless bar and wire sales of the Rustless division with **Peter B. Kline** as assistant manager. Also announced is the formation of the development engineering department headed by **Stanley P. Watkins** and **Thomas L. Moore** as assistant manager. **George W. Clearwater** has been appointed office manager and has been elected assistant treasurer, American Rolling Mill Co. The merger of Rustless Iron & Steel Co. with the American Rolling Mill Co. became effective Jan. 1.

—o—

Russell Hunt, vice president in charge of sales, Sloss-Sheffield Steel & Iron Co. Birmingham, is retiring Feb. 1. He will be succeeded by **Charles Northen** who joined the company in May, 1945 as sales manager. Mr. Hunt started with Sloss-Sheffield in 1898 as an office boy and clerk.

—o—

Fred Grotts, who resigned several months ago as president, Fort Pitt Steel Casting Co., McKeesport, Pa., now heads a new corporation, Chester Electric Steel Corp., Chester, Pa. Other officers of the company, which will specialize in carbon, alloy and stainless steel castings, are: **Stanley J. Roush**, vice president and treasurer; **William Burroughs**, plant manager; and **Sam Nicholson**, sales manager.

—o—

Joseph C. Rovensky, formerly vice president, Chase National Bank, New

KENNETH B. HALSTEAD

Who retired as general solicitor, United States Steel Corp., New York, and noted in STEEL, Jan. 7 issue, p. 427.

BENJAMIN S. DOWD

Who has been elected president and general manager, Vulcan Iron Works, Wilkes-Barre, Pa., and noted in STEEL, Jan. 14 issue, p. 74.

HARRY O. BERCHER

Who becomes general manager, Steel Division, International Harvester Co., Chicago, as noted in STEEL, Jan. 7 issue, p. 426.

York, has been elected chairman of the board, Luria Steel & Trading Corp., New York. **David Luria, Ted Luria** and **Mortimer Luria** have returned from active duty with the armed forces and are resuming their activities with the company.

—o—

Clay P. Bedford, who managed various West Coast companies headed by Henry **J. Kaiser,** has been appointed vice president in charge of manufacturing at the Willow Run, Mich., plant of Kaiser-Frazer Corp. He succeeds Vern R. Drum, recently resigned.

—o—

E. D. Flintermann, Michigan Steel Casting Co., Detroit, has been elected president, Steel Founders Society of America, succeeding **A. M. Andorn,** Penn Steel Castings Co., Chester, Pa. **Newlin T. Booth,** Deemer Steel Casting Co., New Castle, Del., is the society's new vice president. **Calbraith P. Champlin,** Strong Steel Foundry Co., Buffalo, was elected a member of the executive committee to serve with Messrs. Flintermann and Booth.

—o—

David Benjamin has been appointed sales manager for the Die Casting Machine Division, Hydraulic Machinery Inc., Dearborn, Mich. Mr. Benjamin recently was released from the Army following three years as lieutenant colonel with the chemical warfare service.

—o—

Walter W. Arpe has been appointed general manager of sales, Laclede Steel Co., St. Louis. He joined the company in 1923 as special agent after a previous association with the United States Steel Corp.

—o—

E. J. Wedge has been appointed general superintendent, Highland Park plant, Ford Motor Co., Dearborn, Mich., and **Harold Robinson** has been named general superintendent of tractor manufacturing and assembly which is housed in the Highland Park plant. **George J. Crimmins** has been named the company's assistant controller and **Ray Beadle** assumes Mr. Crimmins' former position as head of the government contract department.

—o—

Carl F. Barchfeld, following two and a half years' service with the Navy, has returned to the Commercial Steel Casting Co., Marion, O., as sales manager. He will be assisted by **Harold W. Rider,** who has returned from three years with the Army.

—o—

Louis W. Kempf, assistant director of research, Aluminum Co. of America, has been elected chairman, Institute of Metals Division, American Institute of Mining & Metallurgical Engineers.

OBITUARIES...

Louis N. McDonald, who retired in 1940 as general manager of the Youngstown district, Carnegie-Illinois Steel Corp., Pittsburgh, died Jan. 15 in Daytona Beach, Fla. Mr. McDonald had been associated with Carnegie-Illinois for more than 50 years.

—o—

David Feinburg, 60, president, David Feinburg Co., Medford, Mass., scrap dealers, and former president, National Association of Waste Material Dealers, died Jan. 12 at Medford.

—o—

Magnus Gunderson, 57, a structural and consulting engineer in Chicago since he came to the United States from Norway in 1910, died Jan. 7 in that city. From 1927 to 1938 he was chief structural engineer of Graham, Anderson, Probst & White Engineering Co.

—o—

William P. M. Braun, 82, president, Pennsylvania Lawn Mower Co., Philadelphia, died Jan. 15 in that city. Mr. Braun served as president of the company for 60 years.

—o—

John M. Davis, secretary-treasurer, Kelly Reamer Co., Cleveland, died recently in that city.

—o—

Frederick S. Romney, 62, sales engineer, R. Steel & Sons Inc., Long Island City, N. Y., died recently at his home in Bellerose, Queens, N. Y.

—o—

Albert L. Thurston, 66, New York engineering representative, Dollinger Corp., Rochester, N. Y., died recently in New York. Mr. Thurston had been with the company 15 years.

—o—

Frank T. Swain, 81, who retired as vice president and general manager in 1930, after 50 years of service with Jenkins Bros., New York, died Jan. 10 at his home in East Orange, N. J.

—o—

Thomas H. Cannon, 61, retired president, Potter Tool & Machine Works, New York, died Jan. 10 at his home in Hoboken, N. J.

—o—

Henry H. Adams, 72, who retired in 1930 as head of the Colonial Iron Co., Riddlesburg, Pa., died at his home in Greenwich, Conn., Jan. 15.

Allied Control Commission Sets Maximum German Steel Output

Production limited to 5.8 million tons with capacity for 7.5 million tons. Estimate of exportable steel under this program is 600,000 tons. Surplus plants and equipment to be used for reparations payments

ALLIED Control Council for Germany has announced its plans for fixing German steel production and has limited capacity to 7,500,000 tons annually and production to 5,800,000 tons annually. The decision came after many weeks of discussion during which time the Russian representatives on the council held out for an annual production of 3 million tons, and the British representatives thought that 10.5 million tons would be a more desirable figure; both French and American delegates felt that a figure between these two extremes would allow for a minimum standard of living for the German people and would permit a limited amount of exportable steel in order to pay for necessary imports.

In the communique announcing the final compromise the three following paragraphs are extracted as being the most important:

"That the production capacity of the steel industry to be left in Germany should be 7.5 million ingot tons, this figure to be subject to review for further reduction should this appear necessary.

"That the allowable production of steel in Germany should not exceed 5.8 million tons in any future year without the specific approval of the Control Council, but this figure will be subject to annual review by the Control Council.

"That steel plants to be left in Germany under the above program should, so far as possible, be the older ones."

Only One-Quarter of 1938 Production

Under this agreement German steel production will be less than that for any year between 1925 and 1939 and most closely approximates the year 1932 when German steel production was 7,087,000 tons. In 1938 it was reported by official German sources to have reached 23,241,931 tons, or almost exactly four times the maximum figure allowed under the terms of this agreement.

American production experts advising the American representatives said the 5,800,000 tons annual production figure will allow the Germans 4,200,000 tons of finished steel a year in the form of sheets, rails, etc. It is reported that after domestic requirements are satisfied, Germany will be allowed to export 600,000 tons, a minimum amount necessary in order to pay for food imports required to maintain even a minimum nourishment.

The decision is first of a series which will be made this month in order to determine the amount of industry which is to be left in Germany. After these future agreements have been reached, the surplus machinery, equipment and capital will be available for reparations payments.

German Plants Available For Allocation Listed

German industrial plants which have been declared available for allocation on the German reparation account by the Allied Control Council are listed by the State Department and the Office of International Trade, Department of Commerce, Washington.

Firms or persons interested in purchasing for transfer to the United States any of the plants listed should indicate their interest to the OIT. Those interested in purchasing a plant for transfer to a third country should file a statement of interest with the Division of Investment and Economic Development, Department of State. Those interested in purchasing for transfer to this country any German plant not on this list and having information concerning it are asked to furnish as much detail as possible to the OIT as to the location, ownership, type of production and equipment.

Persons or firms who own or have a substantial property interest in industrial plants in Germany which may be declared available for removal or reparation account and who desire to purchase and transfer such plants for operation in other foreign countries should communicate with the Division of Investment and Economic Development.

Plants available for allocation among member nations by the Inter-Allied Reparation Agency include the following: Power plant of Grosskraftwerke Manheim A. G., at Mannheim; machine plant, Hanwell-Lug, Dusseldorf; one-half ball-bearing works, Kugel Fisher, Schweinfurt; lathe and machine tool plants, Wagner, at Dortmund, Fretz Mueller and Bohne Kohle, at Esslingen; Klockner Humbolt Dietz, diesel engine plant, Oberursel; Hastedt steam-electric plant, Bremen; Togency hydro-electric plant, Muhldorf; BMW motorcycle plant, Munich; forgings and crankshafts plant, Kusbellwellenwerke, Glinde, at Hamburg; small arms plant, Metallwerke Neuengamme, Hamburg; Hanseaticshe Kettenwerke, Hamburg, producing cartridge cases and fuses; and explosives plant, fabrick Hess Lichenau at Furstenhagen.

Statements of interest should be received by Jan. 25 for the above plants.

Available details concerning these plants will be furnished by the State Department and OIT. Subsequent lists will be made public as other German factories are declared eligible for removal by the Allied Control Council.

German Railroad Advances Depicted in New Report

German research and development in railroad equipment, facilities and operation during the war is reported by a United States investigator as having resulted in a number of novel improvements in locomotive building, freight car design, and other fields. These improvements, though not revolutionary, may prove valuable to U. S. railroads if they can be adapted to American requirements.

The findings of the investigator, Frank E. Cheshire, London representative of the Railroad Subcommittee, Technical Industrial Intelligence Committee, are presented in Report No. 370, obtainable from the Office of the Publication Board, Department of Commerce, for 25 cents a copy. The report is entitled, "German Railroad Technical Development."

91 Reports Made Available To Industry by Government

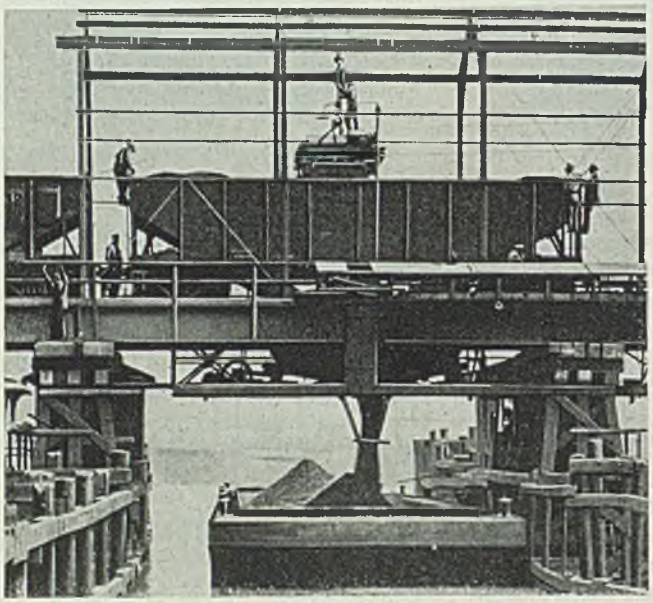
Photostatic copies of 91 scientific and technical reports, largely dealing with German industry and developments, which have been obtained by the military services, are now available to the public, the Office of the Publication Board, Department of Commerce, announced recently.

The reports represent material in addition to 369 reports previously announced as being available in mimeographed or multilithed form. Materials, manufacturing processes, products, developmental works and other scientific and technical matters are discussed in the reports.

Mechanical Shaker Trims Time of Unloading Coal Cars To Minutes

A machine has been invented which literally shakes sticky, stubborn coal out of coal cars. It doesn't even scratch the car's painted sides in the process, according to first reports. Called the Car Shaker, the new machine was designed and built by Robins Conveyors Inc., Passaic, N. J., maker of bulk materials handling equipment.

A button is pressed to start an electric motor. Seismic



action results, and coal flows out the bottom of the car. About 2 min is average time for unloading.

Final testing of the equipment was completed recently by Chesapeake & Ohio railroad at the Carbon Fuel Co., in Charleston, W. Va., where one car was unloaded in 1½ min. Other tests have been conducted on railroad lines in New Jersey. Longest time required was 7 min, when the coal was extremely wet. Only two men are required to operate the unit.

Multiple-Wheel Single-Mount Grinding Under Investigation

According to a Norton Co. report of developments for production grinding, process engineers, for reasons of economy, are becoming considerably interested in the possibilities of using several wheels on a single wheel sleeve for the purpose of grinding different diameters at one time. It is stated that accuracies obtained on sizes are definitely determined by the difference in diameters on the grinding wheels as trued in them, and the ability of these wheels to retain this accuracy. Therefore, combination cuts require matching open tolerance diameters with only one close tolerance diameter. In addition, it is best not to combine interrupted surface types of grinds (such as splined surfaces) with surfaces requiring bearing finishes or accuracies.

Another point stressed was that multiple wheel assemblies should not be used where the wheel spacing and diameter differences prohibit the use of a standard diamond nib while truing. The span between wheels should not be any greater than will provide a practical capacity of the grinding machine wheel spindle design to support such an overhang condition.

Gilsonite Fields To Be Exploited

Western deposits of gilsonite, a hard and shiny black mineral closely related to petroleum, are to be developed by the American Gilsonite Co., to be owned jointly by the Barber Asphalt Corp., New York, and Standard Oil Co. of California. This little known hydrocarbon is resistant to acid and is used in making foundry forms and storage battery cases. It also is useful as an ingredient of paints, varnishes and inks, and has shown promise as a binder for plastics. Gilsonite may be an important source of synthetic petroleum.

The gilsonite fields in Utah and western Colorado, the world's only known important source of the mineral, formerly were owned by the Barber Asphalt Corp. The new company will be headed by Clarence F. Hansen, formerly chief engineer of the oil company's manufacturing department.

Electron Microscope Probes Atomic Nature of Rust

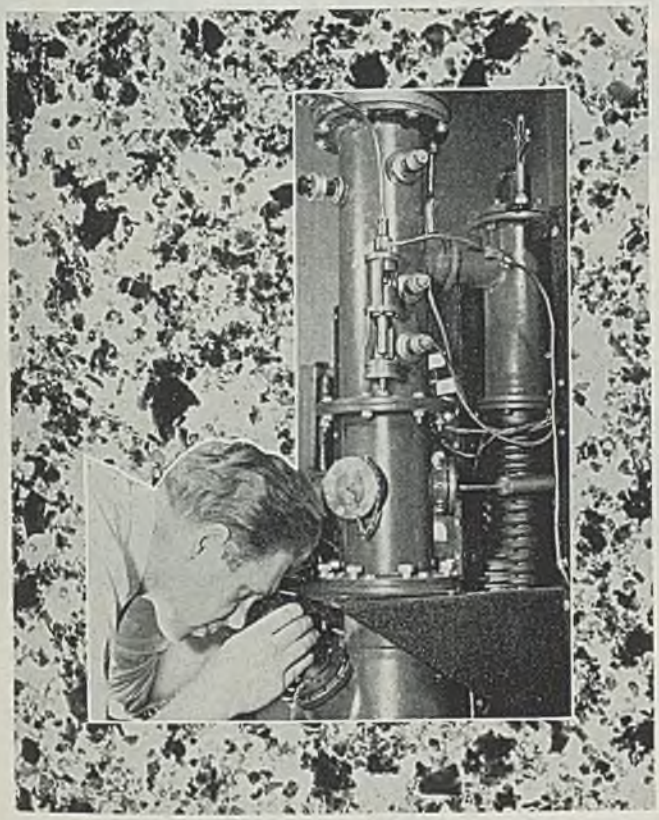
Atomic nature of the coatings or oxides that form on metals, commonly known as rust or corrosion, is being investigated at Westinghouse Research Laboratories with the aid of the electron microscope, the electronic diffraction camera, and the vacuum microbalance. Detailed information on what actually happens in the invisible boundary zone that is formed when metal comes into contact with air, or when a solid reacts with a gas is being collected by Dr. Earl A. Gulbransen in order to reveal better methods for producing alloys and coatings which will completely resist atmospheric deterioration under specific conditions. This is expected to eliminate the need for trial-and-error development and testing, making production of alloys and coatings an exact science.

Electronic microscope, which brings to light the physical nature of the coating, magnifies the film of atoms up to 50,000 times by means of a high-voltage beam of electrons that passes through sample and is pulled outward by magnetic fields along the sides of the microscope. Magnified image, produced by two successive spreadings of the beam, is recorded on photographic film in the form of a shadowgraph.

Diffraction camera also employs an electron beam, but this time it reveals the chemical nature of the coating. Beam is "fired" at an angle so that it ricochets off and strikes another photographic film. Result is a pattern of black and white semi-circles that are formed by electrons bouncing off the different faces of the block-like molecules of the oxide coating. Chemical nature of the oxide is revealed by measuring distance between rings.

Measurement of rate at which rust and tarnish "grow" on a metal exposed to air is afforded by the vacuum microbalance, a highly sensitive weighing instrument constructed mainly of quartz and hair-like tungsten wire enclosed in a vacuum chamber. Sample to be weighed is hung on one end of a balance beam, with a counterweight suspended

from the other. Small amounts of oxygen then are admitted into the chamber to form an oxide coating on the metal, making it gradually heavier. Movement of balance



beam is watched through a microscope, and changes of weight—usually in millionths of a gram—are recorded every few minutes.

As air affects metals differently at various temperatures, experiments are conducted over a wide range, from minus 270 to plus 930°F. Samples are immersed in a bath of liquid air to produce low temperatures, and an electric furnace is used to bring samples up to desired heat.

Whirling Objects Stand Still for "Optical Engineer"

With the aid of a newly developed instrument, the Rotascope, General Electric engineers now are able to make any rotating object appear motionless before their eyes. The blade of an electric fan, or an airplane propeller, will appear to stand still, even though they are whirling at full speed, when the "optical engineer" is focused upon them.

Developed for the study of airplane propellers under actual operating conditions, the Rotascope is the first instrument of its kind which allows continuous viewing of a rotating object at any point on the perimeter (or path of travel), according to Norman F. Barnes of company's General Engineering and Consulting Laboratory.

Device eliminates the rotary component of motion, but shows any flutter or vibration of the moving part, thereby making it possible to study rotating parts of parts of machinery. Engineers actually can see what happens to any of the rotating objects while operating at thousands of rpms. It also may be used in industry to study angular motions, particularly those of low angular velocities.

Lowest speeds as well as speeds up to 2000 rpm can be studied. Special designs of the Rotascope can be made for studying speeds exceeding 2000 rpm.

Injection System Correctly Meters Gasoline to Cylinders

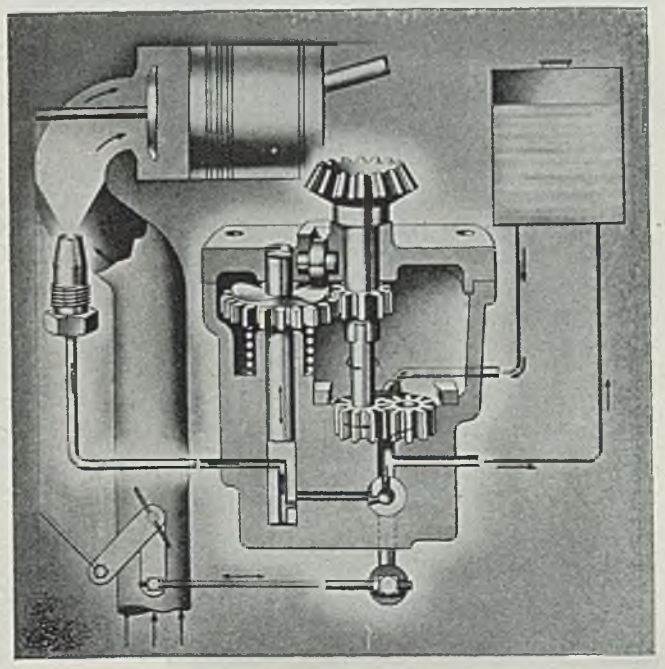
A gasoline injection system, to replace the carburetor on automotive and small aircraft engines, meters mechanically the correct quantity of gasoline to the engine cylinders, and provides a positive control of the fuel-air mixture for best combustion. Fuel may be delivered into the engine cylinder or to the intake manifold just ahead of intake valve.

Essential parts of the device, made by Ex-Cell-O Corp., Detroit, and here illustrated by diagram, are the pump, air-throttle, discharge lines and nozzles. Injection pump consists of three parts: Supply pump, fuel metering valve, and the pumping and distributing plunger.

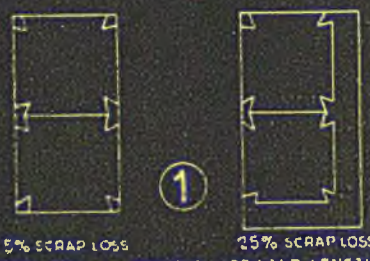
Function of injection pump is to meter the correct amount of fuel and distribute it evenly, at properly timed intervals and at correct pressure, through the discharge lines to the atomizing nozzles. The fuel flows from supply pump through the metering orifice on the throttle shaft to the pumping and distributing plunger. Amount of fuel flowing through this metering orifice is dependent on extent of throttle opening. Since there is a constant fuel flow from metering valve to pumping plunger, the amount of fuel distributed and delivered by the plunger as it rotates and reciprocates during each stroke is uniform to every cylinder and is also constant for all cylinders for a particular throttle setting and engine speed.

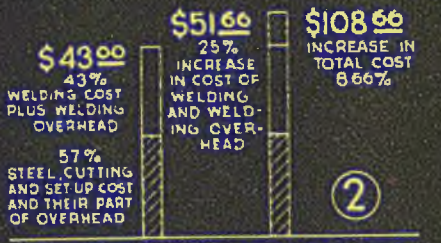
Air-throttle consists of a tube with a butterfly valve near the inlet end and ducts leading from this tube to each cylinder inlet valve. Function of the air-throttle is to provide proper amount of air to mix with the gasoline.

Discharge lines and nozzles convey the metered fuel from pump to the engine cylinder, or to the intake valve where it is delivered by the nozzle into the air stream. The nozzles atomize the gasoline into a fine mist so that it will quickly and thoroughly mix with the air.

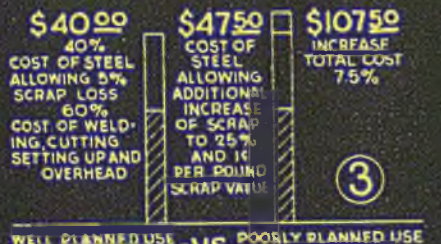


Economics of

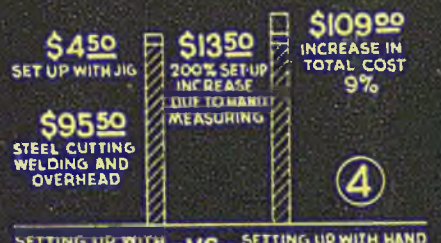




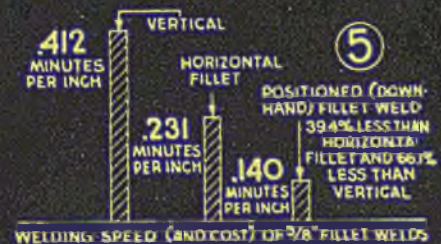
DESIGN TO BEND INSTEAD OF WELD -VS- DESIGN TO CUT AND WELD INSTEAD OF BEND



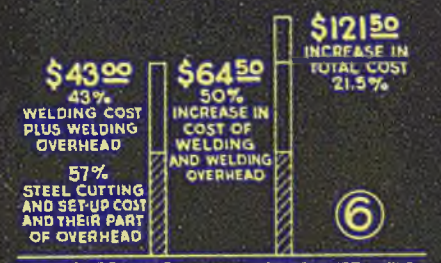
WELL PLANNED USE OF MATERIAL -VS- POORLY PLANNED USE OF MATERIAL



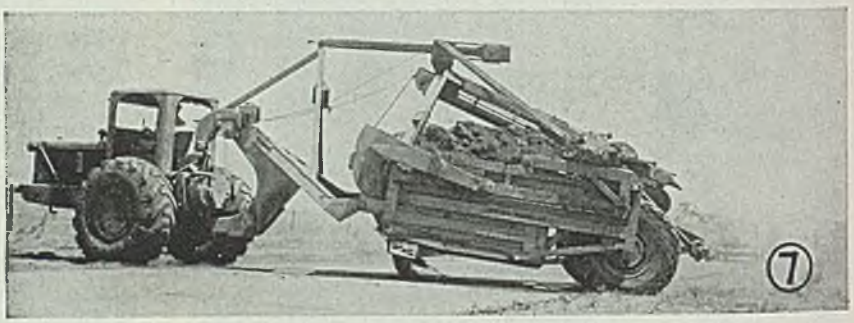
SETTING UP WITH GOOD SET-UP JIG -VS- SETTING UP WITH HAND MEASURING AND NO JIG

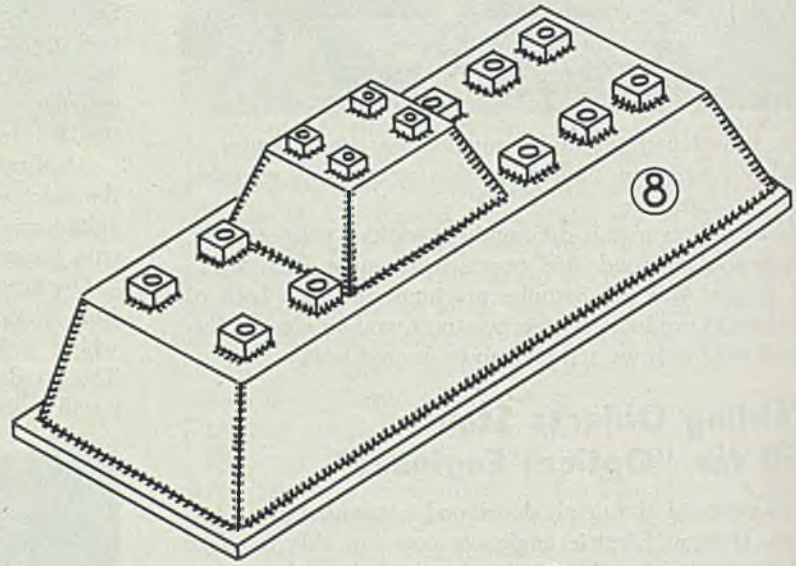


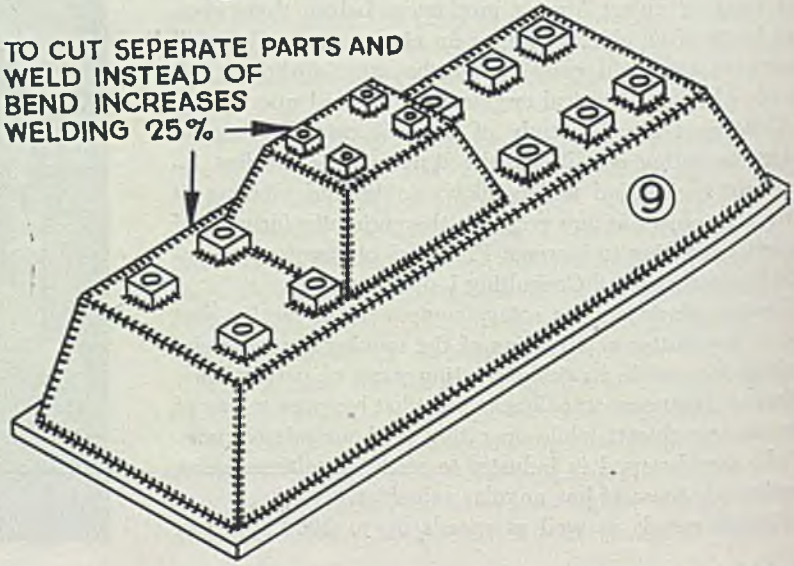
WELDING SPEED (AND COST) OF 3/8" FILLET WELDS DEPOSITED IN THE THREE POSITIONS SHOWN. (ACTUAL TIME STUDY VALUES FOR ARC TIME, PLUS FATIGUE ALLOWANCE).



POSITIONED WELDING WITH WELD POSITIONERS -VS- UNPOSITIONED WELDING WITHOUT WELD POSITIONERS







Arc Welding

By WALTER J. BROOKING
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Eight specific factors common to all welding applications are reviewed and analyzed for their relationship to the total cost of the welded structure. In this, the first of two articles, the author covers economic latitudes permissible in design, use of material, setting up fixtures, and weld deposition, as previously outlined for the Welding Journal

EXTENT to which the arc welding method is used in producing machines and structures in modern manufacturing is an indication that it has certain inherent advantages both from an engineering and an economic standpoint.

Gains made with welded fabrication have been savings in weight ranging from 8 to 40 per cent; in some cases, special mechanical engineering advantages; elimination of open joints; and reduction in bulk. Edges which have been lapped over one another and often reinforced with side plates are considerably bulkier than are the structures in which welding has been used for joining. Rigidity and superior mechanical function are also frequent characteristics found in arc welded construction.

Arc welding of steel structural materials has made it possible to produce machines whose operational efficiency is directly attributable to characteristics of design which cannot be economically obtained by any other means of fabrication. High speed tractor and earth-moving machine shown in Fig. 7 is an example.

Purpose of this discussion is to present relationships of several important factors common to all welding applications which greatly affect the total cost of the welded structure. These factors variously and collectively influence total cost and, therefore, the economics of welded structures, depending upon the amount of control exercised on these various factors. This article will deal with only eight of the most important factors—all so general that they are universal problems in welded construction[1]. They are:

(1) Design to reduce the amount of weld metal required in the structures.
(2) Plan the use of material to reduce scrap.
(3) Use setting up fixtures to eliminate measuring and to standardize structures.
(4) Use positioning fixtures to deposit welds in most favorable positions.
(5) Use the most economical size of electrodes.
(6) Obtain good fitup of welded joints.
(7) Control the size of welded joints to their proper size.
(8) Obtain a good operator factor (use of workman's time).

In this generalized discussion, a sound basis for demonstrating their importance can be provided by a hypothetical welded structure such as the simple welded machine base shown in Fig. 8.

It is assumed that this machine base is made of arc welded steel in an ordinary welding shop, and that it would be made on a mass production basis (a repetitive process like many repetitive manufacturing processes in present day welding production). Let us assume that at least 100 units are to be made.

To establish a fundamental basis of comparison, a cost of production—with normally good welding practice in their manufacture—is fixed at $100.00 each, based upon the following conditions, assumptions and values:

Finished weight of the base is 1000 lb, consisting of 950 lb of steel and 50 lb of weld metal—

1000 lb steel @ 4c per lb plus 5% scrap loss	$40.00
1.64 hr set-up time @ $1.10 per hr plus 150% overhead ($2.75 per hr)	4.50
5 hr cutting and shaping time @ $1.00 per avg. plus 150% overhead ($2.50 per hr)	12.50
50 lb deposited weld metal @ 86c per lb	43.00
Total Cost with normally obtainable good practice	$100.00

(This cost assumes a 70 per cent continuous work, such as arc time and electrode changing time; $1.10 per hr for labor for setting up and welding; 66 2/3 per cent electrode deposi-

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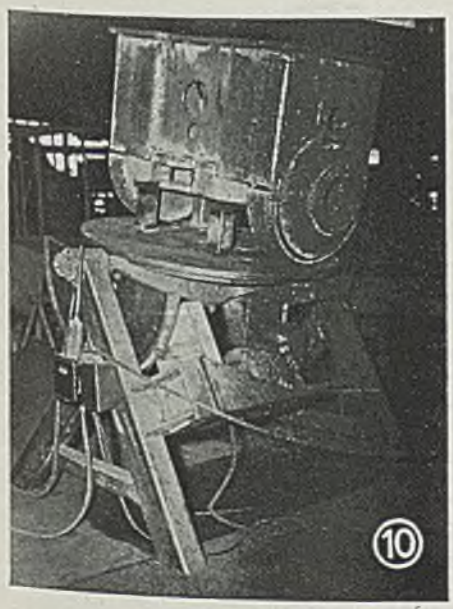

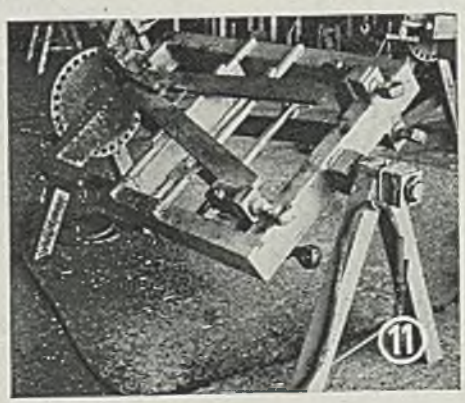

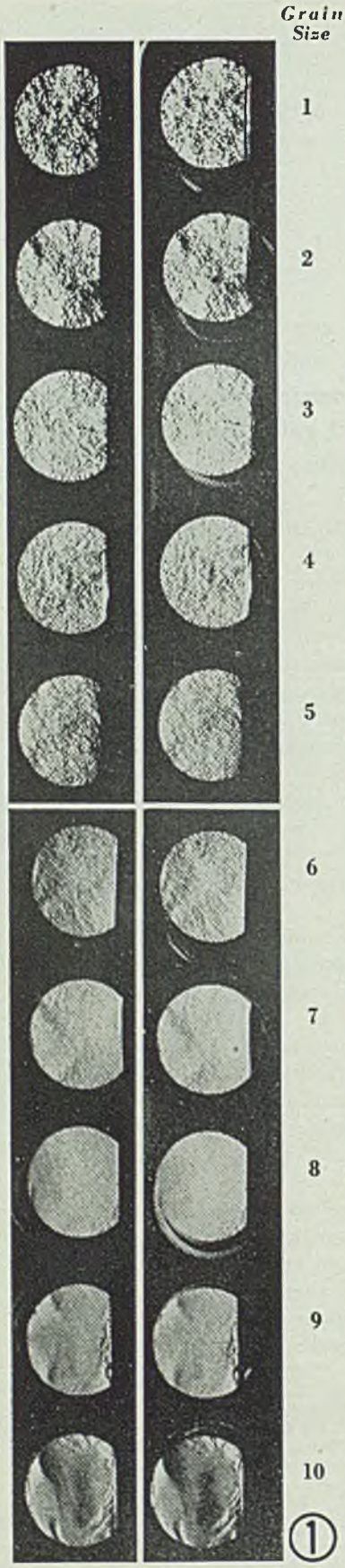

Cold Heading DIE STEEL

Intimate relationship between hardenability and austenitic grain size should be considered carefully in selecting die steels. Various steel analyses are discussed. For additional articles by the author on this subject, see STEEL, Oct. 29, 1945, p. 98, and Nov. 26, 1945, p. 100

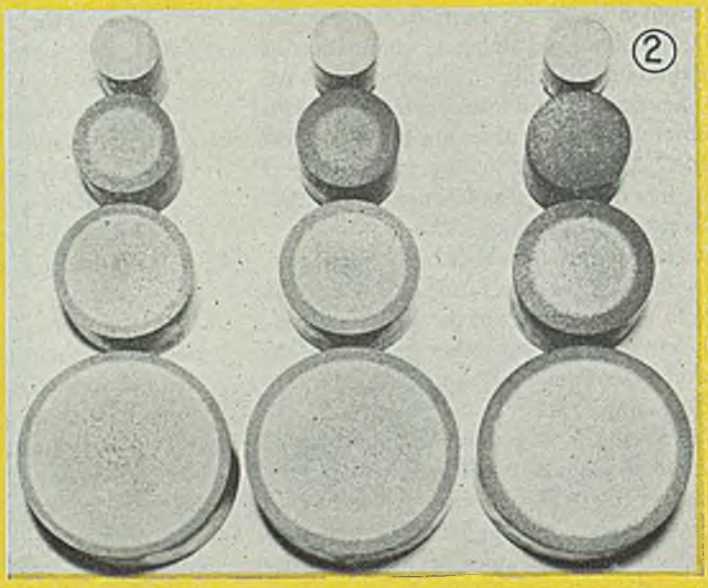

Fig. 2—Hardness penetration in 1, 1½, 2, and 3-in. specimens shown by etching the cross section. From left to right, quenched in 10 per cent brine from 1425, 1500 and 1600° F

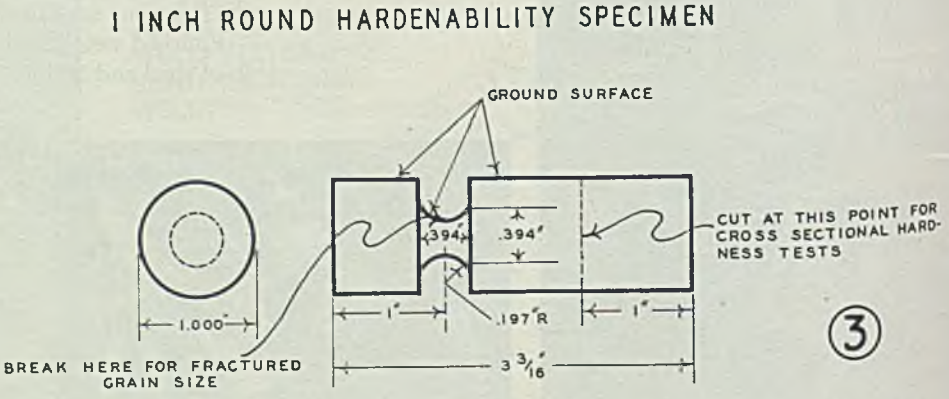

Fig. 1—Sheppard grain size standards. A close estimate of austenitic grain size may be made by comparing a fractured specimen with a standard fracture rating

Fig. 3—Dimensions for 1-in. round hardness penetration and fracture grain size specimen

By A. S. JAMESON
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HARDENABILITY of cold heading die steel is intimately associated with austenitic grain size, therefore, any reference to hardenability of the steel should be accompanied by a grain size recording. A chemical analysis of the elements which promote hardness penetration such as manganese and chromium, or the elements such as vanadium which retard hardness penetration by inhibiting grain growth should also accompany hardness penetration data. It should be noted that vanadium does not always retard hardness penetration, for when the vanadium content is about 0.50 per cent and the steel is hardened from a high temperature, vanadium seems to increase hardness penetration.

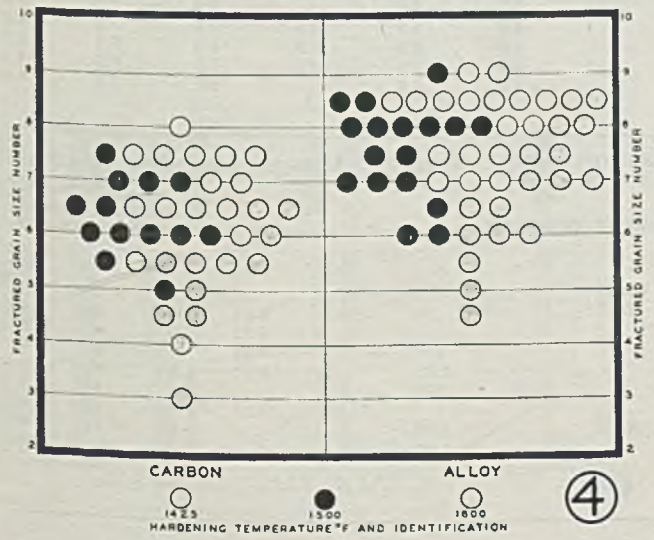
Elements which are used in deoxidizing additions are retained in the steel in such small quantities that they usually are not recorded unless spectrographic equipment is available. Their effect can be indirectly determined by their influence on the grain size and through this on the hardenability.

Primary consideration in cold heading die steel is to obtain a hardened case of the depth to suit the particular requirement. Too deep a case will cause spalling and too shallow a case sinking and loss of size in the die which will make it unsuitable for all but the briefest usage.

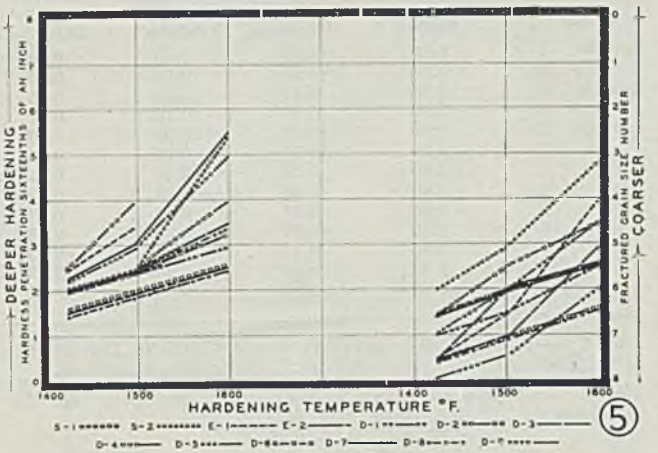
Purpose of hardenability or depth of penetration measurements is (1) to select an analysis which will suit the hardness penetration requirements for a particular die, (2) to ensure from bar to bar a uniformity of case depth and thereby obtain the sameness in each die when given a standard heat treatment. Apart from the influence of grain size on the hardenability characteristics of the steel, grain size in itself has an effect on die life. Too coarse a grain will cause brittleness and die breakage.

By far the most popular choice for cold heading are the plain carbon steels containing from 0.85-1.00 per cent carbon, 0.20-0.30 per cent manganese, 0.15-0.30 per cent silicon with a residual chromium content of less than 0.10 per cent. For smaller dies less than 1½ in. in diameter used for

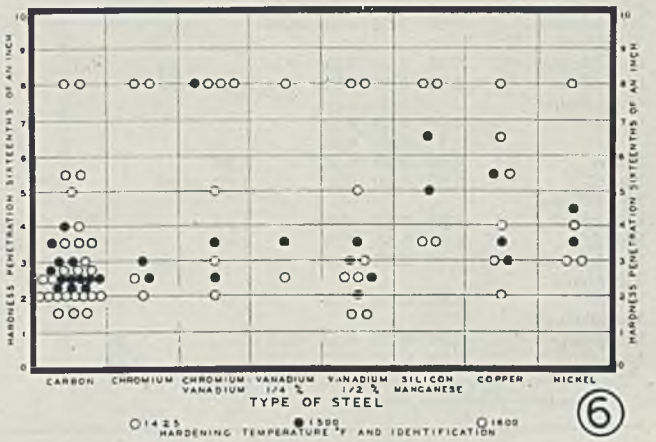
COMPARISON OF FRACTURED GRAIN SIZE OF CARBON AND SOME ALLOY STEELS



RELATIONSHIP OF HARDNESS PENETRATION TO AUSTENITIC GRAIN SIZE
THIRTEEN CARBON STEELS



COMPARATIVE HARDNESS PENETRATION CARBON AND SOME ALLOY STEELS
1 INCH ROUND



HARDNESS PENETRATION CURVES
1½" RDS. HARDENED AT 1425°F. AND TEMPERED AT 500°F.

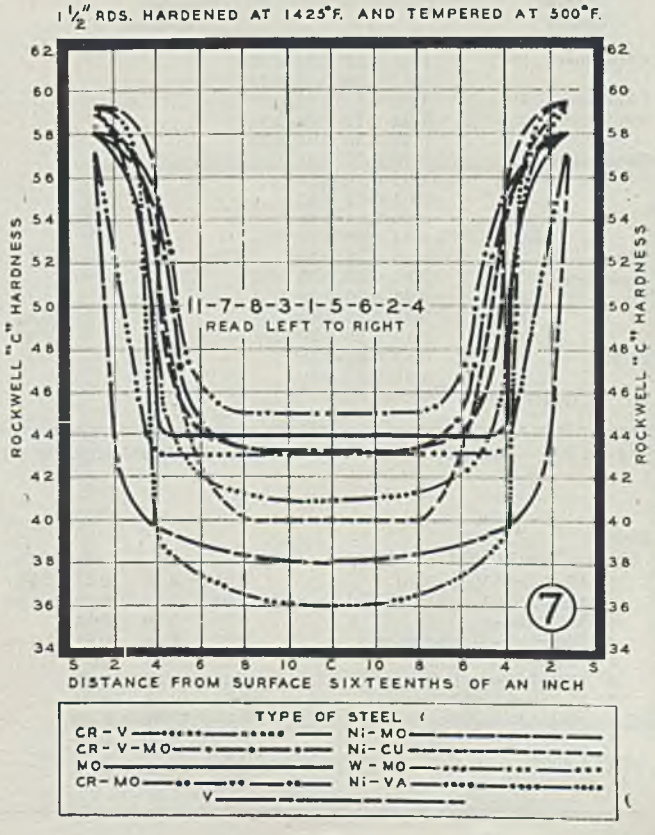


TABLE I—TYPICAL ANALYSIS OF CARBON STEELS

Source		Element per cent: Carbon	Manganese	Silicon	Chromium
Swedish	1	0.95	0.25	0.25	0.00
	2	1.00	0.25	0.15	0.00
English	1	1.05	0.40	0.20	0.03
	2	1.10	0.30	0.15	0.01
Domestic	1	0.90	0.25	0.25	0.01
	2	0.90	0.30	0.25	0.01
	3	1.00	0.25	0.30	0.01
	4	0.90	0.30	0.25	0.03
	5	1.05	0.25	0.30	0.02
	6	1.25	0.35	0.20	0.03
	7	0.95	0.45	0.15	0.05
	8	0.95	0.30	0.25	0.00
	9	0.90	0.35	0.30	0.08

TABLE II—LOW ALLOY CONTENT COLD HEADING DIE STEELS

Type of Steel	Source	Element per cent: C	Mn	Si	Cr	Ni	Mo	V	W	Cu
Chromium	1°	0.95	0.20	0.30	0.25	...	...	...	...	...
	2	0.90	0.30	0.30	0.20	...	...	...	...	...
	1	0.95	0.35	0.25	...	...	...	0.25	...	...
Vanadium	2	1.00	0.25	0.40	...	...	...	0.45	...	...
	3	0.95	0.30	0.25	...	...	...	0.40	...	...
Manganese-Silicon	1	0.95	0.35	0.50	...	...	...	...	...	...
	2	0.85	0.40	0.35	...	...	...	...	...	...
Chromium-Molybdenum-Vanadium	1	0.90	0.25	0.20	0.25	...	0.30	0.20	...	...
Molybdenum	1	0.75	0.30	0.20	...	...	0.20	...	...	...
Chromium-Molybdenum	1	0.70	0.30	0.25	0.15	...	0.20	...	...	...
Copper	1	0.90	0.30	0.25	...	...	...	...	...	1.10
	2	1.15	0.30	0.20	...	...	...	...	...	1.05
Nickel	1	0.90	0.30	0.20	...	1.00	...	...	...	...
Nickel-Molybdenum	1	0.95	0.30	0.25	...	1.00	0.20	...	...	...
Copper-Nickel	1	0.95	0.30	0.30	...	1.55	...	...	...	1.05
	2	1.00	0.30	0.20	...	0.95	...	...	...	0.95
Molybdenum-Tungsten	1	0.90	0.25	0.20	...	...	0.20	...	1.00	...
Nickel-Vanadium	1	0.90	0.35	0.40	...	0.70	...	0.30	...	...
Chromium-Vanadium	1	1.00	0.25	0.25	0.25	...	...	0.25	...	...
	2	0.95	0.30	0.25	0.20	...	...	0.20	...	...
	3°	1.00	0.45	0.40	0.20	...	...	0.20	...	...

(°) Swedish—All others domestic.

heading bolts or rivets less than ¼-in. in diameter, a higher carbon content up to 1.25 per cent is often used in order to obtain increased wear. In the case of larger dies more than 2 1/2 in. in diameter used for heading bolts over 1/2-in. in diameter, the manganese content of the steel is at times increased from 0.30 per cent maximum to 0.50 per cent maximum for the purpose of increasing hardness penetration. Table I gives the typical analysis of some domestic and foreign carbon steels.

There are two other analyses which are also used for cold heading die steel; one contains 0.25 per cent chromium and another contains 0.25 per cent vanadium. These steels cannot be classified as carbon steels but would be referred to as alloy steels. Experimentally, a number of alloy compositions have been used. A list of these steels are shown in Table II.

A discussion of the hardenability and grain size of cold

TABLE III—HARDNESS PENETRATION AND FRACTURED GRAIN SIZE OF CARBON STEELS SHOWN IN TABLE I

Source		Chemical Composition: C	Mn	Si	Cr	Distance from surface in 1/16-in. to 50 R"C" & hardening temperature °F: 1425	1500	1600	Fractured grain size of hardened case and hardening temperature °F: 1425	1500	1600
Swedish	1	0.93	0.24	0.23	0.00	1.5	2.0	2.5	6.5	6.0	5.5
	2	1.00	0.23	0.16	0.00	2.0	2.5	5.5	6.0	5.0	3.0
English	1	1.07	0.40	0.20	0.03	2.5	3.5	...	7.5	6.5	4.0
	2	1.08	0.28	0.13	0.01	1.5	2.0	2.5	7.5	7.0	5.0
Domestic	1	0.91	0.22	0.21	0.01	2.0	2.5	3.0	7.0	6.5	5.5
	2	0.92	0.28	0.24	0.01	2.5	4.0	...	6.5	5.5	4.5
	3	1.00	0.24	0.28	0.01	2.0	2.5	3.5	7.5	6.0	5.5
	4	0.92	0.32	0.23	0.03	2.0	2.5	4.0	7.5	7.0	6.5
	5	1.03	0.24	0.29	0.02	2.0	2.5	3.5	7.0	6.0	4.5
	6	1.21	0.34	0.22	0.03	2.0	2.5	3.5	6.5	6.0	5.5
	7	0.95	0.46	0.13	0.05	2.0	3.0	5.5	6.5	6.0	5.5
	8	0.97	0.30	0.24	0.00	1.5	2.0	2.5	7.5	7.0	6.5
	9	0.90	0.35	0.28	0.08	2.0	3.0	5.0	8.0	7.5	6.0

TABLE IV—HARDNESS PENETRATION AND FRACTURED GRAIN SIZE OF SOME ALLOY STEELS SHOWN IN TABLE II

Type of Steel & Source		Chemical Composition: C	Mn	Si	Cr	Ni	Cu	V	Distance from surface in 1/16-in. to 50 R"C" & hardening temperature °F: 1425	1500	1600	Fractured grain size of hardened case and hardening temperature °F: 1425	1500	1600
Chromium	1°	0.96	0.22	0.31	0.23	...	...	...	2.5	3.0	..	7.0	6.0	5.0
		0.91	0.30	0.32	0.19	...	...	...	2.0	2.5	..	7.5	7.0	6.5
Chromium-Vanadium	1	1.02	0.21	0.26	0.27	...	...	0.20	3.0	3.5	..	8.5	8.0	7.5
	2	1.02	0.29	0.29	0.23	...	...	0.18	2.0	2.5	.	8.5	8.0	7.0
		0.98	0.46	0.41	0.21	...	...	0.22	5.0	..	..	8.5	8.0	7.0
Vanadium	1	0.96	0.37	0.22	...	...	...	0.25	2.5	3.5	..	9.0	9.0	8.5
	2A	1.01	0.26	0.26	...	...	...	0.41	1.5	2.5	3.0	8.0	7.5	7.0
	2	1.02	0.25	0.42	...	...	...	0.44	2.5	3.0	..	8.5	8.0	7.5
	3A	0.96	0.31	0.31	...	...	...	0.45	2.5	3.5	..	8.5	8.0	8.0
	3	0.94	0.27	0.21	...	...	...	0.40	1.5	2.0	3.0	8.5	8.5	8.5
Silicon-Manganese	1	0.95	0.35	0.50	...	...	...	...	3.5	5.0	..	7.0	6.0	5.5
	2	0.86	0.39	0.35	...	...	...	...	3.5	6.5	..	7.0	6.5	6.0
Copper	1A	0.92	0.30	0.30	...	...	1.10	...	2.0	3.0	..	9.0	8.5	8.0
	1B	0.92	0.18	0.24	...	...	1.01	..	4.0	5.5	6.5	7.5	7.0	6.0
	1	1.17	0.18	0.20	...	...	1.08	...	3.0	3.5	5.5	8.5	8.0	6.5
Nickel	1A	0.86	0.28	0.19	...	1.00	...	...	3.0	3.5	4.0	7.5	7.5	4.5
	1	0.91	0.28	0.20	...	1.03	...	..	3.0	4.5	.	8.0	7.0	6.0

(°) Swedish—All others domestic.

TABLE V—CHEMICAL COMPOSITION AND GRAIN SIZE OF STEELS FROM WHICH CURVES IN FIGURES 7, 8, & 10, WERE OBTAINED

Identification	Type of Steel	Element per cent: C	Mn	Si	Cr	V	Cu	Ni	W	Mo	Austenitic grain size & quenching temperature °F: 1425	1500	1600
1	Chromium-Vanadium	0.98	0.46	0.41	0.21	0.22	...	...	...	...	8½	8	7
2	Chromium-Vanadium-Molybdenum	0.98	0.24	0.19	0.26	0.17	...	...	...	0.31	8½	8½	7½
3	Molybdenum	0.76	0.26	0.25	...	...	...	...	...	0.22	6	6	6
4	Chromium-Molybdenum	0.70	0.30	0.25	0.14	...	...	...	...	0.24	6½	6	6
5	Nickel-Molybdenum	0.96	0.35	0.24	...	...	...	1.03	...	0.17	8	7	6
6	Nickel-Copper	1.01	0.28	0.22	...	...	0.95	0.92	...	...	8	8½	7
7	Tungsten-Molybdenum	0.91	0.29	0.14	...	...	...	...	1.05	0.22	8½	8½	8½
8	Nickel-Vanadium	0.90	0.34	0.42	...	0.30	...	0.70	...	...	8½	8½	8½
9	Nickel	0.92	0.30	0.23	...	...	...	1.03	...	...	...	...	6½
10	Copper	0.92	0.30	0.30	...	...	1.12	...	...	...	...	8½	...
11	Vanadium	0.94	0.27	0.21	...	0.40	...	...	...	...	8½	...	...

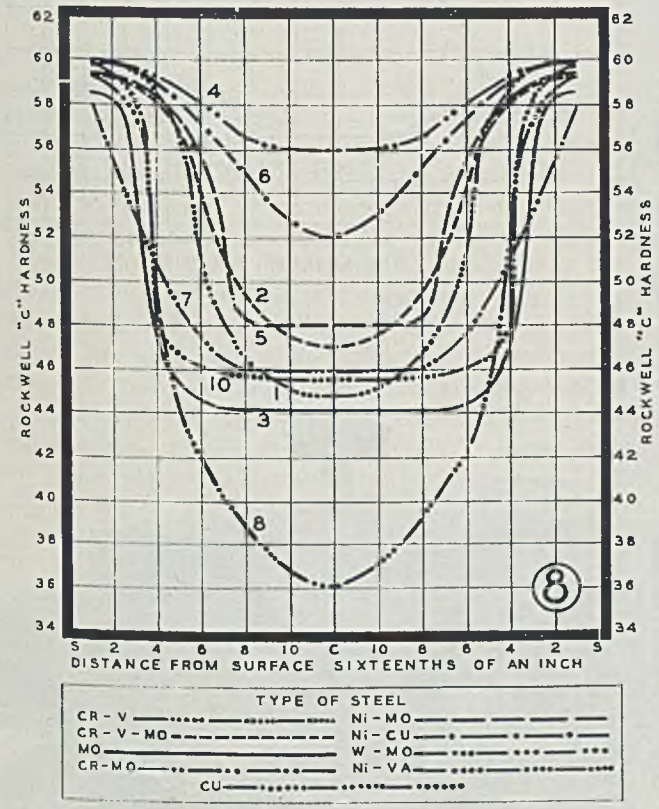
heading die steel can be based on a study of the behavior of the analyses given in Tables I & II.

Austenitic Grain Size

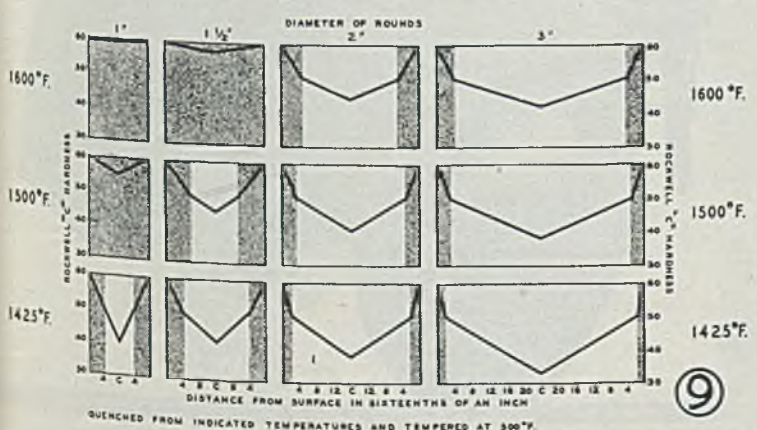
The usual, and as far as can be determined, the best method of recording the grain size of a cold heading die steel is by hardening from at least three temperatures above the critical range and fracturing the hardened specimen. Three hardening temperatures of 1425, 1500 and 1600° F would suffice to cover the hardening range for the steels listed in Tables I and II. Fracture grain size is compared with a set of standards numbered from 1 to 10, see Fig. 1. The first set of standards for fractured grain size was introduced by the Swedish Iron Masters Association. Set shown in Fig. 1 was developed by B. F. Sheppard[1]. Grain size as determined by the McQuaid-Ehn test, which consists of carburizing at 1700° F for 8 hr, and slowly cooling, followed by miscroscopic examination at 100 diameters and rating according to a standard chart, has a limited value.

HARDNESS PENETRATION CURVES

1½" RDS. HARDENED AT 1500°F. AND TEMPERED AT 500°F.



HARDNESS PENETRATION

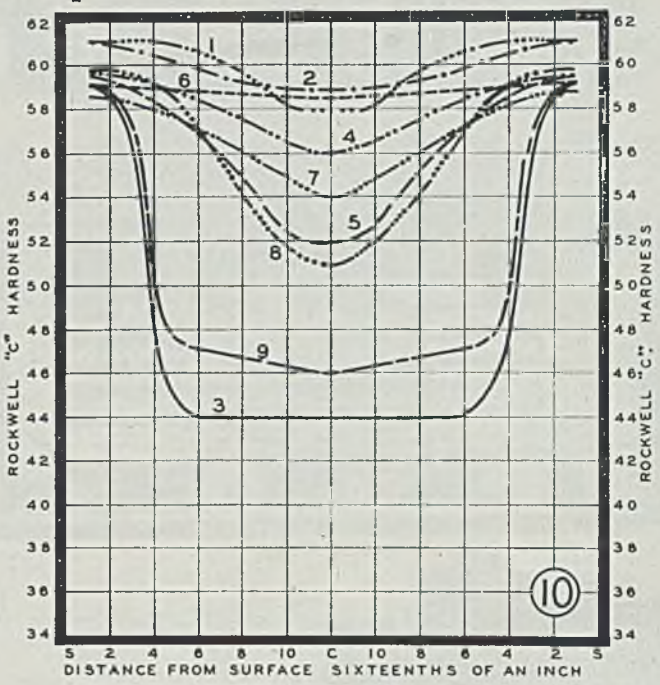


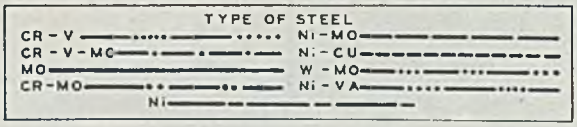
A steel having a fine grain (Nos. 5-8 on the ASTM standard chart) would have no coarser grain when hardened from any temperature below 1700° F. However, a steel showing a coarse grain (Nos. 1-4 on the ASTM standard chart) could have any grain size from fine to coarse at any temperature below 1700° F, and at just what temperature the coarsening would take place would not be revealed

(*Please turn to Page 123*)

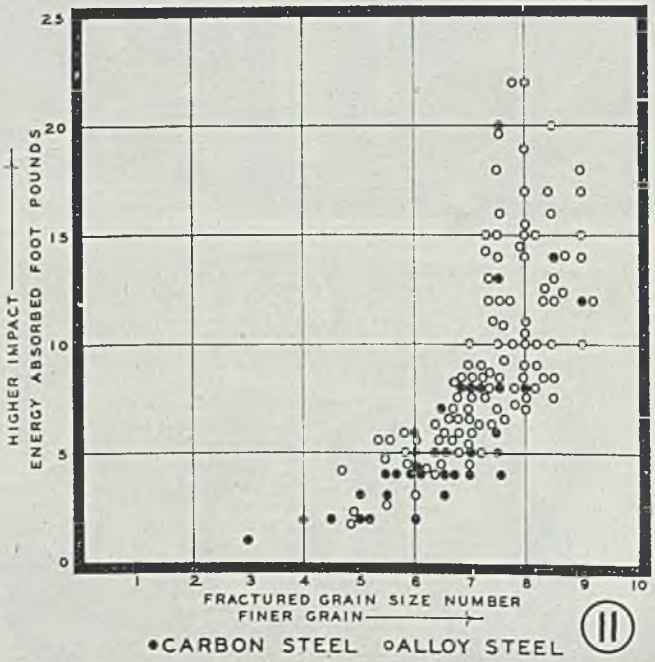
HARDNESS PENETRATION CURVES

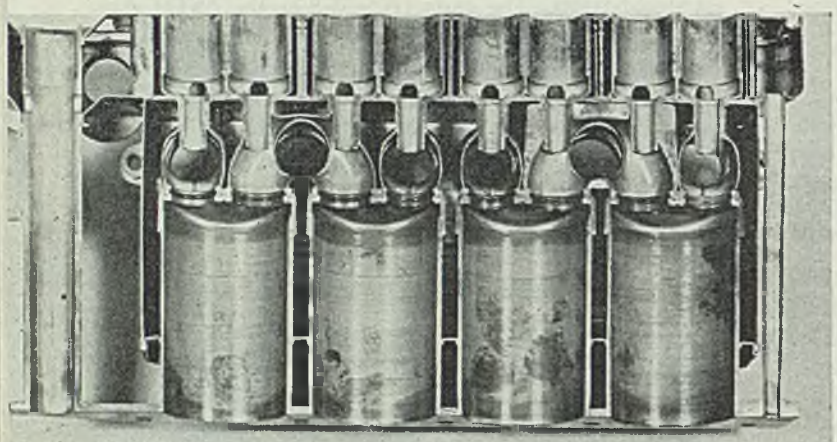
1½" RDS. HARDENED AT 1600°F. AND TEMPERED AT 500°F.

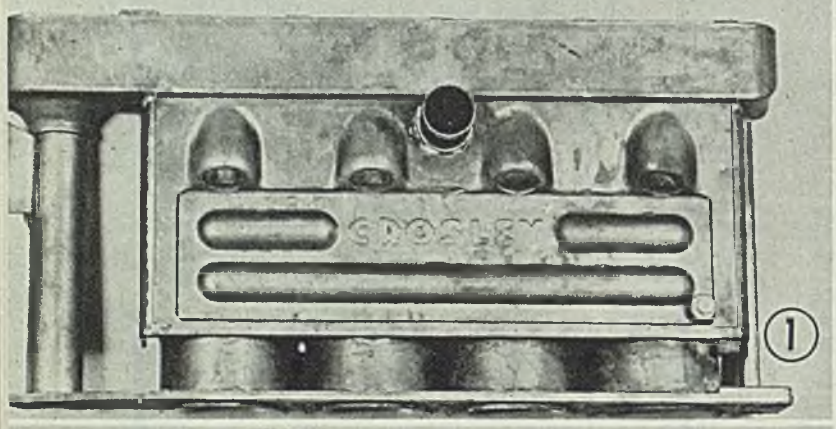




RELATIONSHIP OF AUSTENITIC GRAIN SIZE TO IMPACT STRENGTH






CROSLEY

①

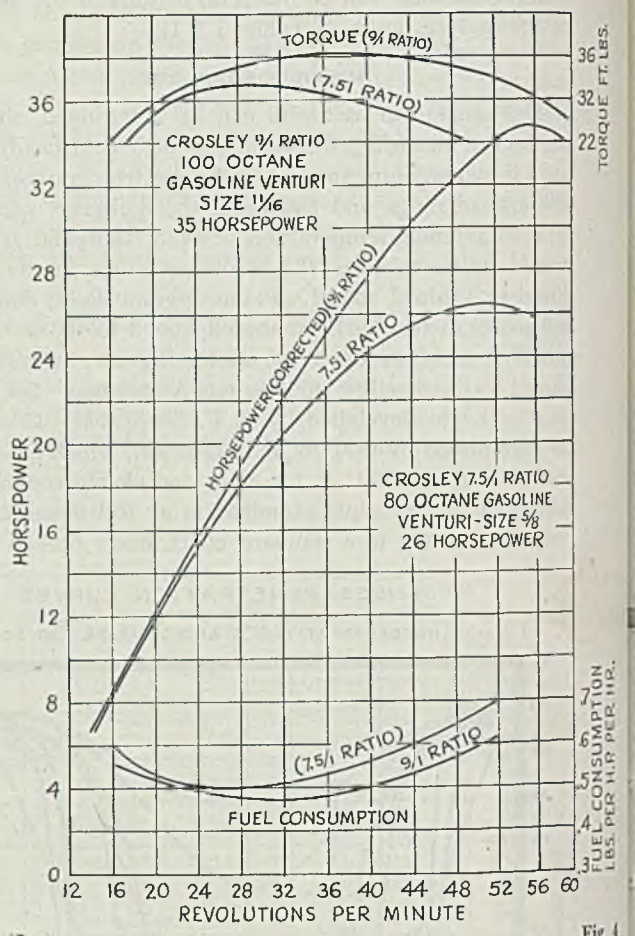
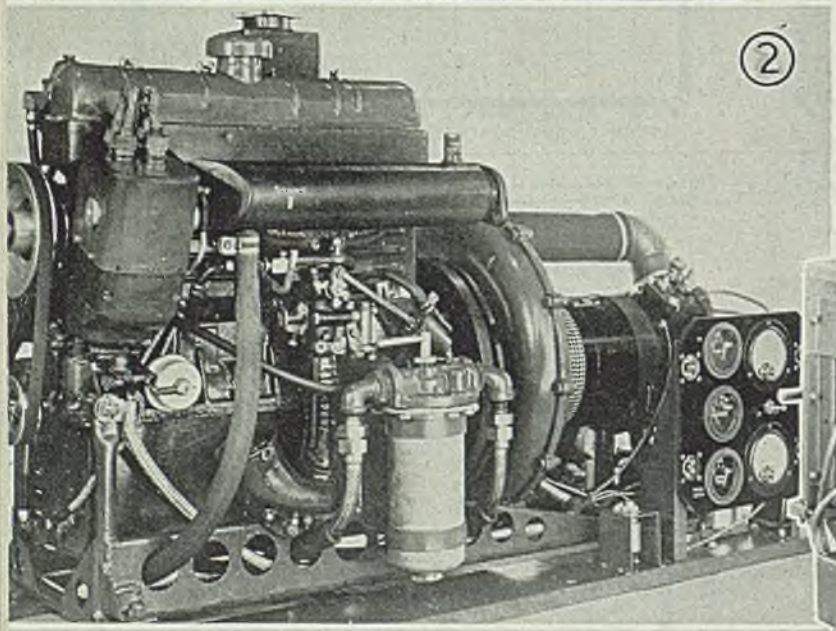
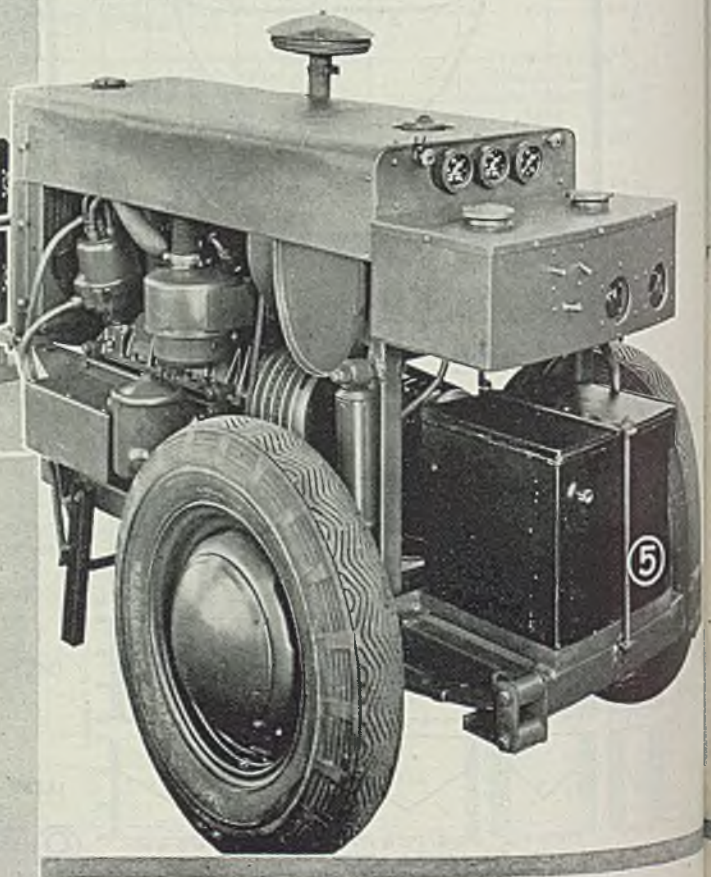

TORQUE (9/1 RATIO)
(7.51 RATIO)
CROSLEY 9/1 RATIO
100 OCTANE
GASOLINE VENTURI
SIZE 1 1/16
35 HORSEPOWER
HORSEPOWER (CORRECTED) (9/1 RATIO)
7.51 RATIO
CROSLEY 7.5/1 RATIO
80 OCTANE GASOLINE
VENTURI - SIZE 5/8
26 HORSEPOWER
(7.5/1 RATIO)
9/1 RATIO
FUEL CONSUMPTION
HORSEPOWER
TORQUE FT. LBS.
FUEL CONSUMPTION LBS. PER H.P. PER HR.
REVOLUTIONS PER MINUTE
0 4 8 12 16 20 24 28 32 36
22 28 32 36
3 4 5 6 7
12 16 20 24 28 32 36 40 44 48 52 56 60

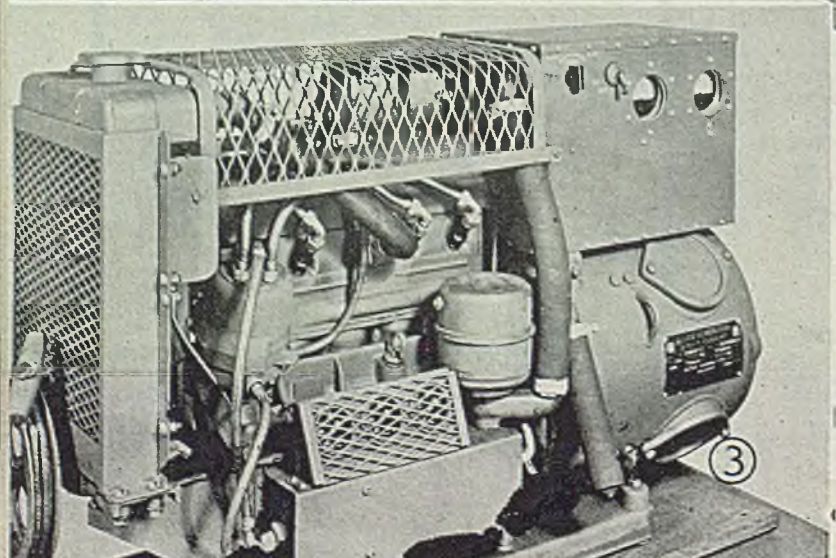
Fig. 4

②





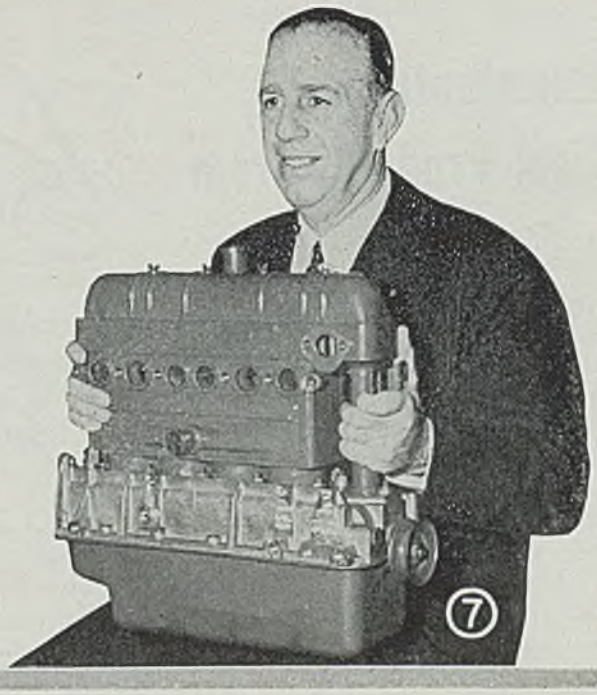
⑤



③

New Engine

. . . . uses stamped steel parts, brazed together



DURING the summer of 1943, Powel Crosley, Jr. heard of an all steel stamped, copper hydrogen brazed engine being tested at the Annapolis Experimental Engineering Station. He was told that the inventor of this engine, Lloyd M. Taylor of Taylor Engines Inc., maintained a laboratory in California, where a second larger steel stamped engine was on test.

Paul Klotsch, chief engineer of Crosley Motors Inc., visited Taylor and witnessed the test of a large 250 hp, hydrogen brazed aircraft engine. The specific horsepower output, fuel consumption, and other general performance data were so outstanding that the Crosley Corp. became interested in the development of an engine of this type for the postwar Crosley car and took an exclusive license under all patents and to all mechanical developments of Taylor Engines Inc.

However, before the end of the war, the Bureau of Ships at Annapolis became interested in a light weight, high powered engine and tested the new development. Six experimental engine generator sets to operate direct drive at 5000 rpm were built for the Navy. These engines developed up to 35 hp. They were given exhaustive, successful tests by Crosley and the Navy. The initial tests having proved successful, experimental engine generator sets shown in Figs. 2 and 3 were constructed, and an engine was operated day and night for 1200 consecutive hours.

During the summer of 1945, Wright Field, Dayton, O., became acquainted with the fabricated all steel cylinder block construction and ordered three experimental generator sets, powered by the same 44 cu in. 4 cylinder engine. The engines for these sets operate at a speed of 3800 rpm and deliver 20 hp at that speed. See Fig. 5.

Specifications and Construction: After much preliminary layout work, an engine with a bore of 2½ in. and a stroke of 2¼ in. designed to meet Navy specifications was decided upon. The displacement for the four cylinders, therefore, became 44 cu in. The engine had to develop

(*Please turn to Page* 103)

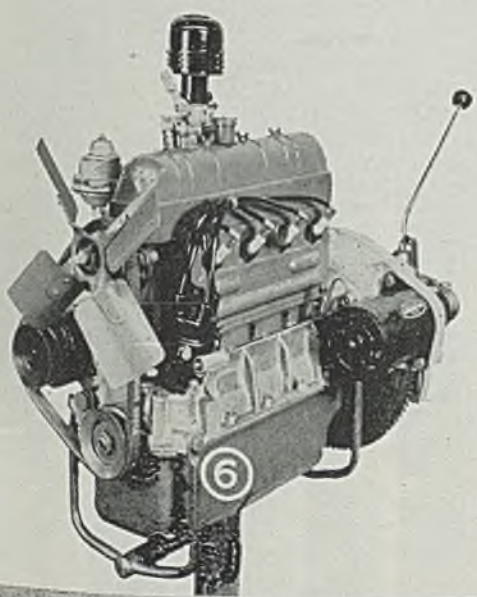


Fig. 1—Light-walled alloy steel tubing and sheet steel stampings form the 120 parts which are held in place by shrink fits, spot weld and crimping operations prior to copper brazing in a hydrogen atmosphere furnace. Subsequent gas quench from brazing temperature hardens critical parts

Fig. 2—Experimental engine generator set of type which successfully passed test of 1200 consecutive hours operation

Fig. 3—One of the Crosley stamped steel engines which operated direct generator drive at 5000 rpm

Fig. 4—Chart showing performance of the Crosley stamped steel engine. Maximum output is 36 hp at 5600 rpm

Fig. 5—Experimental stamped steel engine built for Wright Field develops 20 hp at 3800 rpm

Fig. 6—Engine complete with all accessories as used in auto weighs only 138 lb

Fig. 7—Powel Crosley Jr., president, Crosley Motors Inc, graphically portrays small size of the new engine

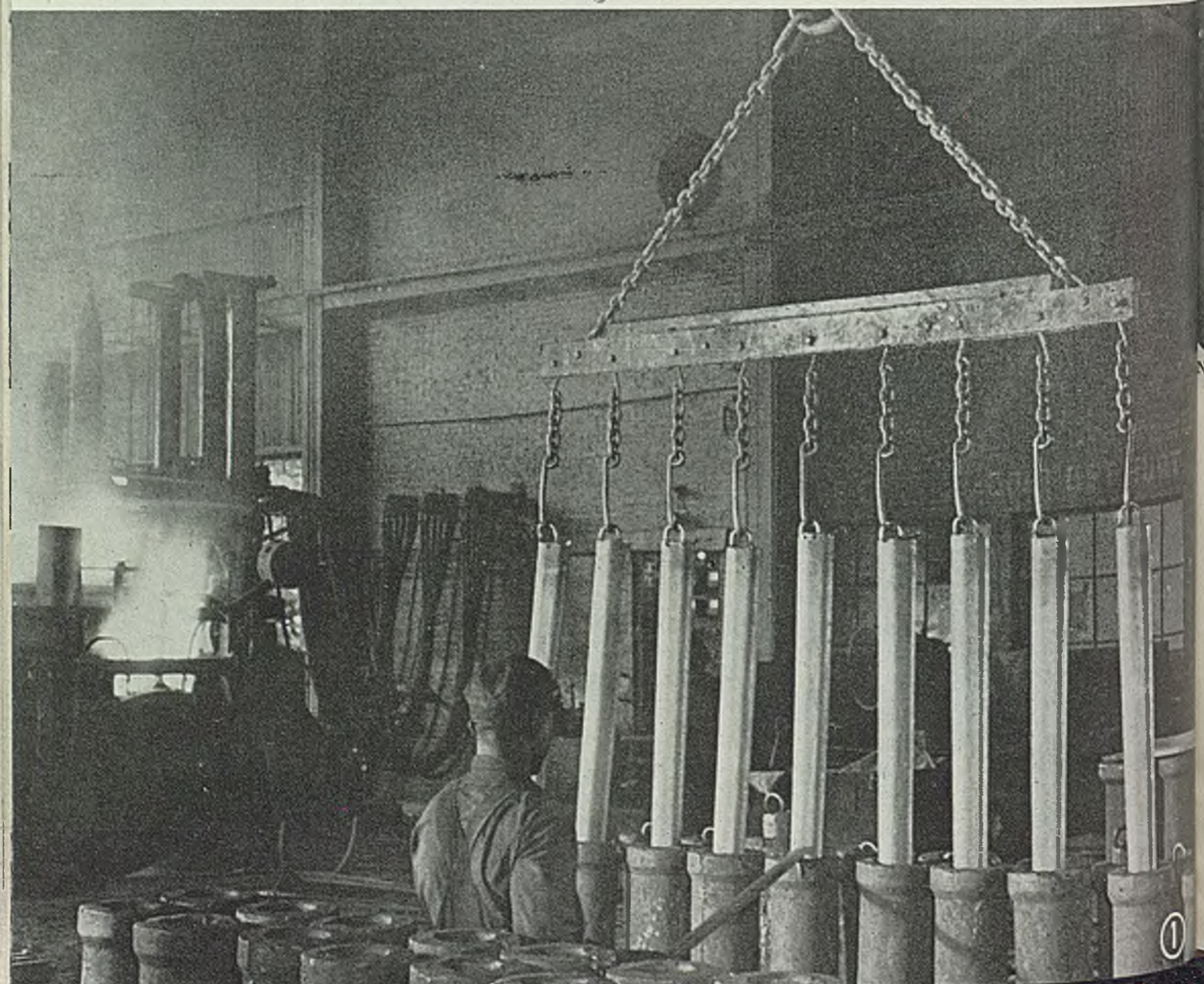
Manufacture of Steel Products from Billet-Size Ingots

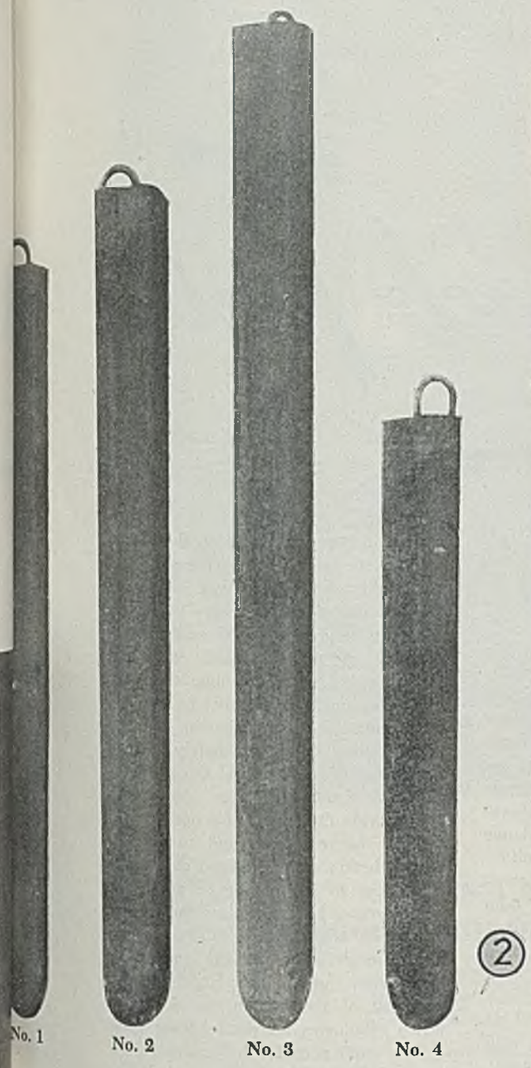
Small ingot practice introduced at southern plant in 1939 eliminates pouring platform. Pins in top of big-end-up ingots facilitate stripping. Antipiping compounds are used instead of hot tops. Ingot segregation is reduced to a minimum. Direct rolling of ingots to finished products eliminates reheating

By R. W. SCHOLL
Assistant to Vice President
Conners Steel Co.
Birmingham

MANUFACTURE of steel products from billet-size ingots attained increased importance during World War II due to the heavy demand on the steel industry as a whole. Steelmaking practice which employs the use of small-size ingots is rather unique and presents some rather interesting operating and metallurgical problems. At the outset it might be stated that small ingot practice, consisting of pouring billet-size ingots, lends itself well to small tonnage heats. Steelmaking practice in most cases consists of producing steel in an electric furnace although there are some instances where this practice is used in conjunction with small open-hearth furnaces.

While it is difficult to say where and when this type of pouring practice originated, it can be stated that the top pouring of small billet-size ingots was in active production back in 1920 at the Old Dominion Iron & Steel Co., Richmond, Va. Pouring operations at this plant consisted of casting small billet-size ingots by grouping the molds along either side of a running and filling the ingots in a horizontal position or at a slight angle from horizontal away from the runner. In 1924, Texas Steel Co., Fort Worth, Tex., produced billet-size ingots using the Webb process. Electric steelmaking practice was employed. About this time billet-size ingots were being top poured at the Manitoba Rolling Mills, Selkirk, Manitoba. The ingot size of 3 and 4 in. was used in conjunction with 25-ton open-hearth heats.





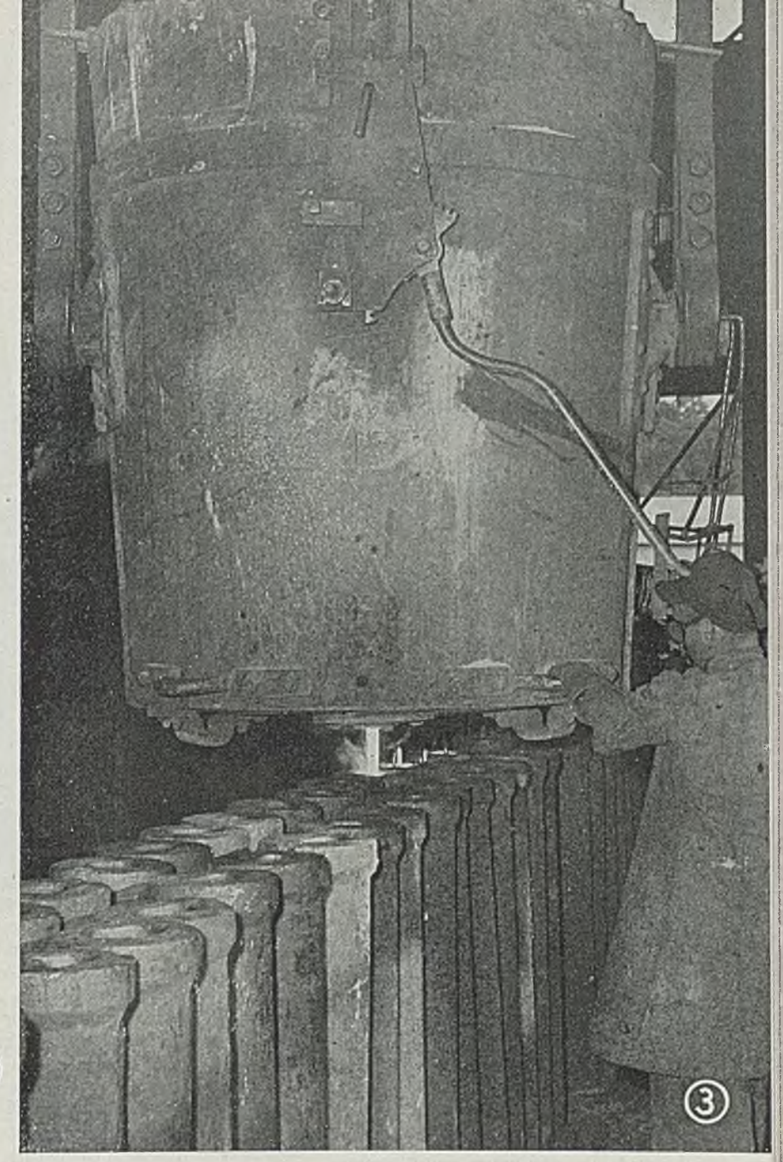


Fig. 1—Nine ingots being stripped from the molds simultaneously with gang hook

Fig. 2—Four sizes of ingots that are poured. Dimensions and weights for each are tabulated in Fig. 6

Fig. 3—Heat of electric steel being teemed into billet-size molds

A number of other plants were either using or introduced billet-size ingot molds during the years from 1925 to 1929. A partial list of such plants follows:

London Rolling Mills, London, Ont.
Phoenix Horseshoe Co., Cleves, O.
Northwest Rolling Mills, Seattle.
Collins Co., Collinsville, Conn.

Since then a number of other companies have adopted billet-size steel pouring practice, including:

Kilby Steel Co., Anniston, Ala.
Knoxville Iron Co., Knoxville, Tenn.
Joslyn Mfg. & Supply Co., Fort Wayne, Ind.
Pacific States Steel Corp., Niles, Calif.

Connors Steel Co., Birmingham, introduced billet-size ingot practice in 1939. Steel producing facilities at this plant consist of two Lectromelt furnaces, one type "PT" having a rated capacity of 3 tons per hour, and the other type "OPT" having a rated capacity of 4½ tons per hour. These furnaces are charged with 7 and 12-ton heats. Single and double-slag basic practice is employed. The particular ingot size used is determined by the type of

(*Please turn to Page* 104)

NEW Research Tools

. . . Sharpen Metallurgist's Perception

By JAMES C. HARTLEY
Director of Research
Heppenstall Co.
Pittsburgh

METALLURGICAL research in recent years has expanded its scope and concepts so greatly that the research metallurgist of a generation ago would hardly recognize his profession. New tools for the evaluation of problems in service stresses have contributed greatly to this development.

For as many years as metallurgy has been recognized as a science in its own right (and not an illegitimate offspring of chemistry or mechanical engineering) the research metallurgist has been hampered by a lack of correlation between the data as obtained by laboratory tests using the classical tools at his disposal and the actual service conditions encountered in the manufactured article. His scope was limited to the measurement of physical characteristics and their interpretation in terms of what he *believed* the service stresses to be. In short, the tools for measuring actual service stresses were not available.

For example, railroad rails failed in service in Canada, while giving excellent life in Texas; crankshafts which had been stress analyzed and provided with adequate safety factors failed in a few days under normal operating conditions —parts placed in a corrosive atmosphere failed under stresses which would have been insignificant in a noncorrosive medium. These and many other problems cried aloud for new tools to measure service conditions; for it is only through the medium of measurement that the scientist can define, classify or acquire knowledge. Try to describe anything without recourse to some form of measurement, length, width, bulk, height, speed, etc.!

The tools for measuring the ordinary physical properties of our materials have been fairly well developed for many years. We could measure resistance to compressive deformation under slow loading and we called this "property hardness." We could accurately measure resistance to slowly applied axial tensile or compressive loadings. In a very restricted way we could measure resistance to impact of a low order of velocities. Resistance to repeated stresses was measurable to a limited degree using specially polished specimens subjected to alternating tensile and compressive stresses.

New Tools for Stress Studies

However, rails continued to fail in Canada and Russia. Crankshafts still broke. Axles snapped off prematurely, and many other phenomena occurred which were not amenable to explanation in terms of the properties which we were able to measure.

Into this breach stepped the physicists with new tools which now permit the research metallurgist to more accurately evaluate service stress conditions. In most cases, it is merely necessary to recite the actual conditions which occur in service in order to provide a self-evident answer to the problem. In fact, when the conditions are fully understood, in many cases no problem exists.

It has been the dream of the metallurgist for many years to be able to explore the inside of a part without the necessity of destroying it. He believed that a number of the conditions which he found to exist in parts which were cross-sectioned and examined under the microscope were harmless to service life.

However, he had no way of proving this because it was necessary to destroy the part before he could establish the presence of the particular conditions; and should a part containing these fail in service, and their presence be detected upon subsequent examination, the alleged defect was immediately blamed for the service failure and the metallurgist was without defense. New tools now provide the information necessary to combat this condition and to actually know whether certain alleged defects are deleterious to service life or not. The x-ray permits him to explore the interior of a piece of metal and to disclose and locate any defects within the scope of his examination which are larger than 2 per cent of the section, an inspection which eliminates all parts having gross defects and permits the evaluation of minor defects by studying their behavior in service.

The supersonic reflectoscope, one of the newest tools, permits the metallurgist to explore a piece of any reasonable size and to detect and locate, accurately, elastic discontinuities so small that a low power microscope would be required to detect their presence in a polished and etched section.

This tool, which is entirely nondestructive, measures the reflection of a supersonic wave which has passed into the piece and which bounces back from any elastically discontinuous surface. The method is quick and reproducible and by proper interpretation of the patterns obtained on the oscilloscope, it is possible to state the type of defect which is present. This tool permits the metallurgist to place in service parts having

CLOSE TOLERANCES (±.0001") and the need for easy, low-cost machining called for Carpenter Stainless No. 5 bar stock on precision parts for the Norden bombsight

FREE-MACHINING Stainless Steels were invented by Carpenter. And easier machining reduces rejects, cuts costs on jobs like this finned spark plug.

FEWER REJECTS on your precision jobs like these torpedo mechanism parts will mean lower unit costs, as well as improved performance for your products.

Improve PRODUCT PERFORMANCE

Lower YOUR UNIT COSTS

where you use Stainless Steel!

Even Stainless Steels of the same analysis aren't all alike. And the differences become most apparent when you start fabricating them. Where one Stainless will be troublesome to machine, another will cut freely. The difference can be traced to the care and quality control that goes into the making of each Stainless Steel.

When Stainless is made under the rigidly controlled conditions of a tool steel mill only the finest quality can result. And that's just how Carpenter Stainless is made. When you add the advantages of Carpenter's pioneering research — Free-Machining Stainless Bars and ductile Stainless Strip —you have the most uniform, easy-working Stainless Steels available.

You can start now to reduce the cost of using Stainless . . . by specifying "Carpenter" on your orders for Free-Machining Stainless bar stock. Standard sizes are available for immediate delivery from warehouse stocks. And don't hesitate to call in your nearby Carpenter representative. He can give you useful hints to help get jobs done at less cost.

. . . ANOTHER REAL HELP FOR STAINLESS STEEL USERS !

A Handy Method for Identifying Stainless Steels

Even in the best regulated plants, steel stocks sometimes do get mixed. And you know the troubles a mix-up can cause in heat treating, machining, stamping, welding or other Stainless fabricating operations. To help you eliminate this problem, the Carpenter Laboratories have developed this chart which explains 8 different tests for identifying various types of Stainless. It shows when and how to use each test. To obtain a copy, simply send us a note on your company letterhead. Write today.

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defects of known type and size, accurately located in advance; and to study the effect of these defects on the service life of the material. The implications in metallurgical research are limitless.

Magnetic particle testing which has become an established inspection method in many industries has aided immeasurably in detecting surface and slightly sub-surface defects in finished parts.

Testing of parts under induced high frequency currents permits an evaluation as to the uniformity of a heat treatment by measuring the response of parts to induced high frequency currents.

One of the most valuable recent contributions to research, which as yet has been utilized in only a preliminary way, is the development of the electric strain gage in conjunction with the recording oscillograph. This permits the measurement of actual static and dynamic strains in a structure under service conditions. When one views the complicated pattern of dynamic stresses developed in a structure in service, it is easy to understand why our earlier concepts of static stress distribution have been inadequate.

A study of surface stresses under service conditions by means of high-speed photography, stroboscopic viewers, strain gages and other new tools have resulted in a simple treatment to reduce the high surface tension stresses encountered during operation which were the primary cause of many fatigue failures. A simple shot blasting (shot peening) or surface rolling to induce compressive stress in the metal at the fillets has resulted in greatly increased life of crankshafts to the point where the metallurgist's measurements of the strength of the material begin to have significance.

New tools of research are now permitting us to make tests at temperatures to which the parts will actually be subjected in service, thus assuring the employment of alloys which will provide the desired service life. Once it was possible to measure the impact strength of steels at low temperatures, the problem of rail breakage was well on the way to solution. Alloys were developed which did not have this inherent susceptibility to low temperature brittleness and another problem which puzzled metallurgists for many years was written off the books.

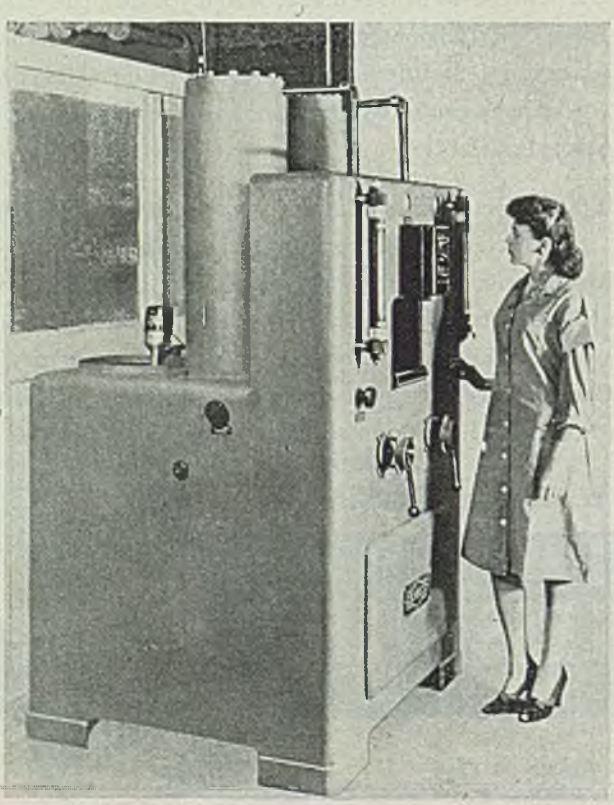
The life of cutting tools has in many cases been greatly extended by the utilization of low temperature treatments during the heat treating cycle. Treatment of cutting tools at temperatures of from minus 120 to minus 150° F has served to stabilize high-speed steels and to complete the transformation. While not designed to study service conditions, it provides a means of increasing service life because our studies of service conditions indicated that incomplete transformation was an important factor in decreasing service life of cutting tools.

Our ability to visualize the highly complex inter-relations in polynary alloys is being rapidly expanded by the use of x-ray diffraction analysis which permits conclusions on inter-relation of the various elements in the alloy. By means of x-ray diffraction it is possible to tell when an element leaves the solid solution phase and goes into chemical combination with other elements of the alloy or when allotropic modifications of the elements of an alloy take place.

The electron microscope, which has as yet found only limited application in metallurgical science has very significant implications in future developments, since we have so little knowledge of the effect of minute amounts of alloying agents. It is probable that through the medium of x-ray diffraction analysis and ultra microscopy we shall eventually be enabled to evaluate these effects.

However, not all metallurgical problems are now on the way to immediate solution. Our horizons have been vastly broadened by the new tools at our disposal and real progress in metallurgical reseach is being made. Nevertheless, many fundamental concepts are still quite hazy and our control of many factors leaves much to be desired.

WATER PURIFICATION SYSTEM

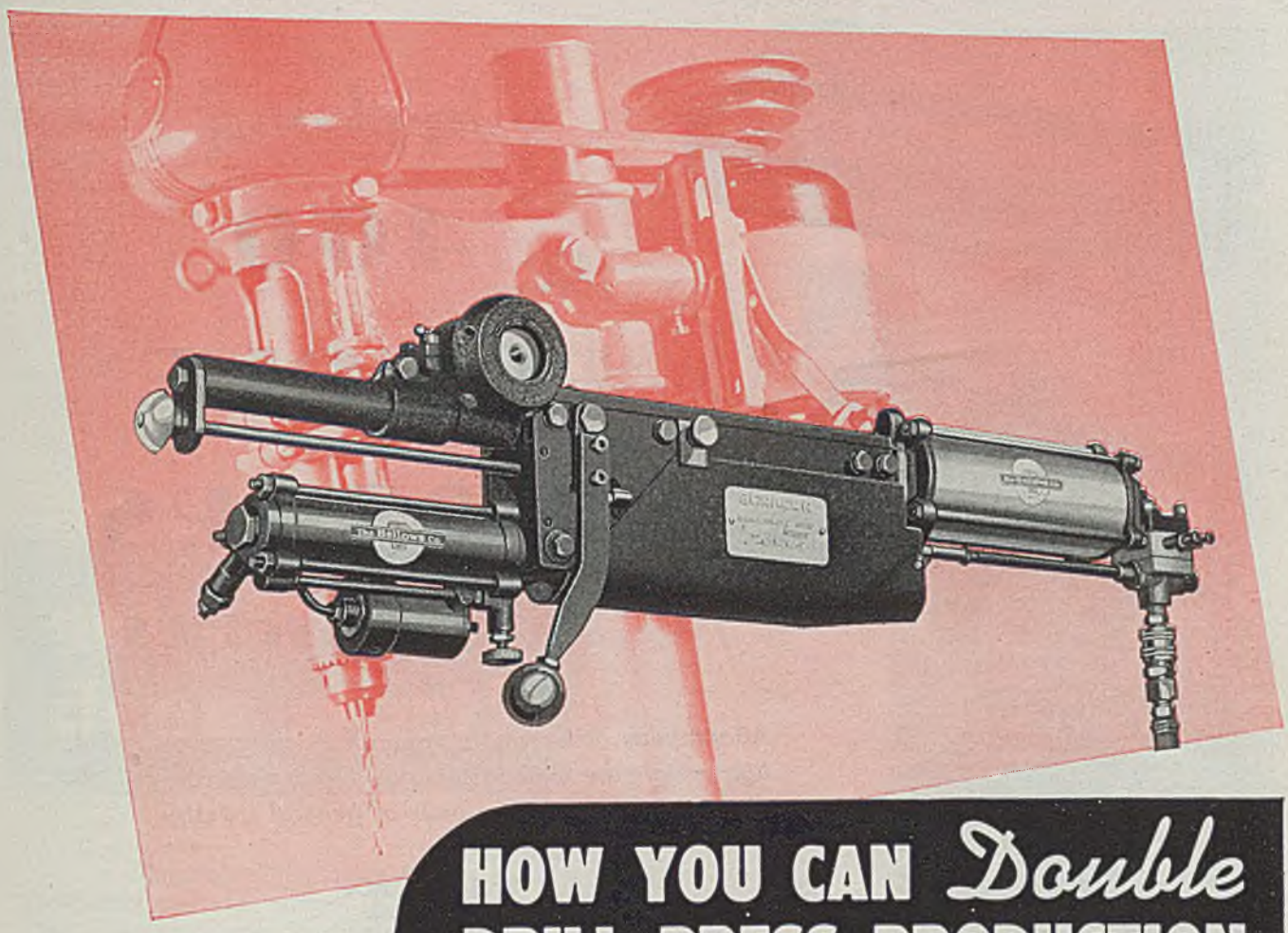


PRODUCES CHEMICALLY PURE WATER AND RECOVERS VALUABLE METALS

CHEMICALLY pure water, and recovery of valuable metals from waste water are some of the applications for the de-ionization system of Dorr Co., New York. Raw water passes over a bed of exchange material which removes calcium and magnesium salts, then an anion exchanger absorbs the acid resulting from the first step. Water meeting predetermined specifications can be thus produced.

The Dorrco D-I system shown is said to have demonstrated a consistent savings in water purification costs of between 90 and 98 per cent. Actual costs, under commercial operating conditions, are from 2 cents to 20 cents per 1000 gal—the costs varying with the mineral concentration of the raw water.

These units, built in sizes ranging from laboratory models to plant units capable of processing millions of gallons of water per day, are said to remove simple hardness from water, reduce bicarbonate alkalinity, reduce total solids and, permit long runs between regenerations. The exchange bed is regenerated with ordinary salt when it is used for the removal of calcium and magnesium.



HOW YOU CAN *Double* DRILL PRESS PRODUCTION *in less than 20 minutes!*

At no increase in wage cost—with fewer rejects—less worker fatigue

Suppose you could have one operator run two or more standard drill presses, as fast, or even faster than he could run one? with less actual physical effort? with better-maintained standards of quality? It would help to beat the squeeze between rising costs and fixed selling price, wouldn't it?

You can. It's being done. In less than twenty minutes you can take practically any standard hand-fed drill press and convert it into a high-production unit. Plant after plant where Bellows Controlled-Air Power Drill Press Feeds have replaced hand-feeding, report production increases ranging from 40% to 500%.

- *For example, a Columbus, Ohio, manufacturer reports one operator is running two drill presses, facing 60° "L's" in 10-20 steel and obtaining better than twice the production he formerly obtained by hand feeding, and with less work.*
- *A Holland, Michigan, firm tells how they converted an old two spindle tapper into a unit producing more than 2500 tapped die cast parts per hour.*
- *A Chicago parts manufacturer reports one operator running three spindles—the first two fed by Bellows Controlled-Air-Power Feeds, the third spindle fed by hand.*

The Bellows Controlled-Air Power Feed attaches to the star wheel shaft of the drill press. A touch on the operating handle advances the spindle any selected distance, at any desired pressure and feeding rate. When the operation is completed the spindle automatically returns to starting position. The easily accessible controls for stroke length, feeding pressure, and feeding rate (more sensitive, more accurate, than the "touch" of the most skilled operator) permit proper feeding of any tool in almost any material.

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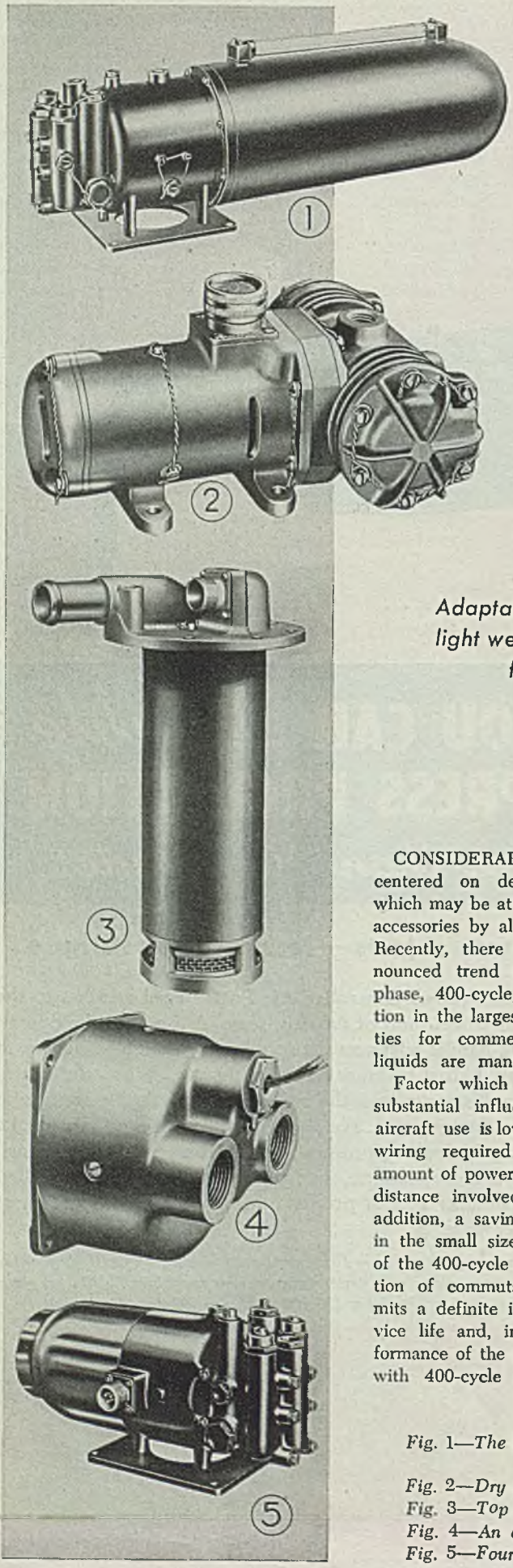

applying 400 CYCLE MOTORS to accessories

Adaptability, economy of operation, compactness, and light weight are some factors pointing to wider use of high frequency power units in general industry

By RAY G. HOLT
Sales Engineer
Pesco Products Co.
Cleveland

CONSIDERABLE attention has been centered on design and performance which may be attained in driving various accessories by alternating-current power. Recently, there has been a very pronounced trend toward the use of 3-phase, 400-cycle, 208 v power installation in the largest aircraft, and possibilities for commercial use in handling liquids are manifest.

Factor which apparently has had a substantial influence on this trend in aircraft use is low weight of the electrical wiring required to transmit a given amount of power over the relatively long distance involved on large aircraft. In addition, a saving in weight is effected in the small size and light construction of the 400-cycle electric motor. Elimination of commutators and brushes permits a definite improvement in the service life and, in aircraft, altitude performance of the motors is bettered. Also, with 400-cycle motor operated accessories, additional advantages are obtained.

Series type direct-current motors are commonly used where speed regulation is not of prime importance and where it is desired to reduce starting inrush current surges to a minimum. The compound wound electric motor is usually specified in applications where a rather flat speed regulation characteristic is required even at the expense of much higher starting current surges.

In selecting a direct current electric motor for a continuous duty accessory drive, it is necessary to use a motor frame size capable of developing the required torque at the desired operating speed. Also it must have necessary heat dissipation characteristics so as to dissipate the motor losses at a motor temperature which will not injure the electrical insulating materials.

For intermittently operated accessories, the heat dissipating characteristics

Fig. 1—The larger, 12 hp packages used for retraction of main landing gear on large bombers. Data also presented before SAE
Fig. 2—Dry air pump powered by 400 cycle, alternating current motor
Fig. 3—Top mounted booster pump for 400 cycle operation
Fig. 4—An alternating current fuel powered transfer pump
Fig. 5—Four hp, alternating current power package

get off to a clean start!

Metal specification is vital to quality and cost control in metal parts fabrication. The early choice of the right metal makes production run smooth from the start. If you are planning a new product, you'll find it worth your while to call in a CMP specialist. Here you will find the production "know-how" to recommend or develop the right specification for your cold rolled strip steel needs.

CMP pioneered in the precision production of flat rolled metals to great accuracy and has, by consistent research and development, achieved constant duplication of exacting physical specifications. Precision Thinsteel is temper-rolled to any desired degree of hardness. Extremely close tolerances guarantee more finished parts per ton . . . therefore, greater economy. Complete information on the advantages and uses of CMP Thinsteel is yours for the asking. Make it a point to get CMP service when you are considering your important 'first step."

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of the motor are of lesser importance and it is possible to operate a direct current electric motor frame at a very high torque for a short period of time. In general, the torque-speed characteristic of the 400-cycle alternating current motor more closely resembles that of the compound wound direct current motor than that of the series wound direct current motor since the alternating current induction motor is inherently a nearly constant speed device.

However, it is not possible to extend the intermittent torque rating of the alternating current induction type motor to the extent possible with the direct current motor since a peak or breakdown torque is reached which is the maximum torque which that motor frame will develop. It is necessary to select a frame size such that its normal rating will be considerably below the breakdown point and so that the locked-rotor torque will be sufficient to start the accessory and accelerate it to a speed close to the rated speed. Some difficulty was experienced in the first alternating current powered accessories in attaining sufficient starting torque, however, later developments have entirely solved this problem.

Perhaps the greatest single factor in delaying the adoption of alternating current power in aircraft has been the lack of suitable generator drives. If the generator is to be driven by the main aircraft engines, a variable ratio drive must be provided to maintain a fixed generator speed, regardless of engine speed variations. It is understood that at least one such drive will soon be available.

Use of auxiliary powered generator sets has received a considerable amount of attention. While the earlier types of auxiliary plants were heavy and rather unreliable, later developments will no doubt overcome many of the weaknesses of the early types of plants. There are also other developments about which little is known at present which may, in the not too distant future, provide suitable generator drives. As an example, an exhaust heat power plant has been built which generates steam at high temperature and pressure in an exhaust heat boiler. The steam is used in a small size, light weight steam turbine to drive the alternating current generator. Provision is made for burning fuel under the boiler during inoperative engine periods so that electrical power is available on the ground.

Fuel Pumps: Those who have had experience in the service difficulties with fuel booster pumps will confirm the statement that there is no such thing as a seal which will seal gasoline on a shaft rotating at high speed with no leakage. In the search for the perfect seal it was found that one of the most satisfactory answers to this problem was to eliminate the seal altogether and allow the motor to run in the gasoline.

Because of the proximity of the ball bearing used on the pump end of the motor armature, to the gasoline in the booster, difficulty was experienced with gasoline vapor or seal leakage washing the grease from the ball bearing, thus causing premature bearing failure. It was also very difficult to provide a grease for the ball bearings which would be sufficiently fluid at extremely low temperatures to provide cold starting properties yet which would lubricate at the high ambient temperatures encountered in continuous operation. Both of these problems were solved in the use of plain bearings instead of ball bearings for the motor. The fuel being pumped then becomes the bearing lubricant. Fig. 3 shows the external appearance of this pump.

Application of 400-cycle motor drives have also been made to vane type fuel transfer pumps. Due to the limited speeds allowable with vane type fuel pumps, it becomes necessary either to gear the motor to the pump or to use a direct drive multi-pole motor. The latter method has been used in preference to gearing as a result of troubles experienced in winterization, serviceability of present direct current gear head motors. This pump is shown in Fig. 4.

Air Pumps: The demand for 400-cycle electric motor driven air pumps has not been as great as for fuel and hydraulic pumps. Development work on this project has been limited to a small displacement, piston type, dry air pump, driven by a four pole motor through a planetary gear reduction of 6 to 1. This air pump, weighing 5 lb, is illustrated in Fig. 2. It has been used in a number of aircraft applications, such as ignition system pressurization, pressurization of fuel tanks, water tanks, and a number of other uses.

It will be noted that in all of the accessories described, the motor in its simplified form of stator and rotor becomes an integral part of the accessory, thereby simplifying the construction. The extremely small size of the motors and the absence of commutators contribute in making the accessory small, compact, and light in weight. In nearly all the designs, the rotating shaft seal has been eliminated, paralleling in this respect the design of domestic refrigerators. In other words, the accessories have become hermetically sealed units.

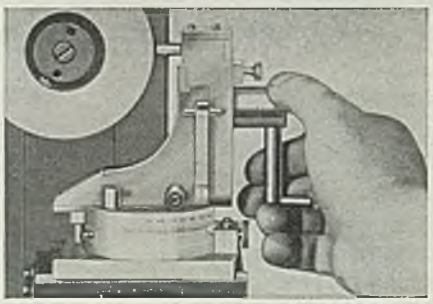
Hydraulic Pumps: Possibly the most outstanding contribution in the way of 400-cycle powered accessories has been in the development of the "power package." These units have been made specifically for use on one of the largest of the experimental bombers yet projected. The smaller of the units, shown in Fig. 5, is 4 hp and is used for retraction of the nose wheel; the larger 12 hp units, shown in Fig. 1 are used for the main gear retraction, one for each wheel. These packages are a complete hydraulic system in themselves.

Included in the package are fluid reservoir, electric motor, pressure loaded gear pump directly driven by the motor at a speed of about 11,000 rpm, two relief valves, and the necessary control valves. The cylinder may be operated in either direction merely by running the motor in the direction of rotation required for that direction of cylinder travel.

The pressure loaded gear pump has been successfully operated in the power packages at speeds up to 12,000 rpm. By operating the pump at such high speeds, it is possible to use the type of motor which is most efficient and lightest in weight. In addition to the larger power packages described, extremely small size packages have been built which use "flea-power" motors. A motor frame is available for use in power packages having an outside diameter of only slightly more than 1 in.

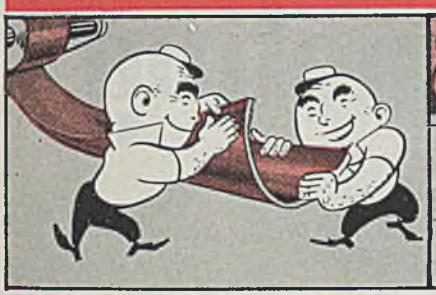
Form Dressing Tool

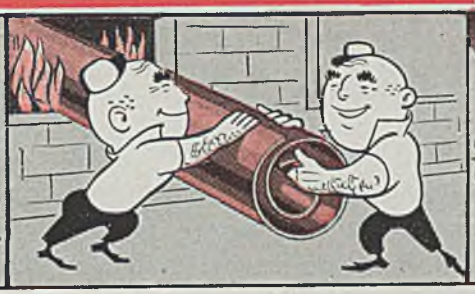
Form dressing the grinding wheels on cylindrical, internal and small bench surface grinders always has presented problems. The average dressing tool does not have sufficient clearance under the wheel for proper manipulation. The new tool illustrated, a product of J. & S. Tool Co., East Orange, N. J., is specially adapted for cylindrical grinders with spindle heights as low as 5-in. from base of table. It accommodates wheel dia-

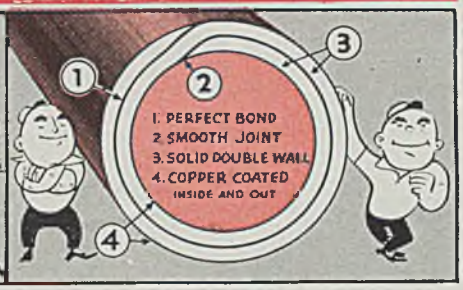


meters up to 7 in. and has radii range to 1½-in., but is only 5⅜-in. high, with a 5-in. diamond-point height and base of only $3\frac{3}{16}$ x 4 in. Form dressing tool has the desirable features of its larger counterparts, yet it will handle the variety of applications presented by small bench surface grinders.

FABRICATING A TYPICAL BUNDYWELD LIFE LINE



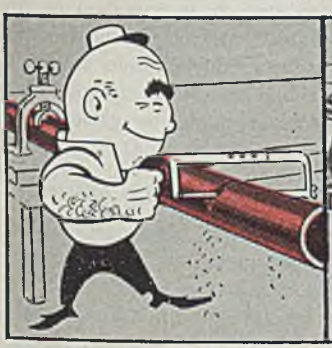


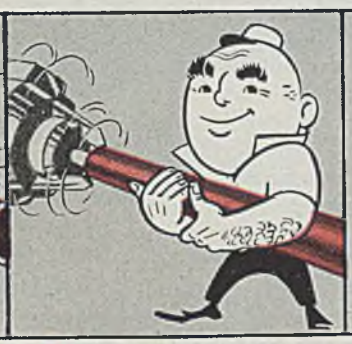


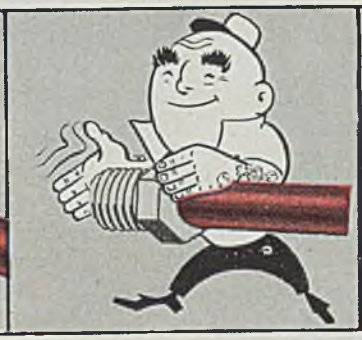
1 The Bundyweld Steel Tubing is made by a process entirely different from that used in the making of any other tubing. A single strip of copper-coated S.A.E. 1010 steel is continuously rolled twice around laterally into tubular form.

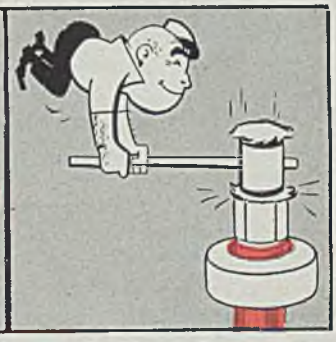
2 Walls of uniform thickness and concentricity are assured by the use of close tolerance cold rolled strip. This double rolled strip is next passed through a brazing furnace where the copper coating fuses and alloys with the double steel walls.

3 After brazing and cooling, the tubing has become a perfectly bonded SOLID double wall steel tube, completely copper brazed throughout 360° of wall contact, copper coated inside and out, free from scale and closely held to dimensions.







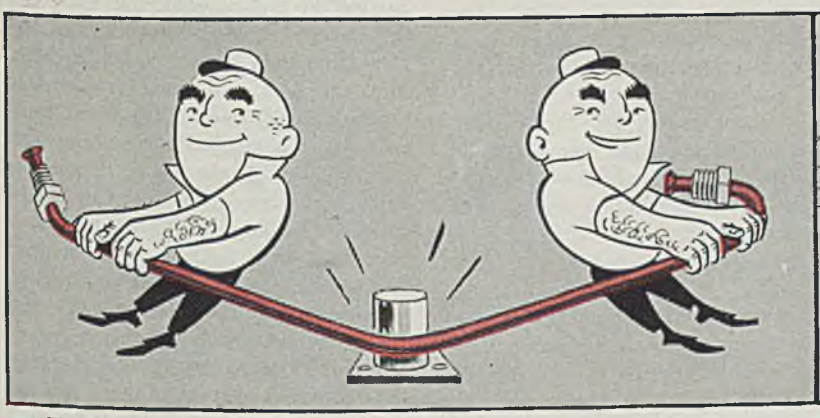


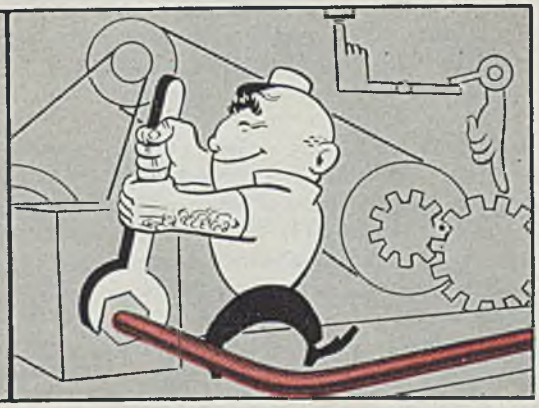
4 The next step in fabrication of a Bundyweld part is cutting to length, which is done at the Bundy plant on a circular saw, or, in the field, with any tube cutter which may be available.

5 The ends of the tube are burred with a specially designed tool with cutting edges of high speed steel which removes both inside and outside burrs in one operation.

6 Next, fittings are assembled. Any of the standard flare, compression type or soldered fittings may be used. Where flare type fittings are used, the Bundy Double Flare is recommended.

7 The Bundy Double Flare, which has been adopted as a standard by the S. A. E., safely permits frequent removal and replacement of fittings, as well as over-torqueing.





8 The last operation in fabrication is bending to shape. Last and most important . . .

9 The Bundyweld part is installed on *your* product.

Bundyweld Steel Tubing is furnished hard or annealed in standard diameters and gauges up to 5/8" O. D. Special sizes cold drawn as desired. Bundyweld is also furnished in Monel. For complete information, contact our nearest representative or write Bundy Tubing Co., Detroit 13.

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Recent advances in porcelain enameling

Improvements include zirconium and one-coat enamels for sheet steel; better protective and decorative coatings for cast iron and aluminum; and shorter processing time

PRODUCTION of porcelain enamel and porcelain enameled articles was greatly curtailed during the war years; frit manufacturers and enamel shops devoted much of their effort and manufacturing facilities to war goods seldom related to the processes of porcelain enameling. In spite of this, enameling did not entirely cease and the frit companies, especially, were able to devote considerable of their research energy and talents to the development of new enamels and enameling techniques.

Many enamel shops conducted enameling on a small scale. This has resulted in several important improvements in enamel industries and has pointed the way for other major improvements to follow in near future.

Sheet Steel Enamels

One of the recent contributions to the industry is the present commercial exploitation of ground coats which will mature at the same time and temperature cycles as that for the average sheet steel cover coat. This ground coat is particularly desirable for jobbing shops and those enameling shops which utilize continuous furnaces. It eliminates the necessity of banking the parts to be fired in the ground coat as these can be hung on the furnace chain or fired in a box furnace simultaneously with other parts being fired in cover coat. In addition to advantages gained in production by firing ground coat and cover coat at the same time, economies are realized because of low firing temperature required for this type of ground coat. Also there is a tendency toward less warpage which often permits making the product from lighter gage metal.

This ground coat has been accepted widely recently and is used for many types of products including flat ware, washing machine tubs, and specialty items.

Pressed steel sanitary ware was being produced prior to the cut backs for war production and it appears that future manufacture of such articles will be extensive. This type of enameled article needs special ground coats and cover coats because of long firing cycle required. Developments have continued during the past several years and it can now be stated that both ground coats and cover coats are available which are especially adaptable to this type of ware.

Most important sheet steel development during the past several years has been the general introduction of zirconium opacified sheet steel cover coat enamels. These have almost entirely replaced former nonacid resisting antimony bearing enamels. Advantages of zirconium over previously accepted super opaque antimony cover coat enamels are: Wider firing range, greater coverage, improved surface texture and gloss, less sagging tendency and generally thinner coatings for same degree of whiteness.

Standard acid resisting enamels which were manufactured prior to the war are still in use. An entirely new development is about ready for the market which is neither zirconium nor antimony bearing. It is based on the use of titanium both as a mill addition and in the formulation of frit.

One Coat Finishes

Another major development in sheet steel enameling has been the production of enamels which can be applied directly to the metal base as a finish coat. It is now possible to produce dark colors (blues, greens, grays and browns) in one coat directly on steel. These can be grained or stippled as desired. They develop excellent gloss and good surface characteristics as well as good bond. They are suitable for many architectural and corrosion resistant purposes, oven liners, and other applications where dark colors are suitable.

Considerable publicity has been given to the application of one-coat white finish directly to steel. It is important in this type of finish that pickling and cleaning operations be conducted under extremely well-controlled conditions in order that full advantages might be gained from both the special steels and the enamels.

By G. H. McINTYRE
Director of Research
Ferro Enamel Corp.
Cleveland

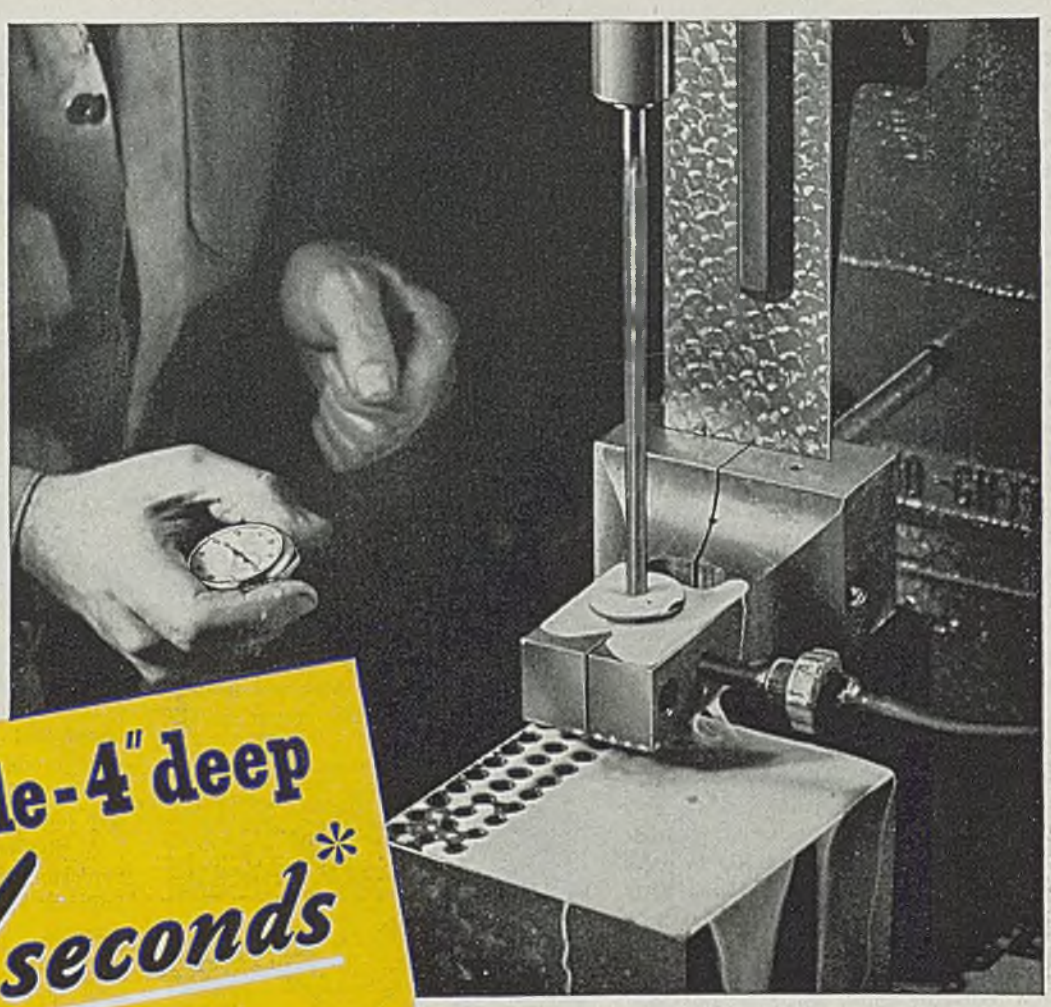
Cast Iron and Aluminum Enamels

Very little, if any, new developments have been completed on dry process and wet process cast iron enamels. There has been practically no cast iron enameling carried on in this country during the war period.

Enamels can be used for both protective and decorative coating on aluminum. Some interest has been expressed in the possibility of using aluminum (in combination with enamel) for signs, light weight molds, architectural purposes, and even for household appliances. Enamels have been developed which have good adherence on both cast and sheet aluminum. These are applied in one coat on the clean surface either by spraying or dipping, but spraying is the best method so far studied. The surface can be cleaned with organic solvents or lightly sand blasted. The firing temperature is in the neighborhood of 950° to 980° F and the time generally from 15 to 30 min. A long, low temperature firing cycle is required because of the low fusing point of aluminum.

New Products

During the war period it became increasingly difficult to secure galvanized and metal alloy hot water tanks. A large quantity of porcelain enameled hot water tanks were manufactured by several companies. At first, considerable difficulty was encountered in eliminating enamel defects which were sources of corrosion when tanks were placed in service. It is important to know that hot water under pressure is extremely corrosive, especially when it contains



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The present size range, 3/8" to 7/8", will be broadened in the coming months. In the meantime, for more details, write for the *"Jet"* bulletin.

**Laboratory test drilling, illustrated above*

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WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF TWIST DRILLS

small quantities of dissolved oxygen and carbon dioxide. It was necessary to work out special enamels both for ground coat and cover coat which would withstand these conditions. While it is true that an enamel suitable for this purpose is considerably acid resistant, it is distinctly not true that all acid-resistant enamels can be considered as water resistant.

It is imperative that the enamel on the inside of the tank be completely homogeneous and of uniform quality and thickness. Unlike galvanizing, porcelain enamel offers no protection to an exposed area from galvanic action. Hence, any exposed area of metal is subject to corrosion.

It is anticipated that considerable enamel will be consumed for the manufacture of hot water tanks in the postwar period as numerous companies have indicated their intention of producing this item.

Another new item which lends itself to porcelain enameling is electrical transformer cases, particularly, those that are normally installed on poles and are exposed to weather. The usual painted case must be painted frequently to prevent corrosion. It is reported that cost of painting these cases once closely approximates the cost for enameling in one coat. Attractive colors can be had with new one-coat finish enamels and the corrosion problem is reduced to a minimum. While not many of these have been enameled, prospects for the future look bright.

Practical for Buildings

Uses of porcelain enamel for general architectural purposes is practical and economical. A large postwar market for porcelain enamel in this field should result because of the low cost, bright colors and durable coatings that can be had.

During the war many items formerly made from heat resistant metal alloys have been fabricated in regular enameling stock or 1020 steel and coated with special enamels. Such items as airplane exhaust stacks, amphibious landing barge exhaust equipment, electric stove heating elements, and electric stove reflector pans have been finished in the special heat resisting coatings. Usual type of finish used on exhaust systems and for electric stove elements are of a matte surface while the reflector pans have been coated in the acid resistant ground coat.

Another growing use for special finishes is application of a highly heat resisting finish to pots used for melting and casting light metal alloys such as aluminum and magnesium. Not many of these pots have been manufactured commercially but foundries have expressed their interest in this application of enamel. The life of the pot has been increased by use of this coating from usual 4 or 5 days for uncoated to several weeks for coated pots.

At least one large producer of stoves has automatically sprayed both ground coat and cover coat on flat panels for several years. Other enameling plants are putting in new installations of this kind.

The ground coat can be applied more uniformly and thus in much thinner coats, resulting in less chippage, less enamel used, and generally higher quality finish. It is recommended that, where possible, this method of applying ground coat be seriously considered.

Many enamel shops also apply cover coat enamel with automatic spraying machines. By controlling the consistency of enamel carefully the same advantages are gained for the cover coat as described for ground coats.

Another method of automatic spraying that has received some attention is the Ransburg process of electrostatic spraying. The Ransburg Co. had originally devised a process whereby work is made to pass through a highly charged electrostatic field for the spraying of organic coatings. Work is made negative; spray is positively charged.

It is evident that for flat ware, the spray can be so adjusted that loss in enamel is reduced from usual 40-50 per cent to approximately 20 per cent. Enamel must be milled finer than usual and there is some tendency for exaggerated dusting and consequent dullness.

Specifications

Enameling industry has become more specification minded, possibly as a result of the war. All enamel frit producers and consumers have had to deal intimately with government and armed forces' specifications for the production of war material and thus, have realized advantages of clear cut specifications for production of products of uniformly high quality.

Industry's technicians are writing, and working out, specifications for higher quality and uniform enameled products. The holloware industry has established a co-operative laboratory at University of Illinois for preparation of specifications covering construction, enameling, thermal shock and impact resistance. Member companies may have their ware tested and receive a report comparing ware produced by them as against the industry. This certainly is a desirable step toward higher quality enamel ware.

A division has been formed in the Porcelain Enamel Institute to study and improve specifications for architectural enamels. Sign manufacturers are attempting to draw up specifications for their industry and, table top manufacturers already have specifications for enameled table tops.

A committee has been formed in the Porcelain Enamel Institute for preparation of workable standard tests and specifications for the enamel industry. It is hoped that this movement for improvement and standardization will be continued.

Testing Equipment

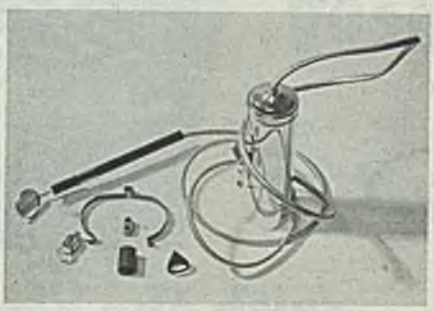
New equipment for testing qualities of procelain enamel include the photovolt reflectometer, the gouge and scratch test machine and abrasion tester, and the thermal shock and acid solubility test equipment of the Kitchenware Institute.

The photovolt reflectometer employs a scanning head with light source, filter and photo-sensitive cell. It indicates reflectance directly on a scale of a millivoltmeter calibrated in per cent reflectance. The instrument is set to read correctly on a panel of known reflectance. The instrument is portable and valuable for production control as any surface can be read without injury to the surface.

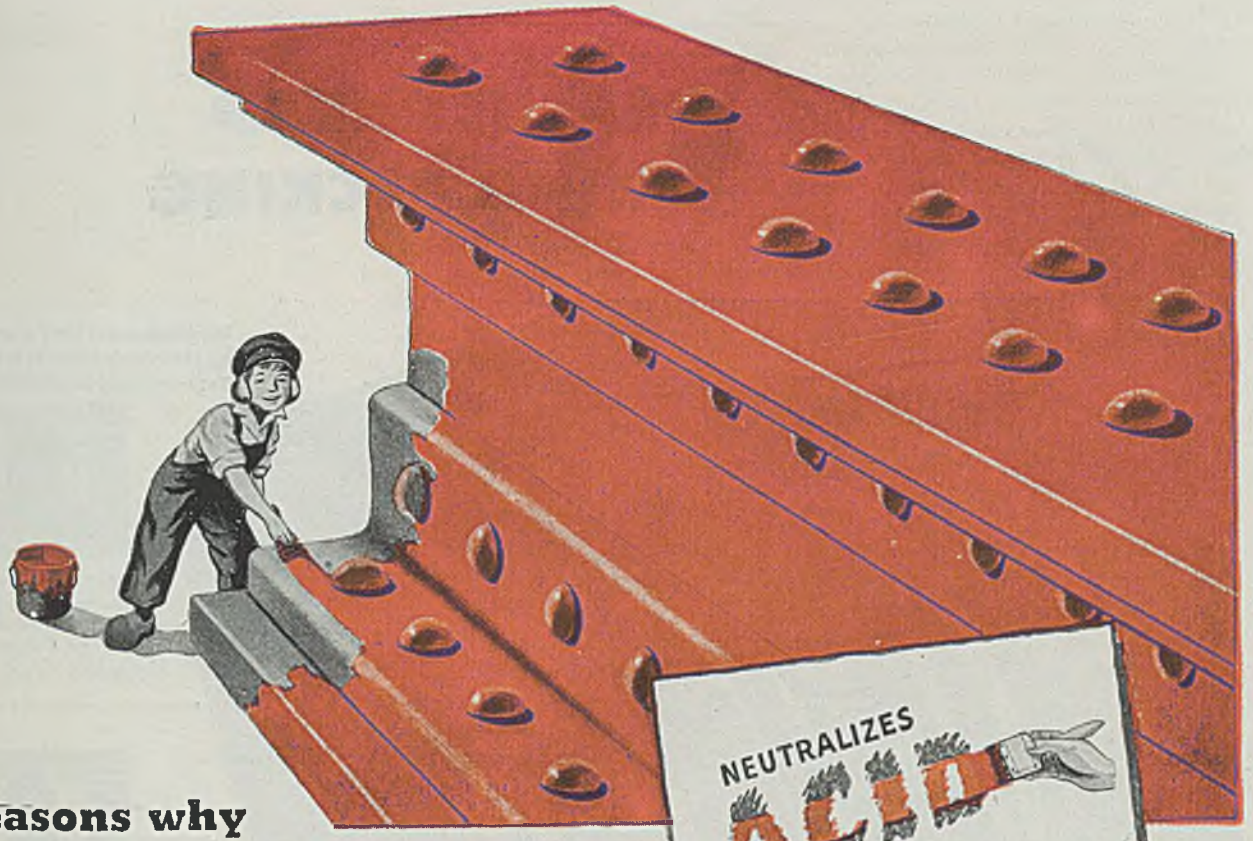
Gouge and surface abrasion equipment are mostly valuable as research instruments. Neither are practical for production control. The thermal shock and impact test machines are essentially research instruments.

Finger Light

A diminutive finger light—with cord, battery container where needed, belt clip and inspection mirror—is being introduced to aid mechanics and inspectors requiring illumination of inaccessible



work areas. Produced by Universal Products Corp., Norristown, Pa., the unit is intended to give brilliant but economical light when attached to finger-tip and pointed into enclosure to be examined. It operates on any 60 cycle 110-v ac circuit.



2 Reasons why

RED LEAD

means Extra Rust Protection . . .

Why is Red Lead so widely accepted throughout industry as *The* metal protective paint?

Why are paints containing Red Lead so generally specified for safeguarding metal surfaces from the costly ravages of rust?

The reasons are many, but none are more noteworthy than Red Lead's ability to counteract acid conditions and to halt electrochemical action—both prime causes of rusting—as explained at right.

Still another important advantage of Red Lead is that it partially combines with the usual vehicles to form compounds generally known as "lead soaps." Due to their composition and the individual way in which these compounds form, the film obtained is highly water-resistant. In addition, lead soaps contribute to the formation of tough, elastic films that "stick on the job."

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify Red Lead for ALL Metal Paints

The value of Red Lead as a rust preventive is most fully realized in a metal paint where it is the only pigment used. However its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better metal paint if it contains Red Lead.

NEUTRALIZES ACID

1 Red Lead has the ability to counteract acid conditions which are recognized as accelerators of rust. Structural steel is exposed to such environments because acid forming compounds are carried by the atmosphere in the form of gas, smoke and moisture. Red Lead has a neutralizing effect on these conditions as it is essentially a *basic* pigment with the ability to develop and maintain, for a prolonged time, a mild alkaline environment at the surface of the metal. Authoritative tests show that, as a result, Red Lead inhibits the process of corrosion. In short, metal paints, too, should "stay on the alkaline side."

2 Another outstanding reason Red Lead means *extra* rust protection is the unique way it shields metal surfaces with a protective film. Rusting is fundamentally an electrochemical process in which weak currents are generated which cause iron to become soluble in the lowest state of oxidation. Red Lead has properties through which this iron is rapidly converted to a stable compound that forms an adherent film. The formation of this protective shield halts electrochemical action, thus preventing further corrosion.

Write for New Booklet

"*Red Lead in Corrosion Resistant Paints*" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior metal protection. It also includes typical specification formulas. If you haven't received your copy, address nearest branch listed below.

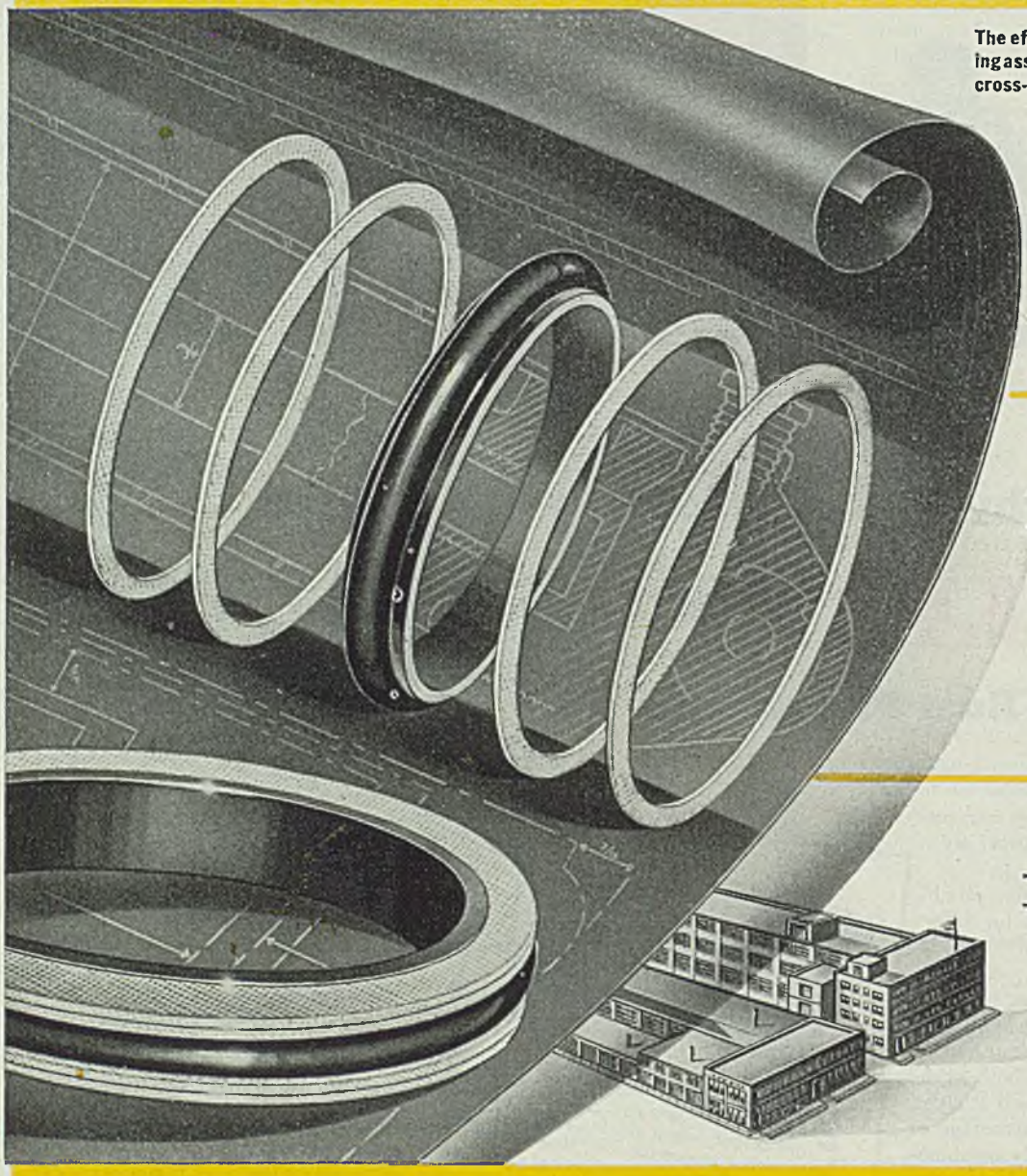
* * *

The benefit of our extensive experience with metal paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 10, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna.); Philadelphia 7 (John T. Lewis & Bros. Co.)

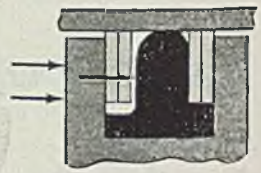
DUTCH BOY RED LEAD

Improved WEATHERHEAD T-RING PACKING

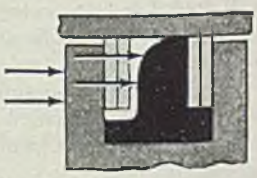


The efficiency of the T-ring Packing assembly is shown by the three cross-sectional panels below.

❶ Packing before pressure is applied. Note clearance between the flanges and the guard rings.



❷ Packing upon immediate application of pressure which swells the flange under the farther guard ring and against cylinder wall.



❸ Full application of pressure. Guard rings are held tightly against cylinder wall — no binding or jamming.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND 8, OHIO
Plants: Cleveland, Columbia City, Ind., Warsaw, Ind., Los Angeles
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The problem of properly sealing fluids in many types of machines is an important one. The new, improved Weatherhead T-ring Packing, recently patented, meets the requirements for both standard and special applications. This seal is available in two types and in sizes varying from ½ inch to 4 inch O. D. For information or literature, write or phone any Weatherhead branch office.

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

New Engine

(*Concluded from Page 87*)

28 hp continuously at 5000 rpm to comply with the rigid specifications. The short stroke was selected to keep the piston speed reasonably low for this high speed operation, and also because it was the intention to use this engine in the postwar Crosley car.

A bevel gear drive was preferred to a chain drive for the overhead camshaft, because the vertical shaft could be used to carry the lubricating oil under pressure to the five camshaft bearings. The oil pump and distributor are driven by helical spur gears from the crankshaft. The oil pump, as well as the fan, generator, and water pump, is driven at three-fourths speed for the car engine.

A cylinder spacing of 3 in. was selected, with a crankshaft bearing between each cylinder. The 5-bearing main crankshaft is a high-strength iron casting with induction hardened bearings. This shaft is designed about 1 in. shorter than a conventional 3-bearing shaft which requires a larger center bearing and an increased shaft length. The crankshaft is in dynamic balance within ¼-in. ounce, and the vibratory stresses do not exceed 4000 psi. One cast shaft underwent a 12,000,000 cycle torsional deflection test, which stressed the shaft to 6000 psi without failure.

The outstanding feature of this engine is the construction of the cylinder block (Fig. 4) which is made up of light-walled alloy steel tubing for the cylinders and cam follower guides, and of sheet steel stamping for the cylinder heads, intake and exhaust ports, valve cases, and water jackets. These stampings number about 120 pieces for one 4-cylinder block.

The parts are held in place by shrink fits, spot weld or crimping operations and form a firm structure even before brazing. The assembly is copper brazed in a specially constructed furnace at 2060° F in a neutral atmosphere, after copper in sheet, strip, wire, or paste form has been applied to the joints.

The furnace, which is 60 ft long, consists of a pre-heat chamber, where the cylinder block is gradually brought up to the brazing temperature; the brazing chamber, where the temperature is maximum; and the cooling chamber.

Gas Quench Controls Hardness: At a certain point in the cooling chamber, where the block has been cooled from 2060 to about 1500° F, a cool neutral atmosphere is introduced into the furnace and allowed to circulate around the brazed assembly, quickly cooling it to about 1100° F. The speed of this gas quench determines the hardness of the cylinder walls, cam follower guides, and intake and exhaust valve seat inserts, which are made from an alloy steel. The cylinder barrels harden to about 280 brinell and the valve seat inserts, which are made from a high carbon tungsten vanadium alloy, harden to about 450 brinell. The warpage is held to about 1/64 in. in 16 in. by properly designing the stampings as to the height of extrusions, control of press fits, and rate of preheat and cooling in brazing furnace.

The fabricated cylinder block, as illustrated on Fig. 1, weighs 14.8 lb before machining, which consists of a light cut-off on the bottom cylinder plate and the top camshaft bearing, and of boring and honing the cylinder walls and cam follower guides. Only ½ lb of metal is removed during this machining.

The inside of the water jacket is covered with a clear, hard coat of plastic which, after baking, becomes so durable that it cannot be removed in a stripping tank of a strong caustic or acid solution. The material of the jacket is 20 gage, SAE 1010 sheet steel and the sides are ribbed in such a manner that nothing detrimental occurs to the block *if the water in it is frozen solid.* This test was made in a cold room at zero F, along with a hand cranking check which proved that the aluminum crankcase does not shrink enough to cause a noticeable drag on the bearings.

Crankcase Only 3-In. High

The crankcase is only 3 in. high, weighs 7¾ lb and is a permanent mold aluminum alloy casting. The hold-down bolts for the cylinder block extend through the case to the main bearing caps. The crankshaft thrust is taken at the rear main bearing, which is the only flanged bearing. All connecting rod and shaft bearings are of the precision replaceable type and no machining is required in assembly.

The overhead camshaft is drilled the full length for the pressure lubrication of the five aluminum camshaft bearings. The cams actuate hardened and ground valve lifters, which are guided in alloy steel bushings in the cylinder block. The intake and exhaust valve heads are made from 21-12 chrome-nickel steel and the stems are made from SAE 3140 steel with flame hardened tips.

The pistons are cast from a heat treated aluminum alloy, the skirts are cam ground and oxidized after final machining. The piston pins are of the floating type with aluminum plugs in each end.

In addition to the stamped cylinder block, the crankshaft pulley, fan assembly and fan pulley, and the water pump impeller and pulley are made from copper-hydrogen-brazed stampings.

The cooling system holds 5 qt of water and the lubricating system holds 4 qt of oil, including the oil filter.

Performance of Engine: Fig. 4 shows the power curve of this engine with a compression ratio of 9 to 1, tested with 100 octane fuel at 5600 rpm. The maximum horsepower output is 36 and the specific power output is 0.8-horsepower per cubic inch displacement. This engine weighs, bare, 58 lb; with flywheel and front and rear bell housing, 79 lb; and complete with all accessories, including generator and starter, 138 lb as illustrated in Fig. 6.

For the 1946 car engine, the compression ratio has been lowered to 7.5 to 1 and the carburetor venturi size has been decreased from ¾ to 11/16, reducing the power output from 35 to 26 hp at 5200 rpm, as shown on the power curve on Fig. 4.

Standard high test gasoline, 80 octane, does not produce a fuel knock at any speed. For the 1946 car engine, the mileage per gallon of gasoline in a 1200 lb test car, with a 250 lb payload, is 50 miles at a speed of 30 mph, decreasing to 35 miles at a speed of 55 mph. At maximum torque, the specific fuel consumption is 0.48 pounds per horsepower hour.

The reason for the high economy is, of course, the high compression pressure. The lack of detonation is due to the cool combustion chamber where pre-ignition is prevented during the compression. The maximum wall thickness at any point separating the combustion chamber from the cooling water is 0.125-in. Because of the uniform substantially thin walls of the fabricated steel construction (see Fig. 1), including the portion between the valve seat inserts, and because of the generous contact between these walls and the cooling medium, a much more even heat distribution is obtained. This prevents the accumulation of heat in certain areas, avoids hot spots, eliminates pre-ignition and permits compression ratios of 9 to 1 to be successfully achieved.

The prewar Crosley car engine had a displacement of 35.3 cu in. and weighed 188 lb, complete. The power output was 12½ hp, as compared to 26 hp for the new engine. The prewar Crosley car weighed 1050 lb, and although the new car is 28 in. longer and 2 in. wider, it will weigh no more. This is made possible partly by the use of much lighter power plant.

The gasoline economy of the new Crosley car is even better than the 1940 car. The maximum speed of the new car is 65 mph.

—o—

Analyzer and recorder that automatically and uninterruptedly controls and graphically indicates the combustible content of a gaseous mixture is offered by Bailey Meter Co., Cleveland.

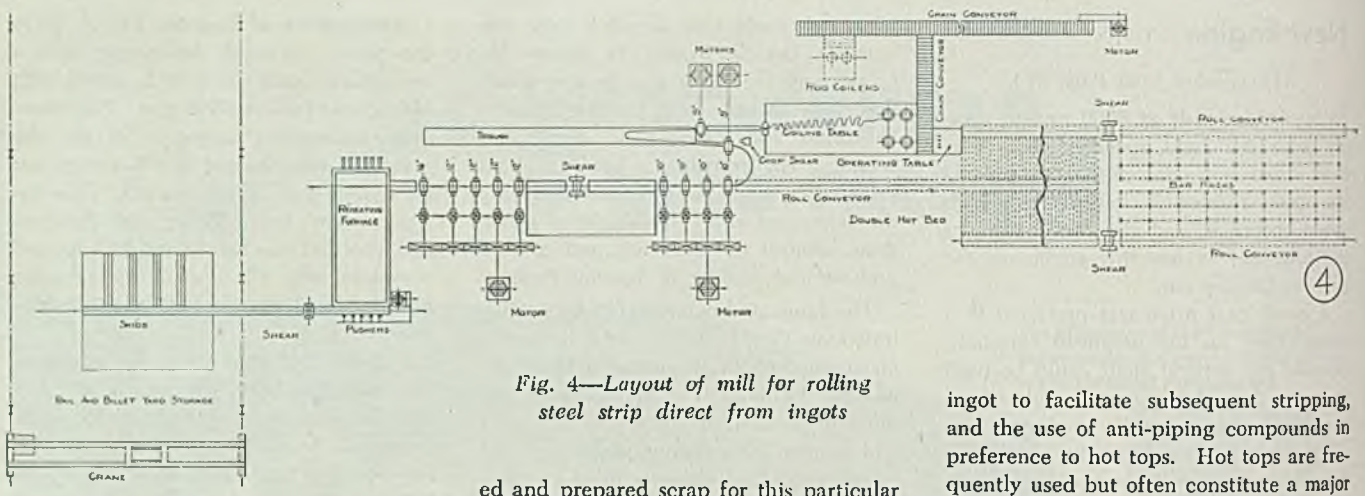


Fig. 4—Layout of mill for rolling steel strip direct from ingots

Billet-Size Ingots

(*Continued from Page* 89)

finished product. Maximum size of the ingot is controlled by the size and capacity of the mill upon which it is to be rolled. Other factors determining ingot size are related to the composition of the heat, deoxidation practice employed with respect to type of steel being produced, namely killed or semikilled, and quality requirements with respect to ingot soundness.

Electric furnaces are top charged with scrap so selected as to control the composition at meltdown with respect not only to carbon and manganese but also with respect to phosphorus, sulphur, silicon, and the commonly met residual metals. Orange peel type charging buckets are loaded by magnets and the first charge is made up by placing several loads of heavy metal in contact with the furnace bottom. This tends to prevent excessive arc play on the bottom. The balance of the charge is made up in the conventional manner.

The charge is melted down rapidly at the beginning, thereby decreasing melting time and melting losses. When the electrodes have bored through the scrap, the electrodes are raised, the roof is lifted and prepared scrap for this particular use is charged into the holes left by the electrodes. The roof is then swung into place and melting proceeds.

After most of the scrap has been melted, that remaining on the banks of the furnace is worked into the bath. Upon meltdown it is desired that a sufficient differential in carbon exist to allow for sufficient oxidation to insure an active bath. This insures a more uniform temperature as well as a cleaner bath. It is felt that such practice results in better quality steel. Slag is worked to the right chemical and physical consistency during which time numerous checks on the composition of the bath are being made. Carbon checks are made by the use of a Fisher scientific carbon analyzer. Deoxidation practice is accomplished in the conventional manner and is dependent upon the grade and type of steel being produced. Temperature is also important where large numbers of small ingot molds are being poured and is therefore carefully controlled.

Practices Vary Slightly

Pouring of billet-size ingot molds is performed in the usual manner with some slight deviations from large ingot practice, such variations being the elimination of pouring platforms, the insertion of hooks or pins into the top of the ingot to facilitate subsequent stripping, and the use of anti-piping compounds in preference to hot tops. Hot tops are frequently used but often constitute a major pit problem due to the large number of ingot molds which must be prepared. With regard to mold coatings, conventional practices are employed which are determined largely by surface requirements of the rolled product. It is customary to insert the stripping hooks somewhat off center to preclude excessive cooling of the central portion of the ingot in which case the primary pipe cavity is slightly greater.

Particular care must be taken in setting the nozzle and stopper in the ladle to insure a cleaner shutoff and avoid a leaky or spraying nozzle. This is important due to the small size of the mold. Prior to tapping the heat, the ladles are thoroughly cleaned and preheated with ample time allowed to insure a hot ladle. This is highly important due to the large number of molds that are to be poured since it is not uncommon to pour as many as 185 ingots from one heat.

Many different ingot designs and sizes have been tried experimentally. As a result of such tests, it has been found that a mold of modified octagon design with ingot sizes ranging from 3⅞ to 5 1/16-in. at the large or top diameter produced an ingot with less tendency toward tearing and cracking during the rolling operation. Billet-size ingots are always poured big end up, which tends to re-

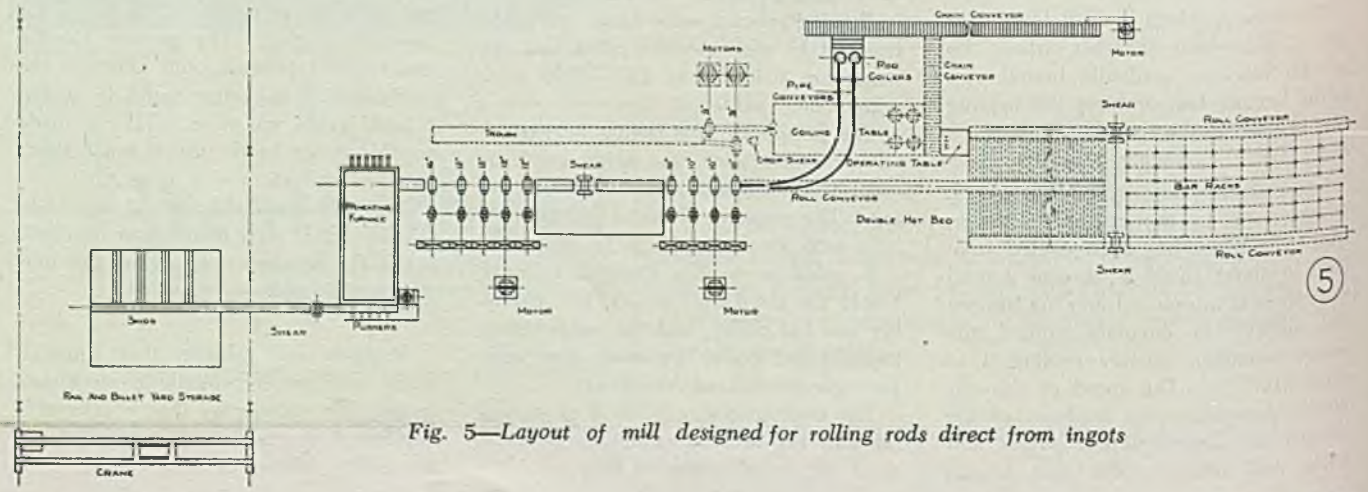
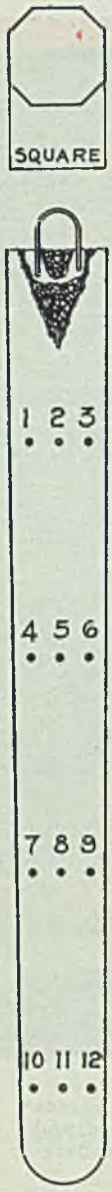


Fig. 5—Layout of mill designed for rolling rods direct from ingots



ANALYSIS OF SPLIT INGOT

SAMPLES TAKEN AS SHOWN ON INGOT SECTION

NUMBER	C.	MN.	PHOS.	S.
1	.20	.52	.018	.037
2	.23	.56	.023	.042
3	.19	.54	.019	.037
4	.19	.54	.018	.037
5	.19	.56	.016	.035
6	.19	.54	.018	.037
7	.19	.54	.017	.037
8	.21	.54	.021	.037
9	.19	.54	.021	.037
10	.19	.54	.019	.037
11	.19	.52	.019	.037
12	.19	.54	.021	.037

LADLE ANALYSIS

C.	MN.	PHOS.	S.
.21	.52	.018	.037

INGOT SIZES

NUMBER	WEIGHT	LENGTH	TOP	BOTTOM
1	120#	44"	$3\frac{7}{8}$" X $3\frac{7}{8}$"	$3\frac{1}{4}$" X $3\frac{1}{4}$"
2	220#	48"	$5\frac{1}{16}$" X $5\frac{1}{16}$"	$4\frac{1}{16}$" X $4\frac{1}{16}$"
3	280#	60"	$5\frac{1}{16}$" X $5\frac{1}{16}$"	$4\frac{1}{16}$" X $4\frac{1}{16}$"
4	180#	36"	5" X 5"	4" X 4"

⑥

Fig. 6—Sketch of No. 1 ingot showing analyses and locations from which samples were taken

duce the primary and secondary pipe.

In order to avoid excessive wear of refractories the metal is poured as rapidly as possible consistent with good teeming practice. It has been customary to use a 1-in. nozzle. Fig. 3 illustrates the teeming operation. Each heat of steel leaves the electric furnace building for the raw material yard, stacked on individual racks, and properly identified and recorded.

Hooks Facilitate Stripping

The ingots are stripped from the ingot molds by inserting hooks under the pins which were inserted in the molds during the teeming operation. The ingots are stripped by the use of gang hooks, Fig. 1, which also illustrates the general arrangement of ingot molds in the pit.

Ingots are heated for direct rolling to the finished product in a gas-fired continuous reheating furnace. The soaked, billet-size ingots are rolled to the finished product on a 9-stand continuous mill having two auxiliary looping stands. These auxiliary stands are used when rolling strip. Fig. 4 illustrates the mill equipment used in direct rolling strip from billet-size ingots. Ordinarily, the ingot is reduced in the first four passes in the roughing stands: the top end is then cropped and the bar is conveyed back to the number one stand, re-entered and given four additional passes before it is conveyed to the next four stands. Fig. 5 shows a schematic layout of the mill for rolling rods direct from the ingot. This mill is also used for slitting and re-rolling rails.

Four ingot sizes are employed in this plant. Fig. 6 indicates the dimensions and gross ingot weights; Fig. 2 illustrates typical ingot sizes. In addition to the ingot sizes listed, special ingot molds may be employed for special production requirements.

It is universally recognized that segregation effects are minimized by the use of small ingots since the solidification of such ingots is fairly rapid. Ingot segregation, while influenced by many factors, is mainly affected by ingot weight. Tendency to segregate varies with the different commonly determined constituents: The segregating tendency of the various elements ranging from minimum to maximum effect being manganese, silicon, phosphorus, carbon, and sulphur. Chemical analyses obtained from drillings at various locations of split ingots readily substantiate this conclusion on segregation.

Analyses of drillings from various locations of a typical ingot are shown in Fig. 6. Macroetch tests reveal metallurgically sound ingot structure for billet-size ingots. Macroetch test specimen of a typical ingot is illustrated in Fig. 7, which reveals a lack of segregation pattern. Positive segregation normally occurs to a slightly greater extent in semikilled ingots than in killed ingots, however, the rapid solidification of billet-size ingots tends to eliminate this distinction.

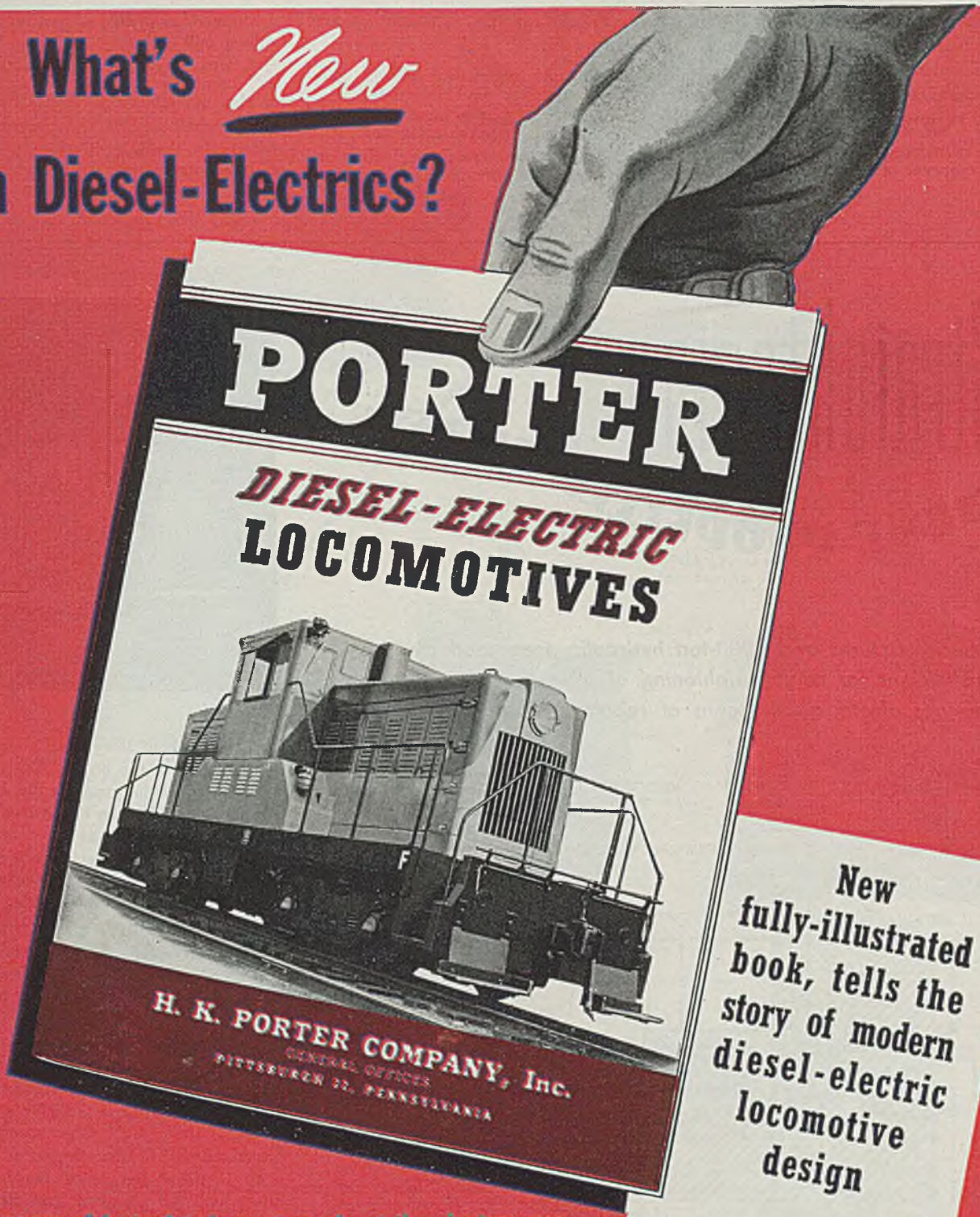
Correct Ingot Size Essential

In the production of killed steel it is essential that the correct ingot size be selected in order to preclude excessive secondary pipe. For this reason special ingot molds must be designed where shell steel or steel of similar quality is being produced. Thousands of tons of shell steel have been successfully produced using small ingot practice in a number of plants, all successfully meeting the rigid inspection requirements of the ordnance department. In the latter instance, ingot molds range from 8 to 14 in. diameter. Hot top practice has been found beneficial with the larger size ingots.

In the production of semikilled steel, ingot molds may be poured to somewhat greater heights without sacrificing product quality. This is substantiated by the fact that large quantities of small hot-

Fig. 7—Macroetch test specimen of typical ingot

What's *New* in Diesel-Electrics?



New fully-illustrated book, tells the story of modern diesel-electric locomotive design

44 pages of factual information about the design, construction, and operation of Porter "Custom-Built" Diesel Electric Locomotives. The book gives detailed descriptions of many design features, and specifications of these highly efficient switching units in sizes from 30 to 100 tons. It's yours for the asking. A note on your letterhead will bring you a copy.

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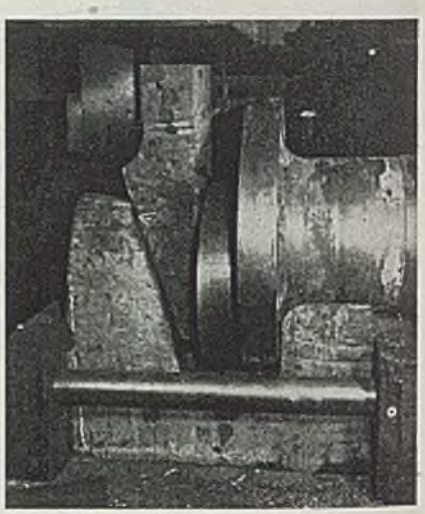
rolled sections were successfully applied to the war effort. In any case, the degree of hot working in the reduction of billet-size ingots has been more than ample to insure satisfactory hot-rolled structures.

The process of making billet-size ingots possesses certain inherent advantages:

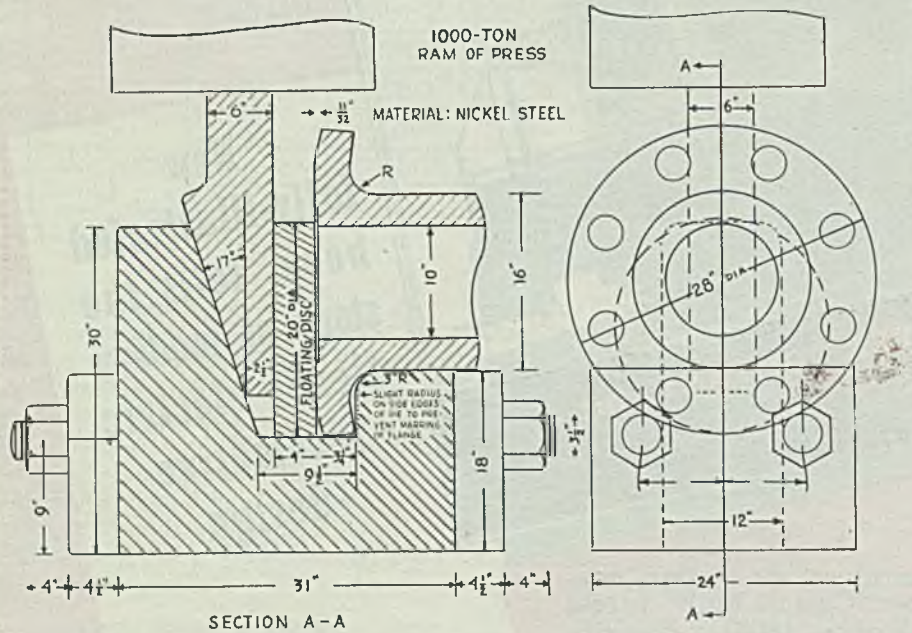
1. Minimum segregation effects with resulting uniform ingot structure.
2. Direct rolling from ingot to finished product, eliminating reheating costs.
3. Adaptability in producing billets or small ingots for direct rolling in shapes of limited size with respect to size of rolling mill.
4. Use of electric furnace practice with its potentially high quality possibilities.

This and other mills employing billet-size of small size ingot practice did contribute to the war effort in producing finished and semifinished products.

Straightening BENT PROPELLER SHAFTS



Special fixtures and 1000-ton hydraulic press used by Navy technicians for cold straightening of propeller shaft coupling flanges afford quick means of repairing damaged warships



WHEN a battle-damaged United States man-of-war put into Pearl Harbor for repairs, it was found that the coupling flanges on five main propeller shaft sections had been badly bent. In normal times, new shafts would have been ordered from the mainland, possibly entailing a wait of as long as 2 months before delivery was made. As the ship was badly needed at her battle station, Navy technicians improvised a quick repair method which utilized a 1000-ton hydraulic press equipped with special fixtures for cold straightening of the flanges. This has worked so successfully that it probably will become Navy procedure in the future.

Fixtures comprise an upsetting die, a floating disk and a wedge. Sections, suspended from a sling so that they can be rotated, are lowered into one end of the die which is properly shaped to hold the flange end without danger of marring its surfaces. A floating disk is placed against the bent flange. The wedge is placed between the floating disk and the sloping end of the upsetting die. Flanges are straightened when the hydraulic ram presses on the wedge, as shown in photo. A solution of oil and graphite is applied between the wedge and the sloping face of the die to prevent sticking along their surfaces.

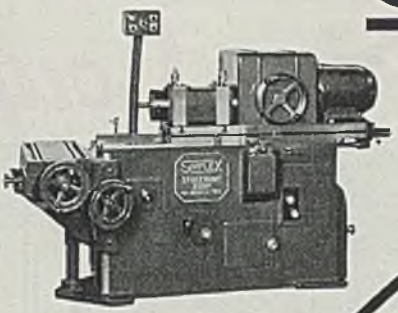
When received, flanges were about 11/32-in. out of line, as indicated at in sketch A-A at left. According to Master Mechanic C. A. Cavanagh, production officer in the forge shop, maximum variation after straightening is 0.010-in. This is said to be almost perfect, as outer thickness of the flange is slightly reduced due to stretching. The operation is expedited by heating flanges to about 250° F, below the critical range of the steel, with hot pieces of steel placed in the shaft bore and coupling-bolt holes. The shaft is rotated 45° and heating repeated around all of the circumference until the flange returns to its original shape. About 1 hr is required to straighten each flange by this method. Subsequent examinations of the etched surfaces reveal that no surface defects result from the operation.

—o—

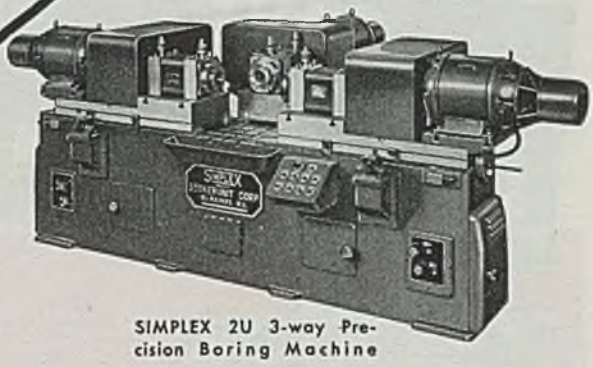
Extension division of the University of Wisconsin announces a new course on "Stress Analysis of Rigid Building Frames, Slope Deflection Method" for engineers and designers. It is part of the correspondence-study program.

SIMPLEX

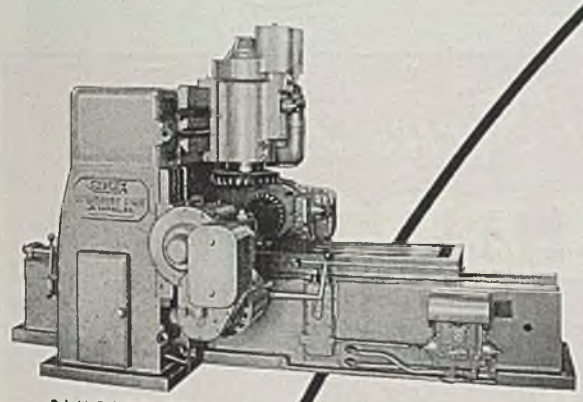
SIMPLEX 1LD1 Precision Boring Machine



SIMPLEX 3U Knee Type Precision Boring Machine

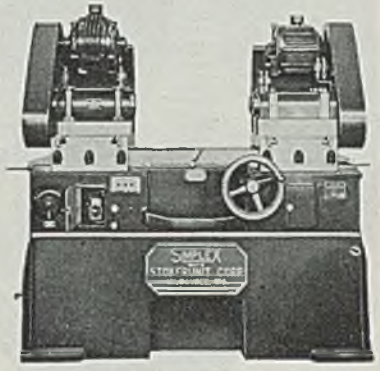


SIMPLEX 2U 3-way Precision Boring Machine



SIMPLEX Planer Type Milling Machine

SIMPLEX 1L1 Precision Boring Machine



SIMPLEX 200 Series Precision Boring Machine

Present day manufacturing methods demand PRECISION TOLERANCES, combined with HIGH PRODUCTION possibilities for machine tools. SIMPLEX design meets these requirements in every respect.

Whether your problem is a single, close tolerance boring job — a multiplicity of operations involving rough and precision boring — or a heavy milling job — there is a SIMPLEX machine to fill your needs. A wide range of types and sizes of precision boring machines and planer type milling machines are available for this purpose.

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SIMPLEX Machine Tools Division

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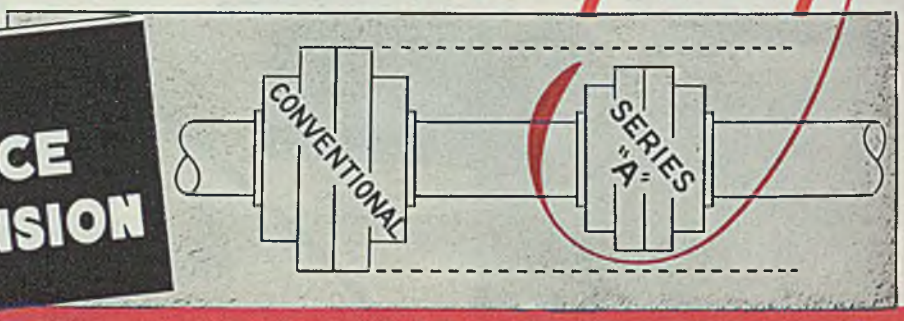

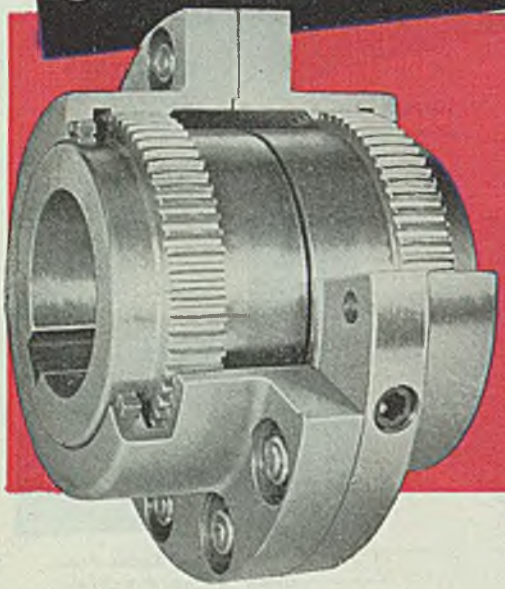

New "Series A" WALDRON Gear Type COUPLING

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Reducing costs to coupling buyers without sacrificing any of the basic design refinements characteristic of Waldron Gear Type Couplings is a noteworthy new achievement of Waldron Engineers.

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The Waldron "Series A" Coupling embodies all the design refinements that have made Waldron Couplings famous. From every standpoint—first cost, maintenance expense, operating advantages, space requirements—it easily proves the most economical coupling to buy and use.

Design and construction details, rating tables, service factors and prices will be furnished on request.

(COUPLING DIVISION)

JOHN WALDRON CORP.

Main Office & Works – NEW BRUNSWICK, NEW JERSEY

SALES REPRESENTATIVES IN PRINCIPAL CITIES

Economics of Arc Welding

(*Continued from Page* 81)

tion efficiency; electrode cost of 6 cents per lb; calculation of overhead at 150 per cent of the labor; and use of electrodes averaging ¼-in. in diameter.

In the interests of clarity and relative simplicity of making pointed illustrations which show the value of each of the factors discussed in detail, several small and relatively minor factors have been disregarded and some cost factors have been combined for simplicity.

An example is the combining of the cost of welding electrodes with the cost of deposited weld metal and using the cost of deposited weld metal per pound as a basis for calculating welding costs. The reason for including welding electrodes in the per pound cost of deposited weld metal is that for most of the factors which are fundamentally associated with the deposition of weld metal, any increase in welding results in an increase in electrode consumption and material cost.

Electrode costs themselves are a small percentage of the total cost of the entire structure. However, this method of expressing electrode welding cost gives a slight expansion of total cost because of the assigning of 150 per cent overhead against the electrode cost as well as the welding labor. This is a relatively small percentage in the diagrammatic illustration of the machine base (Fig. 8) selected for this discussion.

Basis for calculation in the discussion in each of the following paragraphs is given, and in all cases where a theoretical approach has been made the basis for the calculation, a stop watch analysis of shop operation has been found to compare very favorably with results established by the theoretical approach.

A detailed discussion of each of the eight factors follows:

1. Design To Reduce Welding and Deposited Weld Metal: As soon as an organization has committed itself to produce a certain type of structure or equipment by arc welding, a careful analysis of the design of the unit to reduce the amount of necessary welding often yields important economic advantages. *Fundamentally, weld metal is expensive; and all other factors being equal, welded design with the least weld metal is best.*

In the case of the machine base postulated in Fig. 8, assuming good welding practice, side plates and top plate of main base as well as side plates and top plate of the smaller secondary box-like base, are made by notching the corners of two appropriately cut plates and bending sides down so that the only welding required is welding up of corners.

In Fig. 9 is shown a different method of making the same structures but which requires more cutting and increases the welding 25 per cent over the design in Fig. 8. Here the side and top are all cut from separate plates by shearing or flame cutting and are set together in the final setup and welded. Thus, welded joints on top corners of both main base box and smaller upper box replace bent corners.

The relative cost of the normally good practice method shown in Fig. 8 compared to the design using more welding and less bending, is graphed in Fig. 2. According to the normally good practice method, the total cost of producing the unit is $100; of which welding cost, including labor, materials, and overhead, amounted to $43 or 43 per cent of the total cost.

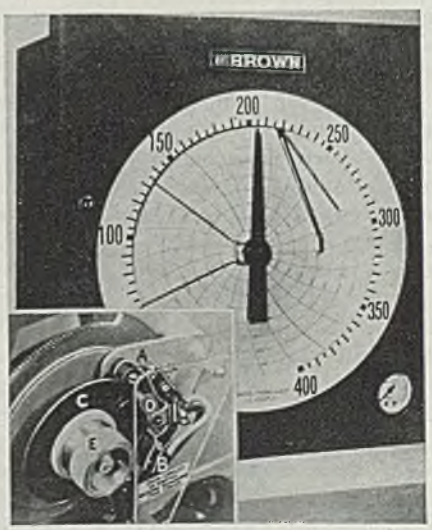
In the design shown in Fig. 9, using several pieces and welding them together instead of bending, the welding was increased 25 per cent. This represents a total increase in the cost of the finished unit of 8.66 per cent. It also increased the number of parts in the individual structures from 17 to 25 and the finished weight from 1000 to 1012½ lb.

Not included in this enlarged cost is the increase in handling and the increase in setup time using the less economical practice but it is assumed that this increase in handling and setup time is offset by the higher overhead cost resulting from bending equipment and fixtures used in normally good practice for a mass production quantity of such units. In this case, the largest saving is the result of the reduction of weld metal where 8.66 per cent of the total cost is a significant margin compared to the normal net profit of manufacturing organizations.

2. Plan to Utilize Material to Best Advantage: Fundamentally, steel, as purchased for arc welding manufacture, is a relatively inexpensive material. By planning to use it to the best advantage, a worthwhile margin of economy can be obtained. Since, in many cases of welded construction, parts are taken from sheets, bars, strips or plates, and because of their odd shapes, moderately high percentages of the purchased material are scrapped.

To illustrate this point, the normally good practice assumed for the machine base in this discussion uses 1000 lb of raw steel and by carefully planned consumption only 5 per cent scrap or 50 lb as illustrated by the cutting of two main parts as shown on the left in Fig. 1. This figure also illustrates a somewhat less carefully planned use of material where the same two parts are cut from standard 1250 lb sheets instead of 1000 lb sheets. On this general basis of efficiency, an additional 250 lb of steel are charged to each machine base. Allow-

EMERGENCY ALARM: A device which utilizes automatic safety alarm principles to protect process equipment and materials has on-off control as well as air control to actuate motorized valves, solenoid valves, contactor panels, signal lights, etc. Contacts A and B are made or broken by action of cam C and roller D, and spring loaded lever to which it is attached. Control point is set by loosening knurled knob E and rotating cam C, so its notch corresponds to position of temperature pen that has been moved previously to desired point. Pen position sounds emergency alarm. Red pointer on scale, not shown, indicates temperature setting of contact controller. This equipment, made by Brown Instrument Co., can be used in steel, petroleum, chemical, plastic and other related processing industries



ing 1 cent per lb scrap value to additional scrap used, there still is a total increase of $7.50 or 7½ per cent to the total cost of the unit.

In general arc welding manufacture, square or regularly shaped oblong parts such as those shown in Fig. 8, normally should be produced with a relatively small percentage of scrap. However, in the case of circular or irregular shaped parts, 25, 30, and even up to 50 per cent scrap is not unusual. It is not uneconomical in many cases, but it is a source of additional cost, some of which may be eliminated by careful planning.

Fig. 3 shows the relationship of the increase of the steel scrap to 25 per cent of the raw material instead of 5 per cent of the raw material as described above and demonstrates it to be a significant figure. It would provide a margin of $750.00 on 100 of these machine bases.

3. Quick Setting Up Fixtures to Eliminate Hand Measuring: Any method of mass production which is sound must produce a standardized finished product. One of the most important contributors to standardized arc welded products is a fixture for setting up the component parts of the structure prior to welding.

Good welding practice dictates that for a repetitive operation, there should be setting up fixtures which allow an operator to place the component parts of a structure in the fixture without error and in their proper relationship. This should be done with a very minimum of measuring of individual parts and careful positioning.

A fixture such as one shown in Fig. 11 provides stops, a framework upon which to place the parts; and plugs, guards, and clamps which accommodate pre-machined parts and all other parts in their proper relationship. It reduces setting up time to a bare minimum and provides maximum standardization of the structures set up in it.

Stop watch studies of setting up operations with and without fixtures, indicate differences of several hundred per cent in setting up without a fixture compared to setting up with a good fixture. This difference is mostly due to additional measuring and fastening time required when a fixture is not used. Assuming a very conservative 200 per cent difference and assuming the setting up time for these machine bases in good practice to amount to only $4.50, Fig. 4 indicates the total cost of setting up without a fixture as $13.50 or a total of a 9 per cent increase in the overall cost. This represents a $900.00 margin on 100 of these machine bases and it is a good margin with which to build a simple setup jig and still realize a profit.

4. Using Positioning Fixtures for Depositing Welds: Because weld metal is a liquid at the time it is deposited, position of joint at the time in which a weld is deposited automatically establishes certain limitations on size of electrode and amount of the molten metal which can be deposited within a given time on a joint. Ordinarily, the nearer completely downhand (into a trough-like joint) position into which a weld may be placed for deposition, the less difficulty is encountered due to fluidity of the metal—and within certain limits—the larger is the welding electrode which may be used. This is especially true of heavier plates and applies to even the relatively light plates used in this machine base.

There are many types of jigs or positioning fixtures for providing means of placing welds in their best position for welding. Fig. 10 shows a power-driven mechanical positioning fixture similar to the rather standardized and commercially available types of fixtures. The use of such a fixture would be applicable to a machine base such as the one selected for this discussion. It provides universal positioning of all welds, and in the case of this machine base would provide a good advantage. It would also be useable for other welding jobs in an ordinary welding production shop.

Fig 5 illustrates in graphic form the relative cost of depositing ⅜-in. welds in the different positions—vertical, horizontal fillet, and the completely downhand fillet position. Basis for the figures in this graph are numerous time studies of actual weld deposition time under normal shop conditions, using arc time, electrode changing time, and adding an appropriate allowance for operator fatigue (20 per cent of total time).

The normally good operating conditions under which this machine base was welded assumed downward position welding, using a fixture such as shown in Fig. 10, or some similar fixture providing downhand welding. If this unit were not positioned in a fixture, additional handling time to block it up and thereby position it or the additional time required to deposit the welds in the horizontal fillet position and the corner welds in the vertical position would increase the cost considerably. Conservatively interpreting the values shown in Fig. 5, the unpositioned welding of this unit would increase the cost of welding 50 per cent (since the normally good practice figure represents a 33 1/3 per cent reduction of the unpositioned and therefore poorer practice.) The result of not positioning the welds in this case would represent an increase in cost of $21.50 for welding, or 21½ per cent increase in the total cost of the structure.

In depositing the welds in the vertical or horizontal fillet position under ideal practice, it would not necessarily mean that a larger amount of weld metal would be deposited. But, under ordinary welding operating conditions, a larger amount of weld metal would usually be deposited because of the tendency for the lower leg of a weld deposited in the horizontal fillet position to be longer than the upper leg. This produces a degree of over-welding if the upper leg is made the specified size.

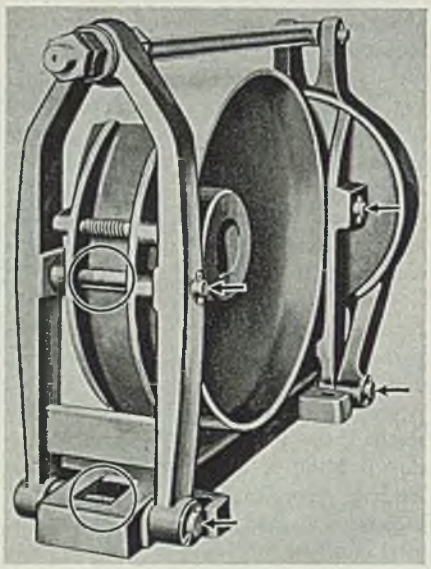
The increase of 21½ per cent in the total cost as diagrammatically shown in Fig. 6, represents a very considerable margin for operation; based on actual time studies and numerous examples throughout the welding industry as a whole, it is a margin, but rather conservatively stated.

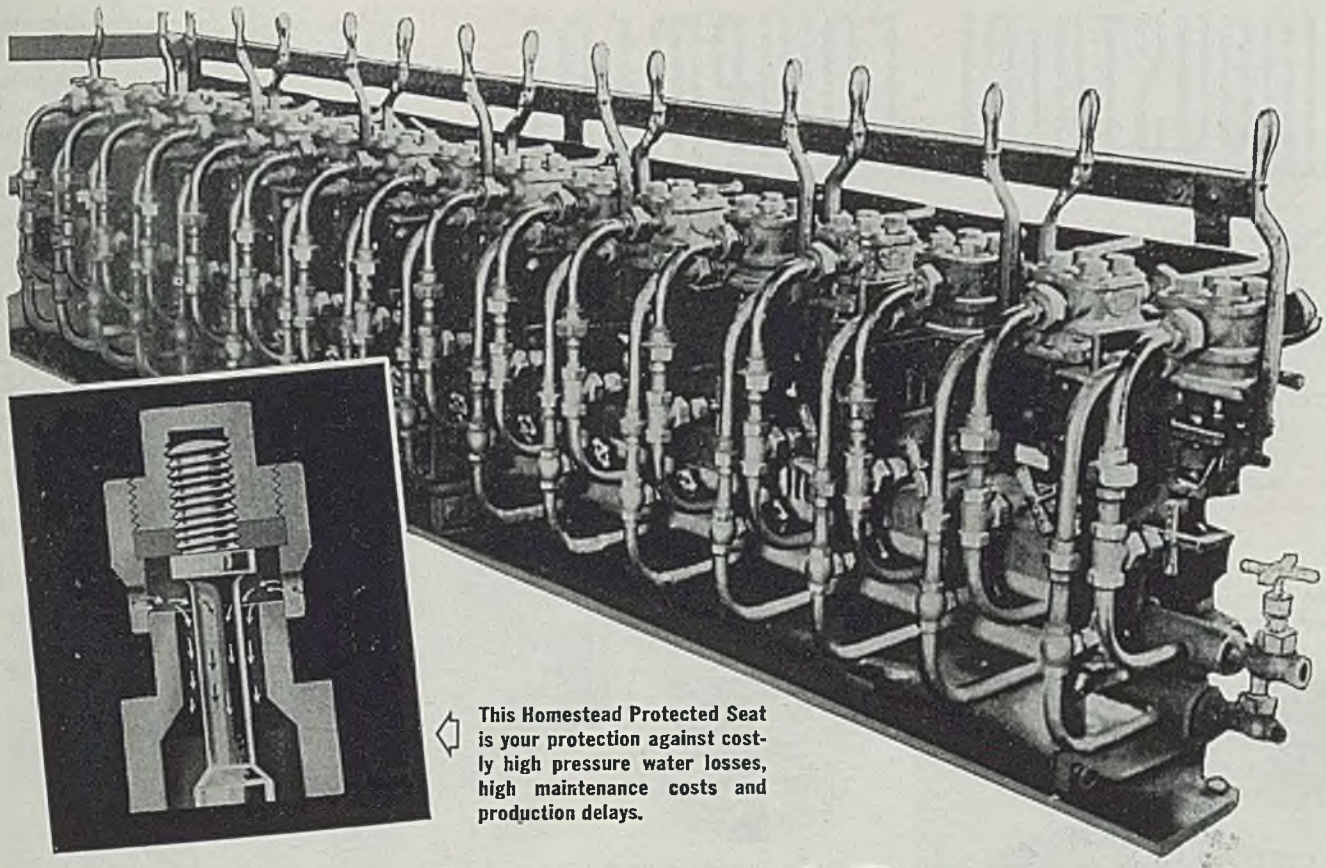
(Continued next week)

[1]A more complete coverage of these factors is given in the author's recent book "Arc Welding Engineering and Production Control", published by McGraw-Hill Book Co., Inc.

Pins On Shoe Brake Enclosed In Tubes

To facilitate removal of pivot pins where magnetic brakes are given frequent and heavy coats of protective paint or where mill dirt, moisture and weather conditions corrode equipment, pins on Type M shoe brake manufactured by Cutler-Hammer Inc., Milwaukee, now are protected by enclosing tubes. Length of tube completely enclosing exposed section of pin is fastened directly to the bearing without touching the pin, as shown in the illustration. This leaves pin free for speedy and easy removal when it is necessary to renew brake lining.





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HOMESTEAD PROTECTED SEAT HYDRAULIC OPERATING VALVES are made in 3-way or 4-way types; or in single poppet types to control hydraulic spray for descaling; sizes $\frac{1}{2}$" to 4", hand operated or remote control, for pressures up to 3000 pounds.

Write today for complete details and copy of Valve Reference Book No. 38.

HOMESTEAD VALVE MFG. CO.

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INDUSTRIAL EQUIPMENT

Cable Connector

A foot-operated Hytool has been developed by Burndy Engineering Co. Inc., New York 54, for installing indent-type connectors on electrical wire and cable, sizes Nos. 22 to 10, inclusive. It is said to fill a gap between power-operated tools normally used for volume production and hand-operated pliers generally used for electrical maintenance and repair.

The Hytool, designated as No. Y 10 R, has these features: (1) Wide jaw opening and front feed for easy insertion of

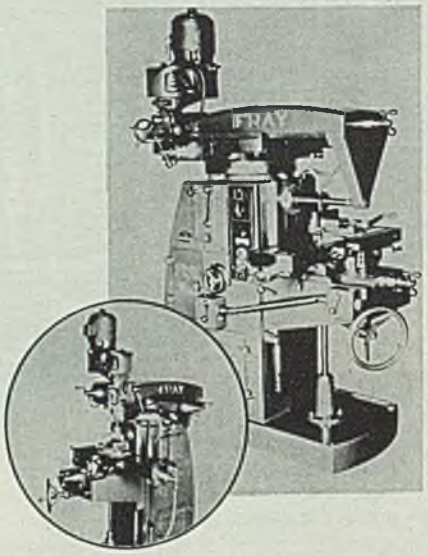
cable and connector, and to insure proper placement in die. (2) The reduction of fatigue resulting from high mechanical advantage designed into tool; only small amount of foot pressure is required. (3) Terminal is completely attached to cable in single stroke of machine, during which insulation grips are closed and terminal barrel is indented on to cable. (4) Each set of dies takes three connector sizes. For example, dies now available will accommodate Nos. 18, 14 and 10 Hydent connectors.

Item No. 9902

Milling Machine

Fray Machine Tool Co., Glendale, Calif., announces a new model milling machine, No. 9, turret head, ram type, built for vertical or horizontal work operations. It features variable speed to power feed, achieved by an electronic control panel built-in as an integral part of the equipment.

Since it is both a horizontal and vertical precision milling machine, almost any operation at any angle or compound angle can be completed without changing the original work setup. It is particularly adapted to jobs involving a wide variety of operations on a single piece. One easily accessible control panel,



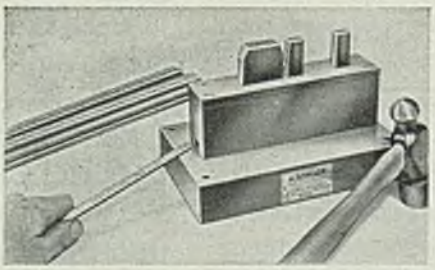
made by Westinghouse, is the operating focal point of the compact unit.

Item No. 9814

Stamping Jig

A portable hand stamping jig mounted on a heavy steel base or anvil, may be set up for use on any type of table or bench. Although small, it can handle marking which would normally require a press of from 50 to 60 tons capacity or one having excessive bolster area. This tool for flat, round, or square work is made by Acromark Co., 398 Morrell street, Elizabeth 4, N. J.

The tool is said to lend itself to applications requirng a fair degree of accu-



racy in the location of stamping, especially on jobs where quantities are not excessively large. The separation of marking into areas which can be easily sunk with a hammer blow also facilitates changes in wording or the replacement of individual die sections rather than the entire die.

An improved method of holding the marking stamps in position eliminates chatter marks on the stamped part and allows both large and small stamps to be individually preloaded to the correct tension for best results. Individual markings accomplished with this equipment create a minimum of destruction as compared with entire marking by one press stroke.

Item No. 9950

Torque Wrenches

Jo Mfg. Co., South Gate, Calif. announces the introduction of several improvements in the Jomi torque wrench and the addition of Model 1600 to the line. Model 1600 is an extra large, heavy duty wrench with a torque range from 700 to 1600 in.-lb, and a ½-in. standard drive. Model 600 has been changed to Model 750, with a torque range of 100 to 750 in.-lb, and a ⅜-in. standard drive.

Moving parts pertaining to the torque control feature of the wrench are now

ball bearing, thus reducing error due to friction to a minimum and making it unnecessary to compensate for a frictional load. Variance due to a variable friction load has been eliminated. Overtightening is impossible for once set, it automatically breaks when the predetermined torque has been reached. Tool is set by turning the guide to the desired micrometer reading on the barrel.

The rubber capped head has been discontinued and its place is one of all-metal. Both the head and the handle are now made of heat treated aluminum, giving the tool balance, lightness, and the durability of heavy steel. All materials used in its construction are rustproofed.

Item No. 9945

Hardness Tester

A brinell testing machine of the manually operated bench type for the hardness testing of metals is announced by Steel City Testing Laboratory, 8843 Livernois avenue, Detroit 4. It is the Superior Model J, and is particularly designed to meet requirements of smaller shops, heat-treat plants, laboratories, schools, etc. Multi-beam and dead weight

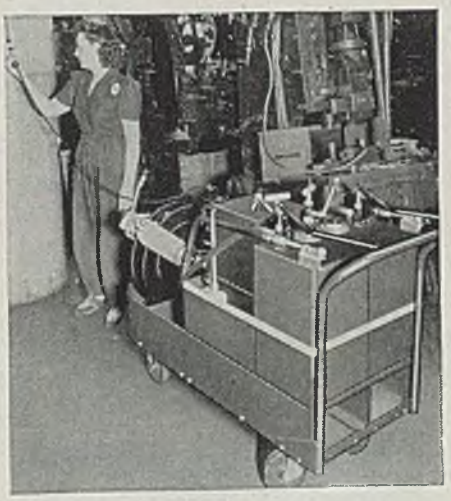
(All claims are those of the manufacturer of the equipment being described.)

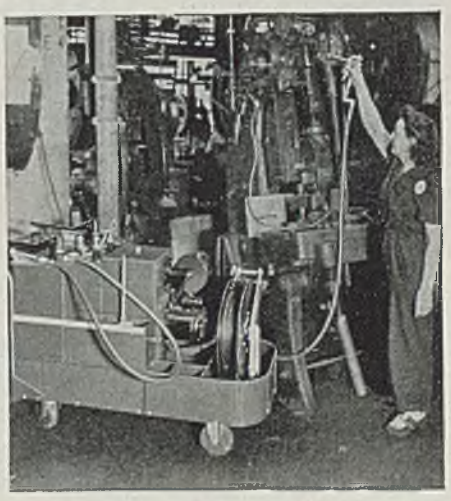
A TEN-STRIKE!

Complete Portable Lubrication Department with New Electric High Pressure Pump

● Without exception, this new Alemite Lubrikart for industry is one of the most popular Alemite developments in a decade.

Here again is a typical example of how Alemite anticipates the needs of industry in meeting lubrication problems. For it is Alemite, and *only* Alemite, that provides the big 3 of lubrication—lubricants, lubricating equipment and methods of application—the prime requisites for safe, economical, positive lubrication. Alemite, 1879 Diversey Parkway, Chicago 14, Illinois.





Pushed like a perambulator, the new Alemite Lubrikart is designed for one person operation. Dimensions: 21" wide, 55¼" long, 39" high. Mounted on five-inch Bassick ball bearing casters. It is able to travel between rows of machines or anywhere in a plant where space is limited. It saves time because of less frequent returns to the oil storage room by the oiler.

High pressure lubrication is made available by simply plugging in the electric cord. The high pressure hose and electric cord are mounted on automatic spring return reels which permit freedom of operation 20 feet in any direction. The unit is also equipped with hand operated equipment for servicing hydraulic systems, oil reservoirs, gear housings and for filling oil cans and grease guns.

Positive lubrication is assured, neglect is ended because proper lubricants and equipment are brought to the point of use. The electric high pressure pump develops 4500 lbs. grease pressure. Other equipment includes hose reel, hose and hydraulic coupler; gear lube and oil containers; compartments for oil cans; space for fittings, tools, waste, etc. Write for complete details.

ALEMITE HELPS THE WORLD GO ROUND

ALEMITE

Another Product of STEWART WARNER

ONLY ALEMITE COMBINES ALL 3 IN LUBRICATION • 1. LUBRICANTS 2. EQUIPMENT 3. PROCEDURE

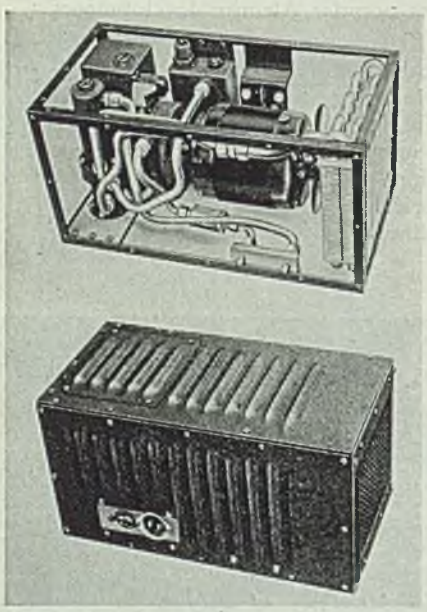
principles are employed, with weights accurately calibrated for loads of 500 to 3000 kg. A hydraulic dash pot eliminates shock on the load as it is applied. Standard equipment furnished with machine consists of a flat anvil and a V-anvil for testing rounds, and a standard brinell microscope with micrometer scale and case.

Item No. 9936

Heat Dissipating Unit

Heat dissipating unit for television, radar, short wave radio communication, high pressure mercury lamps, x-ray tubes, induction heating units and similar products is announced by Eastern Engineering Co., New Haven, Conn.

Units originally were designed for ground, airborne and water services of



the military. They are now being manufactured for commercial applications, furnished complete with thermostat control, thermostatic valves and flow switch. Unit shown will dissipate up to 1200 w with a constant controlled temperature, irrespective of surrounding temperature, within a close heat control range of 2°C. This unit, size 16 x 7½ x 7½ in. is available in steel, bronze or aluminum. Other models can be built to dissipate up to 5000 w. Smaller models can be built where need is for a smaller unit and wattage is much lower.

Item No. 9956

Combination Unit

Another special purpose, high production machine is offered by LeMaire Tool & Mfg. Co., Dearborn, Mich. by combining several standard units on one fabricated base. The machine drills, reams and taps threading dies ranging in diameters from ¼ to 1½ in. A standard LeMaire twin ram No. 5000 hydraulic unit is used for the drilling; a standard No. 2000 unit supplies power for reaming operation; with a standard lead screw tapping unit completing the cycle. Positioned around a 24-in. index table all three units are mounted on a T-shaped fabricated base.

Maximum accuracy is obtained since the drilling, reaming, and tapping op-

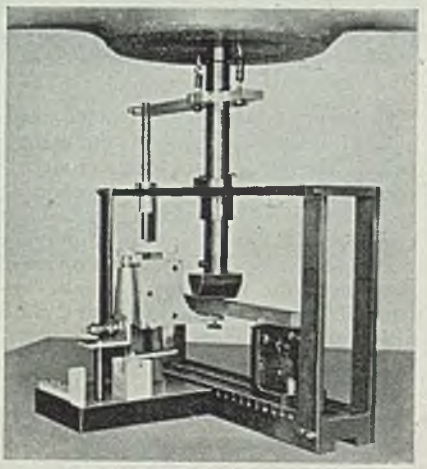
erations are all accomplished without removing part from fixture. Master collet and inserts make possible accommodation of many sized dies; and changeover from one sized die to another is simple since speeds are infinitely controlled by hand knob and feeds by flow valve. In order to maintain cutting speed, all units are controlled by variable speed motors. A forward push on gear lever clamps part in position and a pull unclamps part and ejects it when table returns to front loading position.

Cycle of operation is (1)—load, (2)—drill, (3)—ream, and (4)—tap. A multiple head can be applied to make this machine suitable for drilling, reaming, and tapping a number of holes in a part at one setting.

Item No. 9844

Deflectometer

Recently developed by the Southwark division of the Baldwin Locomotive



Works, Philadelphia 42, is a combination flexure tool and deflectometer for testing materials. In accordance with the latest federal specifications and those of the ASTM for molded plastics, plastic laminates and woods, it will fit any testing machine.

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Item No. 9897

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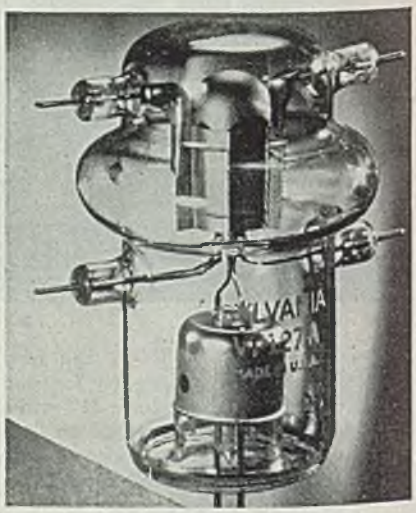
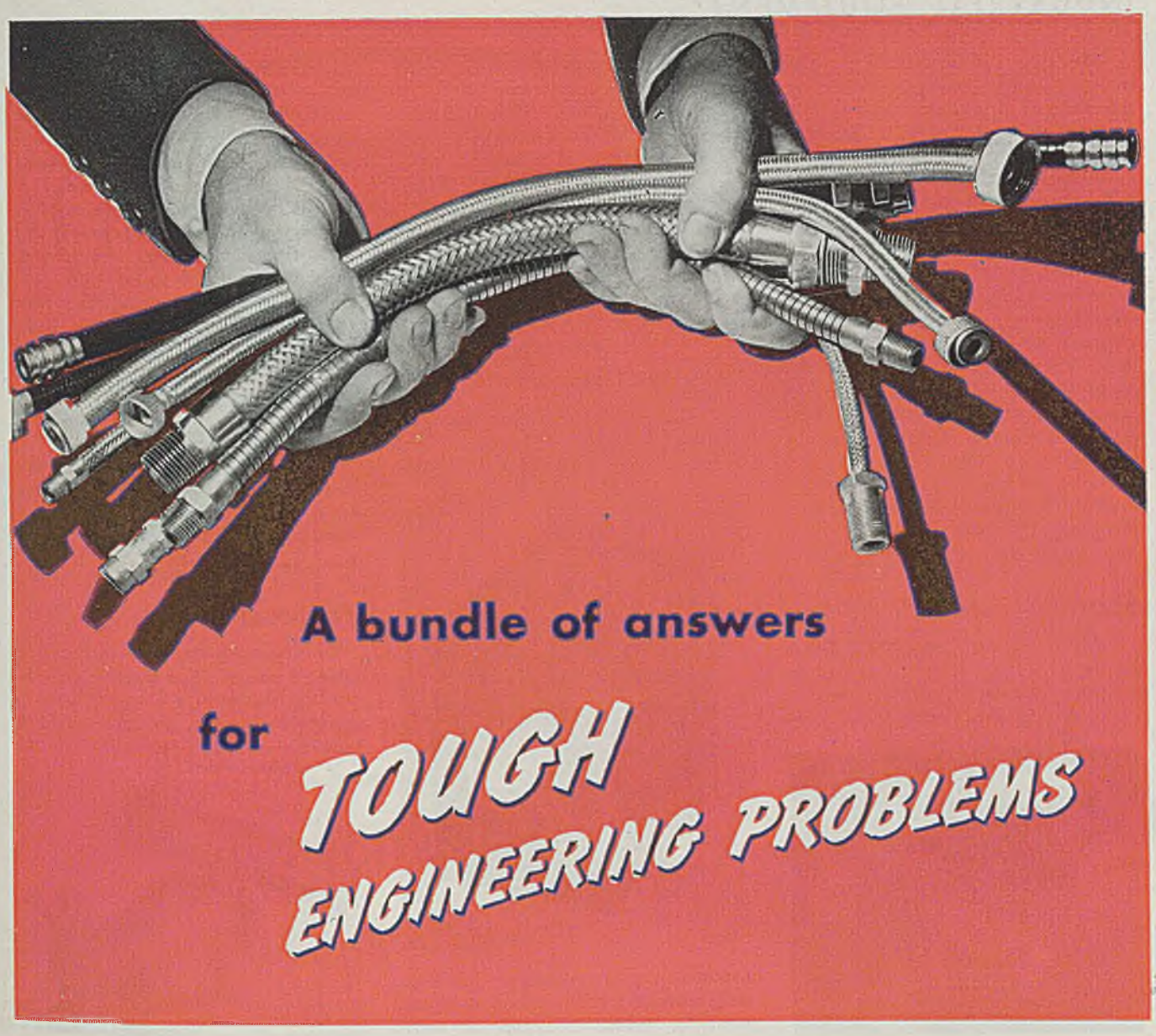


of power measurement lamps developed by Sylvania Electric Products Inc., Emporium, Pa. The lamps are built with two identical small filaments mounted in lock-in type bases. These units measure power outputs ranging between 0.05-25 w with accuracies within 5 per cent or less, depending on the type of reading taken.

Power output measurements are made



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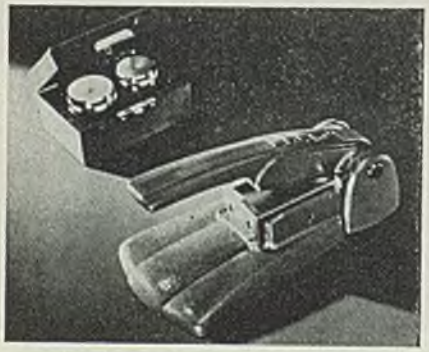
by connecting one filament to the high frequency output and the other to an alternating or direct current source. Voltage of the second filament is regulated until both filaments are equally bright. Power is determined by meter readings in the alternating or direct current circuit with equal power disspated by the filament in the high frequency circuit.

Increased accuracy may be obtained by reversing the filament circuits and averaging results. Calibration, providing increased accuracy independent of filament difference, may be obtained by applying voltage or measuring the current of one filament and then applying voltage to the other until the two filament brightnesses are equal. Power dissipated by the second filament is then calculated in terms of voltage or current in the first filament.

Item No. 9899

Specimen Shear

Taber Instrument Corp., North Tonawanda, N. Y., announces the new triple cut specimen shear. This shear was designed for use with the Taber V-5 stiff-



ness gage to assure accurate cutting of test specimens (1½ x 2¾ in.) for uniform and comparable test results. Its use is recommended specially for shearing very thin specimen materials which if not cut to precision may affect the test results. The shear will cut 0.020-in. paper, plastic or thin metallic sheet and foil in preparation of stiffness or resilience test on the stiffness gage. A test strip is cut and detached from a sheet in one operation by placing the straight edge of the sample sheet against the back gage of shear and pushing down with a quick motion.

Item No. 9858

Magnetic Components

Line of precision-engineered iron core magnetic components, built to meet specific requirements and incorporating

important design innovations, has been made available for use in electronic equipment by Federal Telephone & Radio Corp., 200 Mt. Pleasant avenue, Newark, N. J., associate International Telephone & Telegraph Corp.

Units are being produced in response to demand for specially designed iron core transformers and reactors. Available with power ratings ranging from milliwatts to kilowatts, components can be provided in any of the basic types of construction—open-frame, semi-enclosed, enclosed and hermetically sealed. Various terminal types can be supplied, including standard nut-fasteners and solder-type binding posts with porcelain bases. Hermetically sealed units (one of which is shown) utilize either compression bushings on porcelain bases, or glass-to-metal fusion seals in one-piece covers. Notable improvements in the latter type seal enable it to withstand successive immersion in ice-water after hot-tin dip.

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Item No. 9952

Positioner

By permitting the angle of tilt to be adjusted almost immediately and without the necessity of stopping work to manipulate wrench, the new model S positioner offered by Metro-Vise Co., 242

Stephenson building, Detroit 2, simplifies the tilting of work during various assembly operations. In principle, the existing vise or fixture is bolted, or other-

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wise secured, to the "place plate" of the Metro positioner. This plate is integral with a ball turning in the socket formed by two clamping jaws, so shaped and pivoted as to maintain a firm grip of the ball, yet so "tensioned" as to let the ball "roll" in the socket when a change in the angle of tilt is desired. Holding pressure exerted on ball is supplied by a heavy tension spring which actuates the two clamping jaw members.

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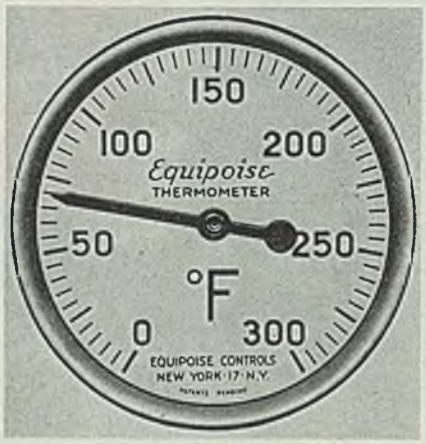
Item No. 9850

Dial Thermometer

A new bimetallic dial thermometer featuring permanently-calibrated, responsive precision bimetallic helical coil measuring element having case of alloy steel in most sizes, 18-8 stainless steel connection nut and stem; large, easy-reading numerals and temperature graduations on metal dial is offered by Equi-



poise Controls, 342 Madison avenue, New York 17. Expansion of bimetallic coil rotates attached small shaft and indicating pointer as one unit over entire scale range as the only moving part. There are no pivots, mechanical linkages or gears. Various standard ranges are available between limits of minus 90° F and 1000° F. Test or laboratory thermometers are graduated in both Centigrade and Fahrenheit on same scale. Over-range protection: Temperature can be increased 50 per cent or more beyond end of scale range without damage to thermometer for ranges up to 500° F, 10 per cent over-range for ranges up to 1000° F. Thermometers are obtainable in 2, 3 and 6 in. dial sizes and are installed by connecting ½-in. standard connection nut directly into socket.

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Item No. 9966

Chilean Steel Plant To Be Completely Integrated

Plans are now well under way for the erection of a completely integrated steel plant in Chile by the Compania de Acero del Pacifico. The plant will be built along the shore of San Vicente Bay, 10 miles northwest of Concepcion—the location having been chosen because it afforded low-cost hydroelectric power, a reasonably well-protected harbor on deep water, a good supply of fresh water from the Bio Bio River and low assembly cost of raw materials. The coal mines are approximately 35 miles from the plant.

The plant will consist of 47 by-product coke ovens complete with benzol plant and batch-type tar plant, but exclusive of equipment for the production of ammonia sulphate. The ovens will be underfired with blast-furnace gas, and the surplus coke-oven gas will be piped to Santiago, where—due to high transportation costs—coal for gas production sells at a premium. The blast furnace will have a capacity of 500 tons of iron per day, supplying hot metal for ingots and castings. The steel production department will consist of a 500-ton mixer, a 60-ton open hearth, a 50-ton electric furnace and a 12½-ton bessemer.

Rolling facilities will consist of a 2-high rougher mill with a 3-stand finishing mill for the production of structurals, rails and bars. There will also be a merchant and rod mill for producing wire rods, bars and light structurals. Adjacent to the merchant and rod mill will be installed a wire finishing mill. A 72-in. 3-high plate mill stand will be installed to roll light plates and break-downs for sheet and tin plate which will be finished on 2-high mills. These products will be produced alternately under the same roof in view of the relatively light tonnage involved. An electric-weld cold-formed pipe mill will be installed for the production of welded pipe from 2 to 4-in. Sizes below this are now being produced in other plants. The foundry will consist of an iron and steel foundry, including facilities for production of centrifugal cast iron pipe in diameters up to 12 in.

Raw Materials Arrive By Boat

Raw materials will arrive by boat and will be unloaded by a traveling tower onto a belt conveyor running inshore along a 1500 ft pier to a crushing and screening plant; and the fine and coarse materials will then be bedded for use as required.

Iron ore will be brought from El Tofo mines, near Coquimbo, 450 miles north of Concepcion, and will be loaded into 10,000 ton carriers at the Bethlehem loading dock at Cruz Grande. This is the same ore which has been used for many years by Bethlehem at Sparrows Point.

Limestone will be shipped from Caleta Coloso, near Antofagasta, 750 miles north of the plant, and will be brought down in the same boats used for ore.

The coal, which is similar to the Utah coals of the United States, will come from the nearby Schwager and Lota mines, which produce most of the coal mined in Chile. While the Chilean coals give a satisfactory furnace coke, it is possible that initial operations will involve a small percentage of U. S. coal for mixing with the Chilean coals in order to obtain a stronger coke. However, this practice will probably be discontinued as experience in coking Chilean coals is gained.

Hydroelectric power will be furnished from the Abanico plant now nearing completion. It will be brought to the plant at 150,000 v over a 100 mile transmission and stepped down to the operating voltages, maximum load being 28,000 kw. A small diesel plant will be used as a standby.

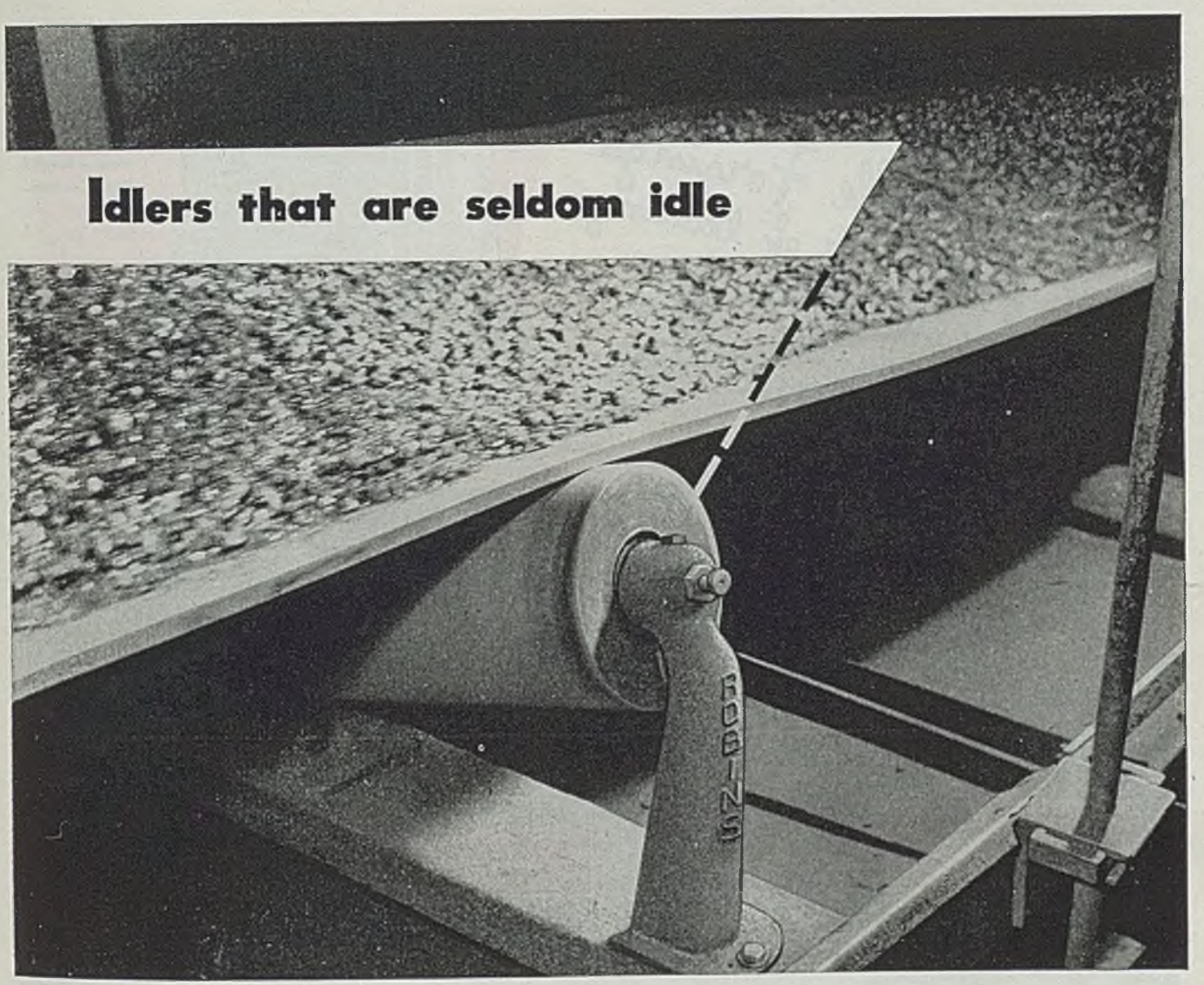
Water will be pumped at a rate of 25,000 gpm through a 4-mile pipe line from the Bio Bio river, south of the plant.

This project is part of an overall plan for the industrial development of Chile, with the purpose of making her more self-sustaining and improving her financial position with respect to foreign exchange and bettering the standard of living of her people.

In addition to furnishing employment for a large force during construction the plant will require an operating personnel of 1500 to 2000, when operations are started in 1948.

Chilean foreign exchange, at present derived largely from the exportation of copper and nitrate, will be benefited to extent of $10,000,000 per year when steel products now being imported are produced locally.

Idlers that are seldom idle



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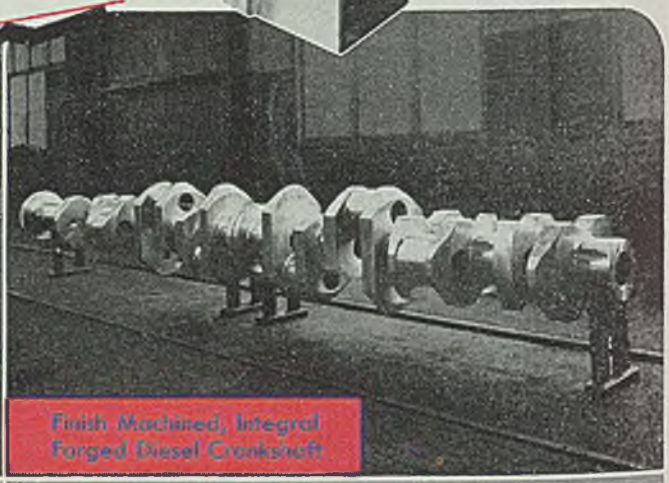
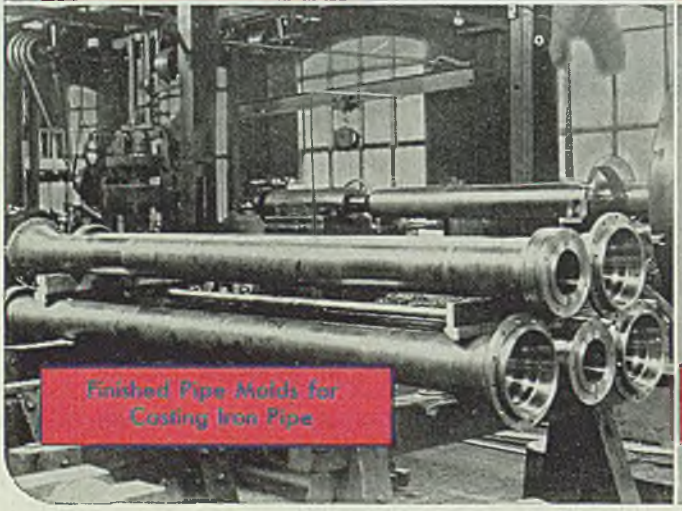
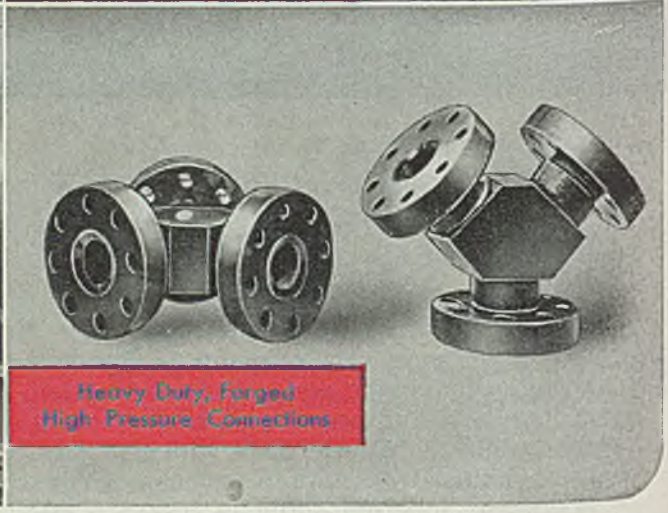


Finish Machined, Integral Forged Diesel Crankshaft



Finished Pipe Molds for Casting Iron Pipe



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Cold Heading Die Steel

(*Continued from Page* 85)

by the McQuaid-Ehn test. As a general rule all plain carbon steels are coarse grain after the McQuaid-Ehn test and almost all the alloy steels are fine grained. Without doubt the actual grain size over the complete hardening range as determined by a fracture test in the fully hardened condition is the most desirable test for the grain size of cold heading die steel.

Hardenability

As stated previously, grain size and hardenability are interrelated. It is, therefore, desirable to make the two tests on the same specimen. This can be readily accomplished by brine or water hardening a suitable section, fracturing and reading both grain size and hardness penetration visually.

Various types of specimens have been and are being used to determine hardness penetration and grain size such as step down disks[2], ¾, 1, 1-½, 2, and 3-in. cylinders[3,4], tapered or cone shaped specimens[5]. A test piece and method which is coming into use but on which little data are available, is the end quench L bar described by W. E. Jominy[6]. The advantage of the L type bar is that it will accommodate steels having a wider range of hardenability than can be determined using a 3/4 or 1-in. cylinder, for in a great many instances a 3/4 or a 1-in. round will harden all the way through at hardening temperatures over 1450° F.

Fig. 2 illustrates how a 3/4 and 1-in. round fails to give a hardness penetration recording on a chromium-vanadium steel at hardening temperatures of 1500 and 1600° F for a 3/4-in. round and at 1600° F for a 1-in. round. This also illustrates another method used to record hardness penetration on a conventional cylindrical specimen namely, one of cutting the specimen, grinding the cross section and etching in 1:1 hydrochloric acid solution. W. E. Jominy presents data to show that the L bar is more sensitive a test piece than a totally quenched 1-in. round. However, it is noted that Barrow and Soler[7] reject this test bar for steels containing 1/4 per cent of chromium and nickel on the grounds that the bar invariably cracked in hardening.

Table III gives the hardness penetration using 50 rockwell C as a reference point and the fractured grain size number according to standards illustrated in Fig. 1. Hardness penetration and fractured grain size of the plain carbon steels shown in Table I, determined by using a specimen as in Fig. 3, are given in Table III.

Specimen shown in Fig. 3 is a 1-in. cylinder hardened by heating to a particular temperature, holding for 1-hr and quenching in a 10 per cent brine solution held at 65-75° F, followed by tempering at 500° F for 1-hr. Purpose of tempering is to prevent cracking in cutting for cross sectional hardness readings which was the method used to record hardness penetration.

It will be noted from Table III that there is a considerable difference in the behavior of steels from the different sources. Therefore, it would be expected that if hardness penetration or fractured grain are significant factors effecting die life, these differences would be apparent in die performance. At any rate, when dies made from these steels were given a standard heat treatment there would be no uniformity in either of these characteristics. It will also be observed that the rate of hardness penetration increase with the use of an increasing hardening temperature is not a straight line relationship. This also applies to the grain coarsening which takes place as the hardening temperature is increased. Fig. 5 is a graphical representation of Table III. It is obvious that there is a relationship between hardness penetration and austenitic grain size.

Hardness Penetration Factors

The effect of the quenching temperature alone as being a significant factor in increasing hardness penetration has been disposed of by Davenport and Bain[8]. One of the most significant factors affecting hardness penetration is the grain size of the austenite at the time of quenching[9]. Another factor affecting hardenability is the homogeneity of the austenite with respect to the carbides[10]. In this respect the prestructure, that is, the microstructure existing in the steel before heating for hardening as it affects the homogeneity of the austenite before quenching will influence the recorded hardness penetration[10].

Values shown in Table III are for specimens which were given no prior heat treatment to establish uniformity of prestructure. Reason for this was that it is not customary to give cold dies a pretreatment before hardening. In a previous article the author has noted the importance of controlling the annealed microstructure of cold heading die steel (See STEEL, Oct. 29, 1945, p. 98).

A truer picture of what is to be expected in the heat treatment of cold heading die steel is obtained by taking the steel as received from the manufacturer assuming the absence of a pretreatment of the dies before hardening.

Other factors which affect hardness penetration are the normality of the steel[10]. Presence of small amounts of elements from the deoxidizing additions and from the melting practice affect both directly and indirectly the degree of hardness penetration. For example, residual chromium would tend to increase hardness penetration directly because of its effect on the transformation rate, whereas, vanadium or aluminum used as deoxidizers can be considered to have indirect effects by retarding austenitic grain growth and also in removing oxygen thereby promoting normality.

The effect of substantial additions of alloys on the hardenability of steel has been the subject of considerable study. Cold heading die steels containing vanadium and chromium are in common use. Chromium is added to increase the depth of hardness penetration. Vanadium is used mainly to provide a steel with a fine grain over a wide range of hardening temperatures; vanadium being particularly effective in promoting fine austenitic grain size. The effect of vanadium is to provide finely dispersed oxides which provide nuclei for grain formation. Manganese is added to increase the depth of hardness penetration often in conjunction with silicon. Recordings of the hardness penetration and fractured grain size of chromium, chromium-vanadium, vanadium, manganese-silicon, copper and nickel steels are shown in Table IV. Graphical representation of the hardness penetration characteristics recorded in Table IV is shown in Fig. 6.

As indicated in Table IV (or Fig. 6), chemical composition is not necessarily a criterion of hardness penetration. Although, there is no doubt the addition of alloys which increase hardenability will cause an increase in hardness penetration; their effects may be masked by other factors. Of the alloys added, manganese appears to be the most potent in increasing hardness penetration. The effect of the alloys seems to be greater at higher hardening temperatures. One factor which would account for the toning down of the effect of alloys which normally increase the depth of hardness penetration is that the alloy steels have a finer grain size, see Fig. 4.

Larger-Diameter Specimen Needed

In 14 instances out of the 30 steels so far dealt with, the 1-in. round specimen was inadequate in giving a complete story of the hardness characteristics due to the specimen hardening throughout at one of the hardening temperatures. It appeared obvious that a larger diameter specimen was required. A 1½-in. round specimen of the same general design was used for the other alloy steels whose alloy contents indicated deeper hardening characteristics. The hardness penetration curves for these alloy steels are shown in Figs. 7, 8, and 10. The chemical composition and austenitic grain size of the steels from which those curves were derived are shown in Table V.

Some of the analyses hardened com-

pletely through a 1½-in. round at a quenching temperature of 1600° F. The inadequacy of a 1½-in. round in giving a complete hardenability picture of the deeper hardening alloyed steels is very obvious.

It is also interesting to note that the order of the hardenability of the steels is changed by the hardening temperature. For example, the order of the hardenability at various hardening temperatures is as follows:

ORDER OF INCREASING HARDENABILITY:

At 1425° F	7 8 3 1 5 6 2 4
At 1500° F	3 7 8 1 2 5 6 4
At 1600° F	3 8 5 7 4 1 6 2

This is, no doubt, due to changes in the austenitic grain size and alloy solubility brought about by the particular austenitizing temperature. Holding time used at various hardening temperatures was 1-hr exclusive of the heating time. This serves to illustrate that in hardenability determinations of low alloy tool steels, the determination must always be associated with the austenitizing temperature employed. Though no evidence has been presented here to support this view, it has been the author's observation that holding time at the austenitizing temperature is also a very potent factor affecting hardenability for the same reasons as previously cited for the austenitizing temperature itself.

Importance of case depth on the performance of dies was mentioned in the introductory paragraphs. When considering its importance, one should be aware that its effect on the performance of a die because of its relation to the mechanical properties of the section, depends on the section involved. Fig. 9 will serve to clarify this. This Fig. 9 shows the hardness penetration on 1, 1½, 2, and 3-in. rounds at three hardening temperatures for a chromium-vanadium steel. The curve is the usual schematic form of showing hardness changes from the center to the outside of a round section. Shaded section shows the actual hardness penetration to 50 rockwell C or the way it would appear if the bar were split longitudinally through its axis and deep etched.

It is clear that as the section increases a lesser amount of the cross section is materially affected by the hardening operation. Therefore, accurate control of the hardness penetration characteristics of a steel is less important, the greater the section.

The effect of grain size on the mechanical properties of a hardened section, is shown in Fig. 11. These impact values were obtained when breaking the hardenability test specimen for fractured grain size determination. From Fig. 11 it will be seen that the finer the frac-

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tured grain size the higher is the impact strength. It will be noted that there is considerable scatter, typical of impact testing where steels are tested in the higher hardness ranges.

For those readers who may be further interested in the hardenability of steel as it is related to carbon or low alloy tool steels, a bibliography is appended which is in addition to those articles already referred to in the course of this article.

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Cementite Stability and Its Relation to Grain Size, Abnormality and Hardenability—Austin and Fetzer, Trans. A.S.M. 29, p.339.

Effect of Rate of Heating Through the Transformation Range on Austenitic Grain Size—Rosenberg and Digges, Trans. A.S.M. 29, p. 638.

Effect of Deoxidation on Hardenability—Cash, Merrill and Stephenson, Trans. A.S.M. 29, p. 755.

Kinetics of the Austenite to Martensite Transformation in Steel—Greninger and Troiano, Trans. A.S.M. 28, p. 537.

The Influence of Alloying Elements on the Critical Points of Steels as Measured by the Dilatometer—Gillmor, Trans. A.S.M. 30, p. 1377.

The Hardening of Tool Steels—Payson and Klein, Trans. A.S.M. 30, p. 218.

Hardenability Control of a One Per Cent Carbon Steel—Barrow and Soler, Trans. A.S.M. 31, p. 943.

The Effect of Carbon Content on Hardenability—Rowland, Welchner, Hill and Reiss, Trans. A.S.M. 35, p. 46.

Hardening Characteristics of One Per Cent Carbon Tool Steels—Digges and Jordan, Trans. A.S.M. 23, p. 839.

Austenitic Grain Size of Eutectoid Steel—Tobin and Kenyon, Trans. A.S.M. 26, p. 133.

Effect of Tempering Quenched Hypereutectoid Steels on the Physical Properties and Microstructure—Austin and Norris, Trans. A.S.M. 26, p. 788.

—o—

Valve renewable parts chart, 22 in. long and 28 in. wide, is available from Reading-Pratt & Cady Division, American Chain & Cable Co., Bridgeport 2, Conn. It contains pictures and data on brass and iron valves, and lists briefly replacement practice for worn parts.

NEW PRODUCTS

Roof Coating—For withstanding heat, asphalt coating is combined with an integrally contained aluminum coating, known as Hornlume. Asphalt sinks down to the roof, and aluminum stays at the top, reflecting back sun's rays. A. C. Horn Co., 43-36 Tenth street, Long Island City 1, N. Y. ST424

—o—

Acid Cleaner and Descaler—Pennsalt PM-90 contains addition agents for surface action and inhibition, is used primarily as a pickling bath concentrate in electroplating shops and as an acid cleaner for removing water scales from boilers and industrial equipment. Pennsylvania Salt Mfg. Co., Philadelphia 7. ST422

—o—

Welding Film — For minimizing adherence of welding spatter to metal and to reduce cleaning time, Non-Spatter film can be sprayed on work, and welding can proceed whether film is wet or dry. After welding, spatter can be removed easily by wiping or brushing. Lincoln Electric Co., Cleveland. ST425

—o—

Flux—Flo-Well No. 1, an improved free-flowing flux, is used to gas weld wrought, cast, or high tensile aluminum and aluminum alloys of any size or shape wherever welding is possible. It will not solidify or deteriorate and is applied easily. A. K. Mauk, 7539 Hamilton avenue, Pittsburgh 8. ST415

—o—

Color Glue—Kriegr-O-Dip, for laminating or bonding plastics and color together, comes in red, blue, yellow, orange, brown, black, and green. Colors can be mixed. Krieger Color & Chemical Co., 6531 Santa Monica boulevard, Hollywood 38, Calif. ST420

—o—

Pickling Inhibitor—Soluble either in sulphuric or muriatic acid, Kelite control protects metal and saves acid by causing pickling acid to work on scale only. It prevents attack on healthy metal and reduces possibility of hydrogen imbrittlement. Kelite Products Inc., Los Angeles. ST416

—o—

Rust Preventive — To prevent tube rust in transport or storage, Nox-Rust-tube coating does not run off, is clean, and does not interfere with additional machining. It dries into a firm, dust-free film and may be removed easily. Nox-Rust Corp., 2463 South Halsted street, Chicago 8. ST419

the BUSINESS TREND

RATE of industrial activity in the week ended Jan. 19 likely will show a decline when production figures for it are available. The production index since the Christmas holiday week has been on the upgrade but great uncertainty arising from strike threats reduced steel industry operations during the week ended Jan. 19, thus exerting a depressive influence on the index.

In the week ended Jan. 12, latest for which production figures are available, STEEL's industrial activity index registered 119 per cent of the 1936-1939 weekly average. Previous week's index was 114. Contributing to the increased rate for the week ended Jan. 12 were rises in steelmaking, electricity output, and automobile assemblies. Production of 23,340 autos that week was 67 per cent larger than in the previous week. Greatest portion of this increase came from Ford Motor Co. plants. Those plants produced 53 per cent of the week's output, while Chrysler Corp. accounted for 20 per cent.

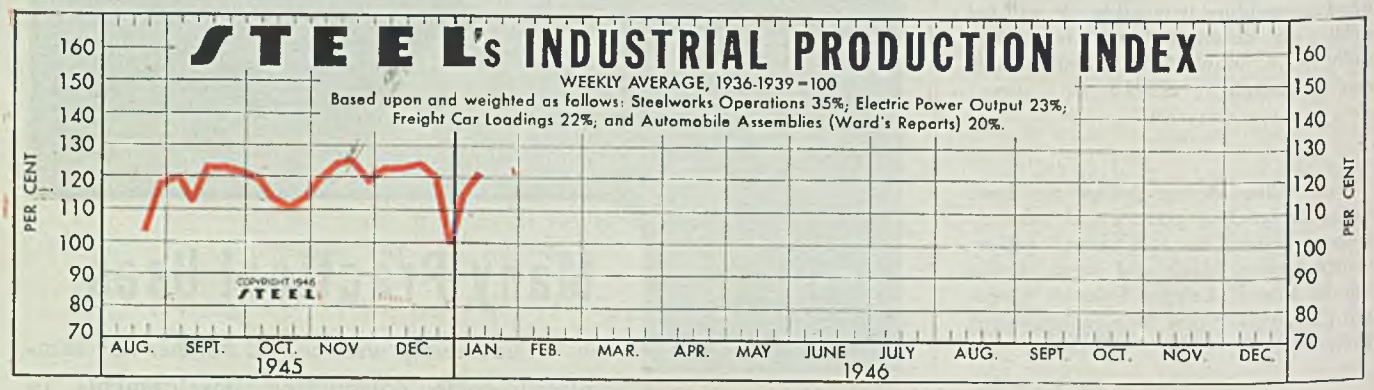
CAR LOADINGS—A 4 per cent decrease in freight car loadings in the first quarter of 1946 compared with the corresponding period of 1945 is expected by the Association of American Railroads. While shipments of some commodities, including automobiles and agricultural implements, are expected to increase, others, including ore, ferrous and nonferrous metals, machinery and boilers, and coal and coke, are expected to decline. Car loadings in the first quarter of 1945 totaled 6,687,839. Estimated loadings for first quarter, 1946, are 6,417,622 cars.

RAILROAD INCOME—Estimated net income of Class 1 railroads in November rose 63 per cent over that of October but was 46 per cent under November, 1944. In the first 11 months of 1945 their estimated net income was 18 per cent below that of the like period of 1944.

ELECTRICITY—Kilowatthour sales of electricity in 1945 declined 2.1 per cent below those of the previous year, but total revenue rose 1.7 per cent. Total customers increased 2.6 per cent. Causing the sales decrease were declines in electricity usage by large consumers, public authorities, and railways. All but two of eight classes of users increased in 1945, and likewise revenues from all but two of the eight groups rose.

COKE—Production of coke climbed 24.2 per cent in November over that of October, a month of low output because of a coal miners' strike. November coke output totaled 5,143,329 tons, compared with 4,141,005 tons in October.

TRADE—First decrease in weekly department store sales since the week ended Sept. 8 was registered in the week ended Jan. 5, when sales were 6 per cent under those of the corresponding week of 1945, principally because of four trading days that week instead of five as in the like week a year ago.



Latest Week (preliminary) 119 Previous Week 114 Month Ago 122

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	82	81	83.5	94
Electric Power Distributed (million kilowatt hours)	4,170	3,845	4,154	4,614
Bituminous Coal Production (daily av.—1000 tons)	1,683	1,167	2,007	1,762
Petroleum Production (daily av.—1000 bbls.)	4,578	4,548	4,515	4,723
Construction Volume (ENR—Unit $1,000,000)	$88.0	$43.3	$67.6	$22.9
Automobile and Truck Output (Ward's—number units)	23,340	13,920	16,240	19,830

*Dates on request.

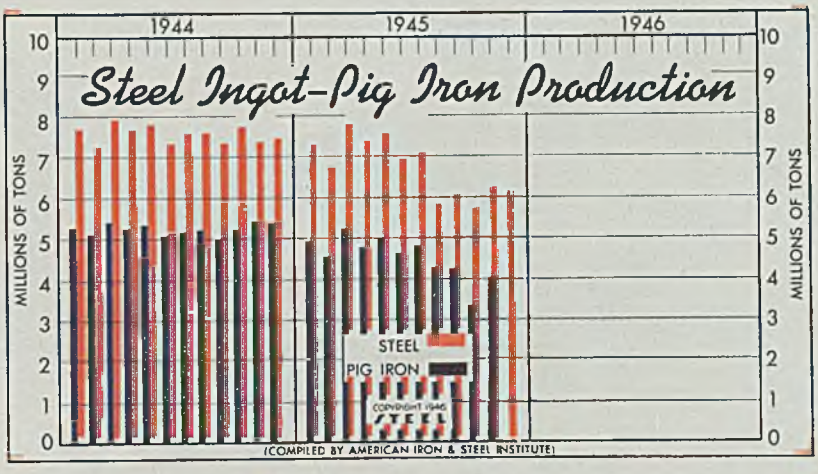
TRADE				
Freight Carloadings (unit—1000 cars)	678‡	652	772	782
Business Failures (Dun & Bradstreet, number)	10	13	10	25
Money in Circulation (in millions of dollars)‡	$28,297	$28,491	$28,370	$25,257
Department Store Sales (change from like wk. a yr. ago)‡	−6%	+28%	+10%	+2%

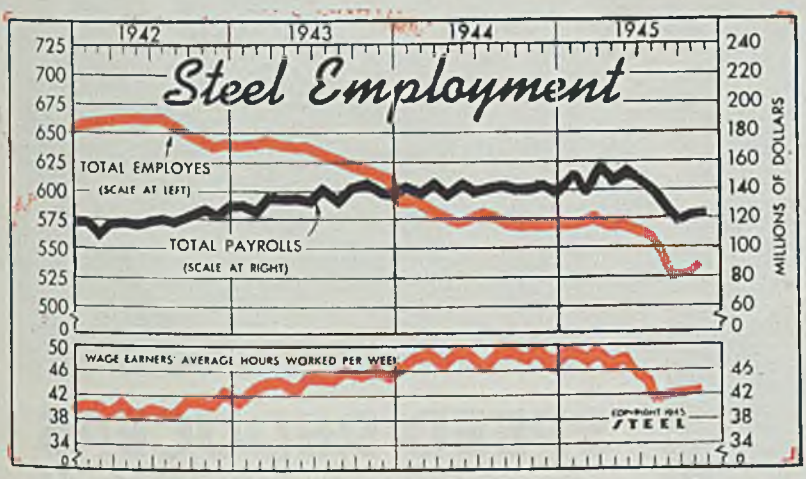
‡Preliminary. ‡Federal Reserve Board.

Iron, Steel Production

(Net Tons—000 omitted)

	Steel Ingots			Pig Iron	
	1945	1944	1943	1945	1944
Jan.	7,206	7,593	7,424	4,945	5,281
Feb.	6,655	7,194	6,824	4,563	5,088
Mar.	7,708	7,826	7,673	5,228	5,439
April	7,292	7,594	7,375	4,786	5,248
May	7,452	7,703	7,550	5,016	5,348
June	6,842	7,234	7,041	4,605	5,062
July	6,987	7,498	7,416	4,812	5,162
Aug.	5,736	7,499	7,592	4,249	5,215
Sept.	5,983	7,235	7,519	4,227	4,993
Oct.	5,598	7,621	7,819	3,388	5,200
Nov.	6,201	7,279	7,374	4,026	5,426
Dec.	6,085	7,366	7,266	.....	5,404
Total	79,745	89,642	88,873	.....	62,866





Steel Employment

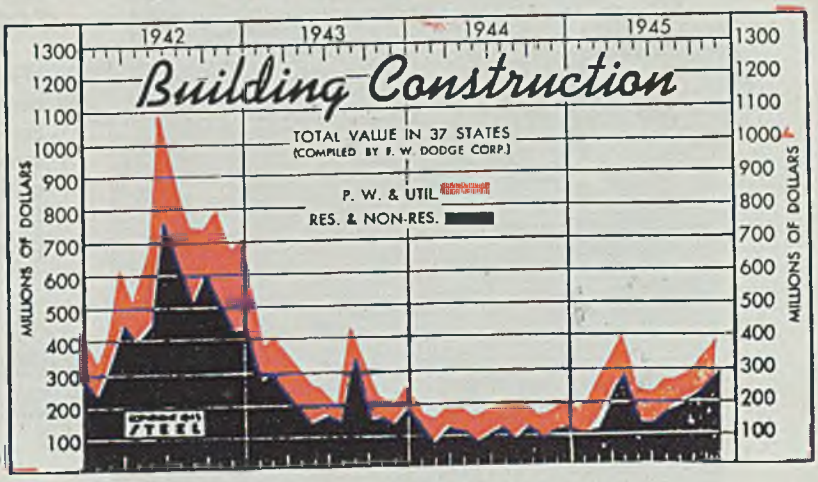
	—Employees— (000 omitted)			——Total Payrolls—— (Unit—$1,000,000)		
	1945	1944†	1943	1945	1944	1943
Jan.	564	583	637	$150.3	$141.8	$129.7
Feb.	566	583	635	138.4	137.6	122.8
Mar.	570	578	637	155.0	145.3	136.8
April	567	573	634	147.0	138.9	133.3
May	565	569	632	154.0	145.4	137.4
June	562	570	631	144.1	140.5	136.2
July	557	571	627	141.0	141.8	142.8
Aug.	543	569	625	128.1	143.9	139.9
Sept.	521	565	620	119.1	142.2	143.8
Oct.	522	564	615	121.3	141.7	144.9
Nov.	533	564	611	122.8	143.1	141.5
Dec.		564	605		139.9	140.2

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

Construction Valuation In 37 States

(Unit—$1,000,000)

	Total	Public Works-Utilities		Residential and Non-Residential	
	1945	1945	1944	1945	1944
Jan.	140.9	39.8	50.3	101.2	108.9
Feb.	147.0	32.0	55.1	115.0	82.1
Mar.	328.9	90.6	61.3	238.3	115.1
Apr.	395.8	111.9	72.0	283.9	107.3
May	242.5	107.9	55.8	134.6	88.4
June	227.3	95.0	70.7	132.3	93.1
July	257.7	89.9	80.5	167.8	110.0
Aug.	263.6	77.5	69.4	186.1	99.9
Sept.	278.3	54.6	64.1	223.6	111.6
Oct.	316.6	61.1	52.2	255.5	92.6
Nov.	370.1	74.0	48.0	296.0	116.9
Dec.	.....	.....	66.6	.....	121.8
Total	.....	.....	746.0	.....	1,247.7



FINANCE

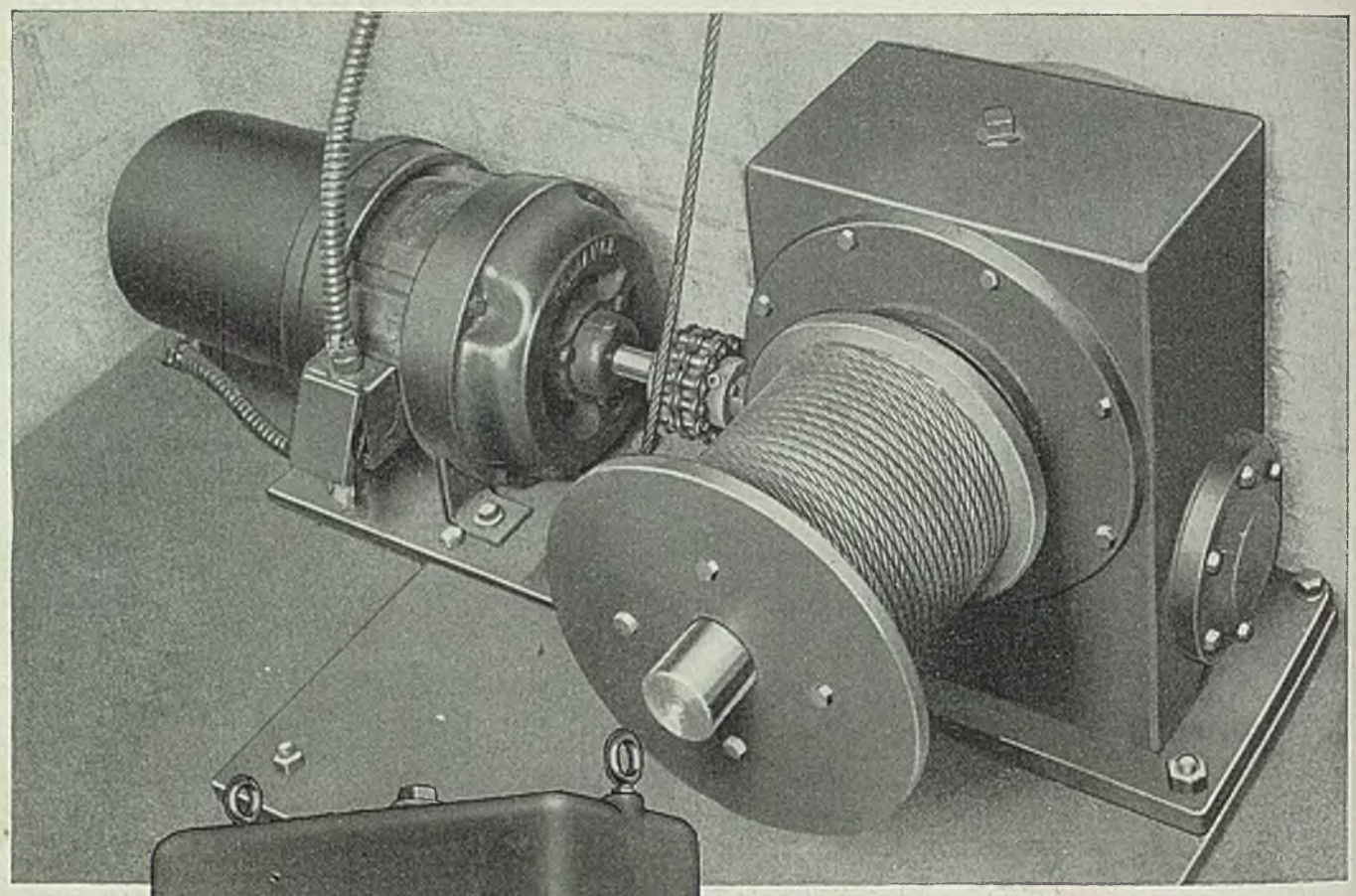
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$13,149	$11,936	$13,466	$11,543
Federal Gross Debt (billions)	$278.6	$278.7	$278.6	$232.8
Bond Volume, NYSE (millions)	$50.6	$27.1	$41.3	$112.5
Stocks Sales, NYSE (thousands)	12.290	5,054	8,488	11,099
Loans and Investments (billions)†	$67.9	$67.7	$67.1	$59.9
United States Gov't. Obligations Held (millions)†	$48,674	$48,541	$48,654	$44,323

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$57.55
All Commodities†	106.8	107.0	106.5	104.6
Industrial Raw Materials†	119.7	120.6	119.1	115.4
Manufactured Products†	102.6	102.6	102.5	101.3

†Bureau of Labor Statistics Index, 1926 = 100.



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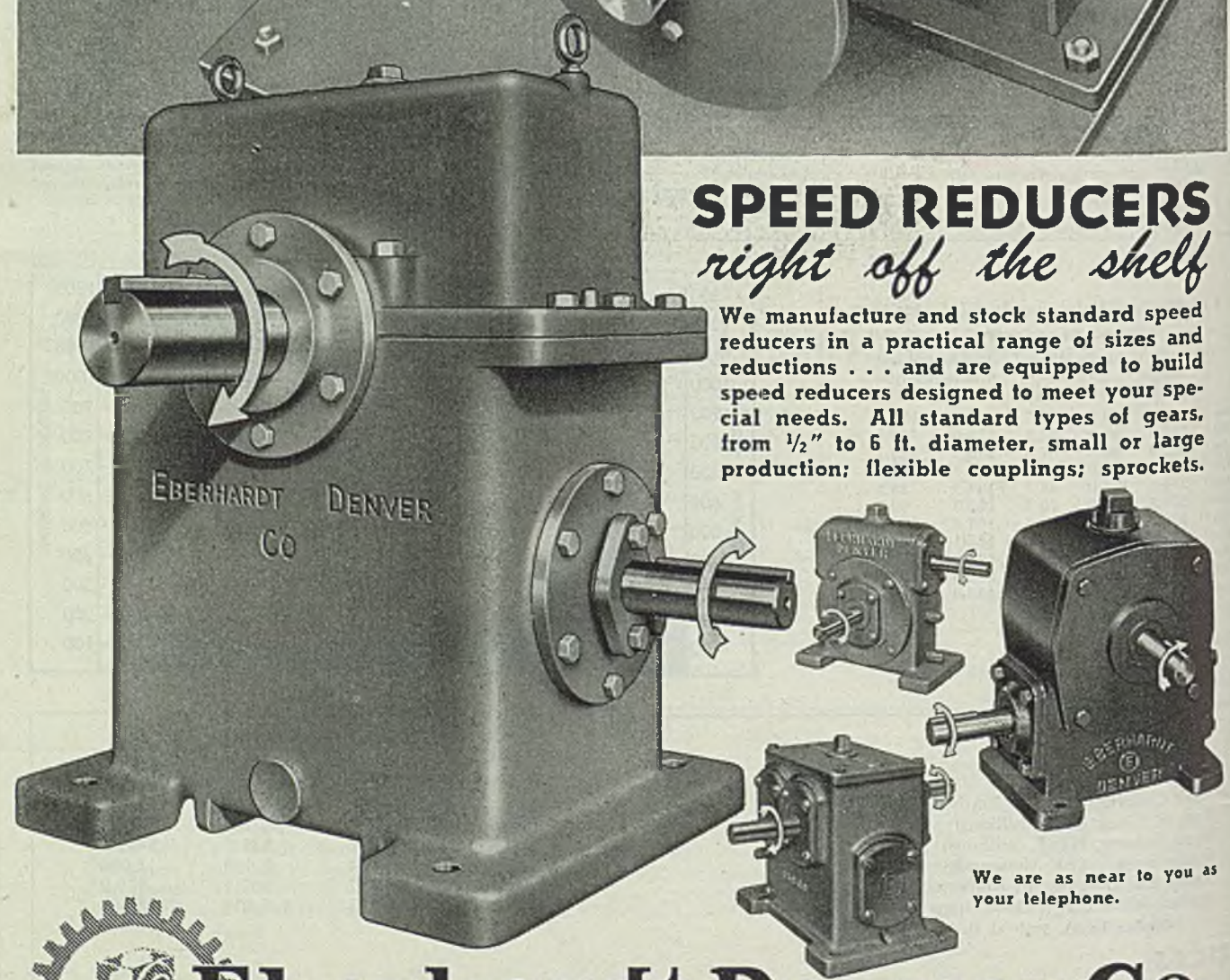

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HELPFUL LITERATURE

1. Turbine Pumps

Worthington Pump & Machinery Corp.—12-page illustrated bulletin No. W-34-B2 describes features of regenerative turbine pumps for general water, cooling tower, small boiler feed, condensate, circulation system, washing system, sanitary drinking water supply, gasoline transfer and volatile liquid services. Dimensions and rating tables are included.

2. Special Machine Tools

W. F. & John Barnes Co.—48-page pictorial review entitled "Special Machine Tools for Diesel Engine Metal Working Operations" describes briefly Barnes Unit-Type and special machines designed and built to perform multiple machining operations on diesel engine components.

3. Testing Machines

Baldwin Locomotive Works, Baldwin Southwark Div.—4-page illustrated bulletin No. 212 presents specifications of S-604 Sonntag universal testing machines. Dimensional drawings, list of tools and accessories and other information are included.

4. Soot Destroyer

Nutmeg Chemical Co. — 4-page illustrated bulletin "Management Knows the Facts of Life" describes function of No-Karb soot remover which is scattered over burning coals or in path of oil burner flame to remove carbon, soot or fire scale from fire side of boiler surfaces. Details are given on NCC sludge solvent which prevents formation of sludge in components of oil burner system.

5. Extruded Aluminum Bronze

Ampco Metal, Inc.—19-page illustrated bulletin No. 64A covers prices and specifications of extruded bronze bars, tubes and shapes of certain grades of Ampco metal, Ampcoloy bronze alloys and Ampco rolled sheet. Diameter increments, tolerances, weights, physical properties and other data are given.

6. Industrial Gas Burners

Surface Combustion—4-page illustrated bulletin GA-1 is descriptive of combustion accessories for industrial gas burner equipment. Details are given on tunnel blocks, adapter castings, governor, pilots, pilot mixers, combination lighting and inspection castings, flue tile, pyrometer tile, pressure gages and sight glasses for use with gas burners in industrial applications.

7. Products Directory

Allis-Chalmers Mfg. Co.—32-page illustrated comprehensive directory of products and engineering literature describes lines of industrial equipment for industry. More than 1600 products types are included. Engineering literature is arranged according to product discussed. New products added since previous directory, such as induction and dielectric heating equipment, are starred for easy identification.

8. Metal Sawing

W. O. Barnes Co.—48-page illustrated booklet entitled "Handbook of Metal Sawing" contains recommendations on use of hand and power hack saws together with instructions on operation and adjustment of metal cutting band saws. Specifications and prices of Barnes saw blades and band saws are given. Tables of recommended teeth and speeds are included and special attention is given to narrow width and skip tooth band saws for high speed cutting of nonferrous metals.

9. Hydraulic Gages

Watson-Stillman Co.—4-page illustrated bulletin No. 290-A outlines construction details of line of direct stem and flush mounted gages designed for use on hydraulic presses and pumps where accurate indication of hydraulic pressures is essential. Direct stem gages are applicable for pressures ranging from 1000 to 30,000 pounds per square inch. Flush mounted gages will register pressures up to 10,000 pounds per square inch. Several dial sizes are available.

10. Resistance Welders

Taylor-Winfield Corp.—20-page illustrated bulletin No. SP-1 entitled "Resistance Welders with Engineered Performance" describes principles of design, construction and applications of resistance welders. Special and standard units are covered.

11. Industrial Equipment

Youngstown Welding & Engineering Co.—16-page illustrated brochure describes facilities and typical production of industrial equipment and materials for metal and process industries. Pickling and heat treating equipment, welded tubes and fittings, and marine equipment are covered. Specializing in corrosion resistant metals, company offers specialized design and fabricating service to industry.

12. Angle Planer

Thomas Machine Mfg. Co.—4-page illustrated bulletin No. 309 gives general description and recommended uses of Thomas angle planers for planing legs and heels of angles. Planing can be square or at any angle desired. Other types of equipment for structural shops, shipyards, car shops and allied industries are also shown.

13. Gas Holders

Stacey Bros. Gas Construction Co.—52-page illustrated bulletin No. W-45 presents full data on wet seal gas holders. Details of construction, welded design, typical installations, engineering data, operation and maintenance are some of factors covered.

14. Industrial Doors

Barber-Colman Co.—4-page illustrated bulletin A.I.A. file No. 17a2 describes Barcol OVER-door, overhead door which opens upward on steel tracks. Typical installations, advantages of use and specifications are given. Design and features of construction are outlined.

15. Electronic Motor Controls

Electron Equipment Corp.—4-page illustrated bulletin No. 178 describes Varitronic electronic motor drive units which provide full range, adjustable, stepless speed control. Power for alternating current lines is converted for driving variable speed direct current motors serving machines and tools requiring infinitely variable speed range within capacity of motor. Typical units in line are shown.

16. Copper Covered Wire

Copperweld Steel Co.—24-page illustrated bulletin entitled "30 Years" traces development, manufacture and applications of Copperweld copper covered steel wire and rod made by molten-welding process. This material has heavy copper coating which is permanently and continuously welded to strong alloy steel core. Typical uses of this material for electrical power transmission are shown.

17. Foundry Equipment

American Foundry Equipment Co.—24-page illustrated catalog No. 40 entitled "The American Line" presents detailed summary of Wheelabrator Airless blast cleaning equipment; Airblast rooms, cabinets, accessories and supplies; Wheelpeening equipment; metal washing equipment; Dustube cloth bag type dust collectors; Sandcutters for conditioning foundry sand; rod straightener and shear machine; and Airblast Long Lyfe nozzles.

18. Pipe Hangers

Blaw-Knox Co.—36-page illustrated catalog No. 2026 presents details of design, application and features of functional spring hangers and vibration eliminators for industrial piping installations. Conclusions of prefabricated power piping engineers regarding design of piping layouts for flexibility are given. Engineering data on use of these auxiliary units are included.

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19. Hydraulic Units

John S. Barnes Corp.—4-page illustrated bulletin No. 302-U describes L-type self-contained hydraulic units. Advantages of use are outlined and plan drawings are shown. Units from 2 to 15 horsepower are covered.

20. Lift Truck

Automatic Transportation Co.—4-page illustrated bulletin No. 1001 describes Transporter platform type and fork type lift trucks. Electrically propelled by storage batteries, trucks are operated through thumb tip control on steering handle. Brake is mechanical and lifting is hydraulic. Specifications are given and dimensional drawings are included.

21. Carbide Tools

Willey's Carbide Tool Co.—8-page illustrated bulletin No. 28-A describes six grades of Willey's metal which are designed for machining various metals. Data are given on standard carbide cutting tools and standard blanks which are available in each grade.

22. Electric Welders

Westinghouse Electric Corp.—8-page illustrated booklet No. B-3090 describes alternating current welders for use with Unionmelt process to speed industrial production. Advantages, applications and operation of equipment are included.

23. Vane Type Pumps

Vickers Inc.—8-page illustrated bulletin No. 40-16 includes description, specifications and applications of two-stage vane type pumps for oil hydraulic working pressures up to 2000 pounds per square inch for use on hydraulic presses, die casting machines, injection molding machines, welders and other heavy duty machinery.

24. Plating Machine

Udylite Corp.—4-page illustrated folder gives data on compact automatic plating machine adaptable to most quantity plating operations. Features include counterbalanced hydraulic tank transfer control, versatile work carrier mechanism and standard replacement parts.

25. Carbon-Graphite Material

United States Graphite Co.—40-page illustrated technical booklet presents technical and application data on Graphitar, carbon-graphite material. Physical properties and design information are covered. Specification sheet to aid in securing engineering recommendations for parts made of Graphitar is included.

26. Tube Furnaces

Burrell Technical Supply Co.—Two illustrated bulletins describe Unit-Package tube furnaces and McDanel combustion tubes for high temperature furnaces, respectively. Tube furnaces are designed for operation at temperatures up to 2650 F. Dimensions, prices and other data on this equipment are given.

27. Die Cushions

Dayton Rogers Mfg. Co.—Three illustrated bulletins present data relating to selection and application of die cushions. Form No. 93 lists tonnage capacities on presses and gives data to aid in selection of die cushion size and ring holding pressures. Two data sheets list recommendations on die cushions for various makes and sizes of inclinable presses. Form No. 89 describes model CC pneumatic die cushions for power presses.

28. Tool Steel

Crucible Steel Co. of America—30-page illustrated technical booklet is reprint of series of articles entitled "Tool Steel for the Nonmetallurgist." Characteristics of different types of tool steels, purposes for which each is best adapted and suggestions for heat treatment are included. Other factors involved in selection and application of tool steels are discussed.

29. Drill Turret Head

Chicago Drillet Corp.—6-page illustrated folder described Quadrill four-position turret drill head which can be adapted to nearly all makes of drill presses. Four spindles index into position so that four drill press operations can be performed with single setup of part. Unit can be fitted with drilling, counterfacing, reaming, spot facing and other similar tools.

30. Rotary Shaft Seal

Crane Co.—4-page illustrated bulletin "Specify the John Crane Bellows-Type Shaft Seal" lists construction details, operating information, advantages, available materials, engineering data, space requirements and typical installations of this mechanical seal for centrifugal and rotary pumps, refrigeration compressors, gear boxes, speed reducers and other industrial applications.

31. Bending Presses

Cleveland Crane & Engineering Co.—4-page illustrated bulletin No. 2010-B gives construction details, specifications and dimensions of line of Cleveland Steelweld bending presses and bulldozers. Data are presented on special bed and ram designs. Presses are available in 29 sizes for bending, forming, drawing and multiple punching of plate ranging from light gage to 1-inch thick and for lengths up to 20 feet. Bulldozers are available in sizes up to 220-ton capacity.

32. Descaling Process

E. I. du Pont de Nemours & Co., Electrochemicals Dept.—8-page illustrated bulletin entitled "Du Pont Sodium Hydride Descaling Process" describes this material and outlines its use for rapid, efficient removal of scale from metals and alloys. Advantages, features, applications, process and results obtained are covered.

33. Small Pumps

Brady Pump Co.—6-page illustrated folder on machine tool coolant and industrial centrifugal pumps presents data on units for use as standard equipment on machines such as lathes, milling machines, drill presses and grinders. They are adaptable also for use in circulating and sump work, as well as for powering degreasers, quench tanks, etc. Leaflet insert describes Pinch-Hitter portable tank coolant pump units.

34. Gages

Abdite Gauge Co.—32-page illustrated pocket-size pamphlet "Where Unusual Skill and Modern Equipment Combine to Solve your Gauging Problems" is compilation of American Gage Design standards published by National Bureau of Standards. Numerous diagrams and charts are included. Brief history of company is given and typical gages are shown.

35. Arc Welding Electrodes

Wilson Welder & Metals Co.—32-page illustrated catalog "Arc Welding Electrodes" is designed to guide electrode users in the selection of proper electrode for specific job. Data are given on electrode specifications for all types of work on wide variety of base metals. Welding procedures approved for each application are outlined. Chemical analyses, specifications and other engineering data are given for each electrode.

36. Materials Handling

Elwell-Parker Electric Co.—8-page illustrated bulletin "The Logistics of Boxes" discusses use of boxes in transportation cycle and and their advantages for handling of materials. Use of industrial power trucks for handling boxed loads is outlined.

37. Thermocouples

Wheelco Instruments Co. — 32-page illustrated bulletin No. S2-6 is entitled "Wheelco Thermocouple Data Book and Catalog." This manual gives information on selection of correct thermocouple for given conditions and suggest installation aids. Descriptions and list prices are presented on thermocouples, thermocouple wire, lead wire, heads, connectors, plug and socket assemblies, insulators and protecting tubes.

38. Alloy Steels

Carpenter Steel Co. — 16-page illustrated booklet "Fitting the Steel To The Job" explains uses and advantages of alloy steels which are tailor made to tool steel standards. Suggestions are made on selecting alloy steels to meet specific requirements, such as fatigue resistance on parts exposed to extreme vibration, special combinations of toughness and wear resistance, etc.

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MARKET SUMMARY

Heavier Pressure on Steel Calling for Priorities

Flat-rolled and shapes pushing hardest . . . Deliveries now late in year . . . Strike threat slowed production sharply

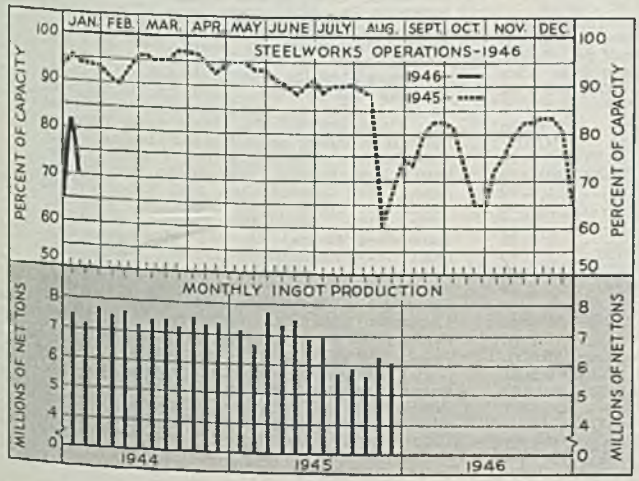
GROWING tightness in steel supply is evidenced by a noticeable increase in requests for priorities assistance, particularly in sheets, including galvanized, electrical and enameling.

While total assistance being granted at present does not represent sufficient tonnage to interfere with distribution schedules the amount is increasing despite best efforts of Washington and producers to keep it down. In addition to sheets increasing difficulty is arising in other products, especially in structural shapes, where in some quarters the feeling exists that the industry will have to give serious thought to further expansion in production. Rolling facilities are adequate but there is need for diverting more steel to this product. At present shape deliveries fall late in first half, with some important producers entirely out of the market for that period.

At the same time a large accumulation of building construction is awaiting more stable conditions before going ahead and will require not only heavy sections but light shapes as well. Particularly in view of scarcity of lumber, the proposed housing program, which may involve 400,000 to 500,000 units this year, probably will require a substantial tonnage of standard structurals.

Up to the present smaller consumers have shared substantially in such priority assistance as has been given and with relatively few exceptions the assistance has been given through CC ratings and in no case has provided for more than 60 days supply. Shortage in galvanized and electrical sheets is ascribed to especially heavy demand and the fact that production in neither case has returned to prewar levels.

Deliveries on all these products, where promises actually are being made, run well into the latter part of the year and in the case of some producers, especially of galvanized, schedules are closed for the year.



DISTRICT STEEL RATES

(Percentage of Ingot Capacity Engaged in Leading Districts)

	Week Ended Jan. 19	Change	Same Week 1945	Same Week 1944
Pittsburgh	56.5	—33	88.5	96
Chicago	64	—24	98	101.5
Eastern Pa.	78	— 2	94	96
Youngstown	65	—20	78	94
Wheeling	93	— 2	93.5	93
Cleveland	83	— 1	86	95
Buffalo	23.5	—57.5	77	90.5
Birmingham	95	None	90	95
New England	80	None	92	95
Cincinnati	81	None	92	94
St. Louis	63	— 5	75	83
Detroit	88	None	83	88
Estimated national rate	70	—12	93.5	99

[a]Based on steelmaking capacities as of these dates.

Strike in the electrical industry has resulted in no important suspensions, as consumers, as in the case of the automotive strike, apparently are laying plans to take in steel in their own plants or in commercial warehouses for the time being. However, so tight is the situation in light flat-rolled products that some of the producers themselves will bring pressure on electrical equipment manufacturers for permission to divert shipments to others in a position to handle it. Some sheet sellers who are operating on a quarterly quota basis have not yet opened books for second quarter, because of the labor situation and its effects, one of which has been to delay issuance of directives against the program for allocating more than 900,000 tons of various steel products for export during first half, this to take precedence over unrated domestic and other export business.

Steel production last week fell 12 points to 70 per cent of capacity, from a revised rate of 82 per cent for the preceding week. The revision and the decline last week resulted from interruption of production at the prior week end in preparation for the steel strike, before news of postponement of the date was known. Buffalo experienced the sharpest drop, 57½ points to 23½ per cent of capacity, the result of a strike at the Lackawanna plant of Bethlehem Steel Co. Pittsburgh lost 33 points to 56½ per cent, Chicago 24 points to 64 per cent, Youngstown 20 points to 65, St. Louis 5 points to 63, Wheeling 2 points to 93, eastern Pennsylvania 2 points to 78 and Cleveland 1 point to 83. Rates were unchanged as follows: New England 80, Cincinnati 81, Birmingham 95 and Detroit 88.

In spite of threats to steel production steel mills have continued to buy scrap wherever it is available, believing in view of the short supply the tonnage will be needed when conditions right themselves and production is more stable. Scarcity persists in all grades, especially in heavy melting steel, borings and turnings and cast.

Average composite prices of steel and iron products are unchanged at existing Office of Price Administration ceilings, finished steel composite being $58.27, semifinished steel $37.80, steelmaking pig iron $24.80, steelmaking pig iron $19.17.

COMPOSITE MARKET AVERAGES

	Jan. 17	Jan. 12	Jan. 5	One Month Ago Dec. 1945	Three Months Ago Oct. 1945	One Year Ago Jan. 1945	Five Years Ago Jan. 1941
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$57.35	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	37.80	36.00	36.00
Steelmaking Pig Iron	24.80	24.80	24.80	24.80	24.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	18.95	21.00

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; other, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material	Jan. 19, 1946	Dec., 1945	Oct., 1945	Jan., 1945
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.25	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.10
Plates, Philadelphia	2.30	2.30	2.30	2.15
Plates, Chicago	2.25	2.25	2.25	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.90	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods, No. 5 to 9/32-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron	Jan. 19, 1946	Dec., 1945	Oct., 1945	Jan., 1945
Bessemer, del. Pittsburgh	$26.94	$26.94	$26.19	$25.19
Basic, Valley	25.25	25.25	24.50	23.50
Basic, eastern del. Philadelphia	27.09	27.09	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	26.44	26.44	25.69	24.69
No. 2 foundry, Chicago	25.75	25.75	25.00	24.00
Southern No. 2, Birmingham	22.13	22.13	21.38	20.38
Southern No. 2 del. Cincinnati	26.05	26.05	25.30	24.30
No. 2 fdry., del. Philadelphia	27.59	27.59	26.84	25.84
Malleable, Valley	25.75	25.75	25.00	24.00
Malleable, Chicago	25.75	25.75	25.00	24.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.94	25.94	25.19	24.19
Ferromanganese, del. Pittsburgh	140.00	140.00	140.33	140.33

Scrap				
Heavy melting steel, No. 1, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt, steel, No. 2, E. Pa.	18.75	18.75	18.45	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.50	$7.50	$7.50	$7.00
Connellsville, foundry ovens	8.25	8.25	8.25	7.75
Chicago, by-product fdry., del.	13.35	13.75	13.75	13.35

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O. may quote carbon steel ingots at $33 gross ton, f.o.b. mill.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45. **Rerolling Billets, Blooms, Slabs:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bll) $38; Pac. Ports, (bll) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co. $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42, Detroit, del. $44; Duluth, billets, $44; forg. bll. f.o.b. Pac. ports, $54.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co. $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18-in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—9/32 in. inclusive, per 100 lbs., $2.15 Do., over 9/32—41/64-in., incl., $2.30; Galveston, base, $2.25 and $2.40 respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.05 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3: Pittsburgh, Youngstown, Chicago Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c, (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Supply Co., may quote 2.55c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit del., 2.80c. (Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del. 3.78c; Pacific ports 4.25c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.36c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron, 3.90c; pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 2.85c; Granite City, base 2.95c; Detroit, del, 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20 gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	....
65	7.25c	8.00c	....
58	7.75c	8.50c	....
52	8.55c	9.30c	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c.

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.25c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 lb. tin, $4.35; 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65; Granite City, $4.45, $4.60, $4.75, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed, .450c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Plates

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. 12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c; Gulf ports, 3.85c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports. 2.75c; Gulf ports. 2.45c.

(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.45c, Bethlehem, Pa., on the general range and 2.55c on beams and channels from 4 to 10 inches.)

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.40c; Pacific ports, 2.95c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham to manufacturers in carloads.

Bright, basic, bessemer wire ..... •$2.75

Spring wire ..... •‡$3.35

Wire Products to the Trade:

Standard and cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, $2.90; Pac. ports, $3.40; galvanized, $2.55 and $3.05, resp.

Annealed Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.20

Galvanized Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.55

Woven fence, 15½ gage and heavier, per base column 67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 72; twisted barbless wire, column 72.

•Add $0.10 for Worcester, $0.05 for Duluth; add $0.50 for bright, annealed, galvanized and $0.70 for other finishes for Pacific ports.

‡ Same bases as for bright basic except Birmingham.

†† Add 10 cents for Worcester; 50 cents for annealed, bright basic and 70 cents for all other finishes for Pacific ports.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½-3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b.f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	.....	$ 9.01	.....	.....
1¼"	13	.....	10.67	.....	.....
1½"	13	$10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., .fo.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

•Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

•Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Base, per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	3	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
•316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
••410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	26.50	32.50	24.00	32.00
443	22.50	26.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

•With 2-3% moly. §With titanium. †With columbium. ••Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Rivets, Washers

Birmingham

F.o.b. Pittsburgh, Cleveland, Chicago

Structural 3.75c

⅞-inch and under ..... 65-5 off

Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ..$2.75-3.00 off

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off

Do., ⅝ and 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 ..... 58 off

Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
1⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off

Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off

Headless, ¼-in., larger ..... 60 off

No. 10, smaller ..... 70 off

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the some designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extra mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prces, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	•7.50
Connellsville, foundry	8.00- 8.50
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	13.65
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	††13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.25

•Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945.

†14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
.Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$20.00

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[2]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[24]	4.244[31]	4.715	6.012[33]	6.012[39]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[16]	4.203[31]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[16]	4.203[31]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[16]	4.872[16]	4.172[31]	4.772	5.816[33]	5.860[39]
Baltimore	3.802[1]	3.739[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[28]	4.152[28]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[37]	4.841[20]	4.141[28]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[37]	4.965[24]	4.265[31]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[20]	3.85[21]	4.669	5.60[33]	5.75[39]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[20]	3.75[21]	4.35	5.60[33]	5.75[39]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[15]	4.40[24]	3.85[28]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[15]	4.30[24]	3.75[28]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[15]	4.40[24]	3.85[31]	4.45[31]	5.60[33]	5.65[39]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	..	4.30[24]	3.75[28]	4.35[28]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.900[21]	4.659	5.93[33]	5.93[39]
Omaha (city, delivered)	4.043[1]	4.093[1]	4.093[1]	5.693[1]	3.793[1]	4.143[1]	4.143[1]	5.615[12]	5.443[24]	4.543[12]	.....	.....	.....
Omaha (country, base)	3.943[1]	3.993[1]	3.993[1]	5.593[1]	3.693[1]	4.043[1]	4.043[1]	5.515[12]	.....	.....	.....	.....	.....
Cincinnati	3.611[2]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[12]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[12]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[33]	5.85[39]
Milwaukee	3.637[3]	3.687[4]	3.687[3]	5.287[3]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[33]	6.087[39]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[21]	4.78	6.08[33]	6.18[39]
St. Paul	3.76[3]	3.81[3]	3.81[3]	5.41[3]	3.51[3]	3.86[3]	3.86[3]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[33]	6.19[39]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[11]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[33]	6.281[39]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[34]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[36]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.313[3]	4.313[3]	5.313[36]	4.10[10]	3.75[28]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[1]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[6]	5.683[23]	5.613	5.85[33]	5.95[39]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.433[21]	7.333	8.304[33]	8.404[39]
Portland, Oreg.	4.45[37]	4.45[37]	4.75[37]	6.50[37]	4.65[37]	4.75[37]	6.30[37]	5.75[15]	6.60[15]	5.633[15]	.....	.....	8.00[39]
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00[39]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.05[21]	5.883[21]	.....	.....	.....

*Basing point cities with quotations representing mill prices, plus warehouse spread.
NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.95
Mesabi nonbessemer	4.55
High phosphorus	4.55
Mesabi bessemer	4.70
Old range nonbessemer	4.80

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, or dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnace

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
	Chemical Composition Limits, Per Cent									
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximum fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, and Oct. 22, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.75	$26.25	$27.75	$27.25
Newark, N. J., del.	28.28	27.78	29.28	28.78
Brooklyn, N. Y., del.	29.25	.....	.....	29.75
Birdsboro, Pa., base	26.75	26.25	27.75	27.25
Birmingham, base	22.13	20.75	26.75	.....
Baltimore, del.	27.36	.....	.....	.....
Boston, del.	26.89	.....	.....	.....
Chicago, del.	25.97	.....	.....	.....
Cincinnati, del.	25.81	24.48	.....	.....
Cleveland, del.	25.87	24.99	.....	.....
Newark, N. J.	27.90	.....	.....	.....
Philadelphia, del.	27.21	26.71	.....	.....
St. Louis, del.	25.87	24.99	.....	.....
Buffalo, base	25.75	24.75	26.75	26.25
Boston, del.	27.25	26.75	28.25	27.75
Rochester, del.	27.28	.....	28.28	27.78
Syracuse, del.	27.83	.....	28.83	28.33
Chicago, base	25.75	25.25	26.25	25.75
Milwaukee, del.	26.85	26.35	27.35	26.85
Muskegon, Mich., del.	28.94	.....	.....	28.94
Cleveland, base	25.75	25.25	26.25	25.75
Akron, Canton, del.	27.14	26.64	27.64	27.14
Detroit, base	25.75	25.25	26.25	25.75
Saginaw, Mich., del.	28.06	27.56	28.56	28.06
Duluth, base	26.25	25.75	26.75	26.25
St. Paul, del.	28.38	27.88	28.88	28.38
Erie, Pa., base	25.75	25.25	26.75	26.25
Everett, Mass., base	26.75	26.25	27.75	27.25
Boston, del.	27.25	26.75	28.25	27.75
Granite City, Ill., base	25.75	25.25	26.25	25.75
St. Louis, del.	26.25	25.75	.....	26.25
Hamilton, O., base	25.75	25.25	.....	25.75
Cincinnati, del.	26.19	26.36	.....	26.86
Neville Island, Pa., base	25.75	25.25	26.25	25.75
§Pittsburgh, del. No. & So. sides	26.44	25.94	26.94	26.44
Provo, Utah, base	23.75	23.25	.....	.....
Sharpsville, Pa., base	25.75	25.25	26.25	25.75
Sparrows Point, base	26.75	26.25	.....	.....
Baltimore, del.	27.74	.....	.....	.....
Steelton, Pa., base	.....	26.25	.....	27.25
Swedeland, Pa., base	26.75	26.25	27.75	27.25
Philadelphia, del.	27.59	27.09	.....	28.09
Toledo, O., base	25.75	25.25	26.25	25.75
Youngstown, O., base	25.75	25.25	26.25	25.75
Mansfield, O., del.	27.69	27.19	28.19	27.69

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. § For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenbridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$31.25		
6.51-7.00	$32.25	9.01- 9.50	37.25
7.01-7.50	33.25	9.51-10.00	38.25
7.51-8.00	34.25	10.01-10.50	39.25
8.01-8.50	35.25	10.51-11.00	40.25
8.51-9.00	36.25	11.01-11.50	41.25

F.o.b. Jackson county, O., per gross ton. Buffalo base $1.25 higher, whichever is most favorable to buyer. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, low phos., f.o.b. 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. $25.25
Valley base 25.25

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $31.25 base; $32.49, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $28.25.

Switching Charges: Basing Point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $68.50

First Quality

Pa., Ill., Md., Mo., Ky.	54.40
Alabama, Georgia	54.40
New Jersey	50.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases 63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	32.90
Wire Cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded Magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.00 war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135 f.o.b. 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 f.o.b. 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 and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l. 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l. max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom: 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%. car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max. sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract ton lots, $1.89, less $2.01, eastern; freight allowed; $1.903 and $2.623, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide, approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 18-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c, and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all f.o.b. Bridgeville, Pa., usual freight allowance.

Silicon Metal: Min. 97% silicon and max. 1% iron; eastern zone, bulk, c.l., 12.90c; 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96% min. manganese, max. 2% iron), 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.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: Spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6.8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon. 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 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

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	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

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.31
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	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

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, O:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. 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
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	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

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.50
Shoveling Turnings	12.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	9.50-10.00
Shoveling Turnings	11.50-12.00
Cast Iron Borings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	12.50
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", under	15.00
Alloy-free Turnings	7.00
Tin Can Bundles	14.50
No. 2 Steel Wheels	15.50
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.50
Uncut Frogs, Switches	15.50
Scrap Rails	15.50
Locomotive Tires	15.50

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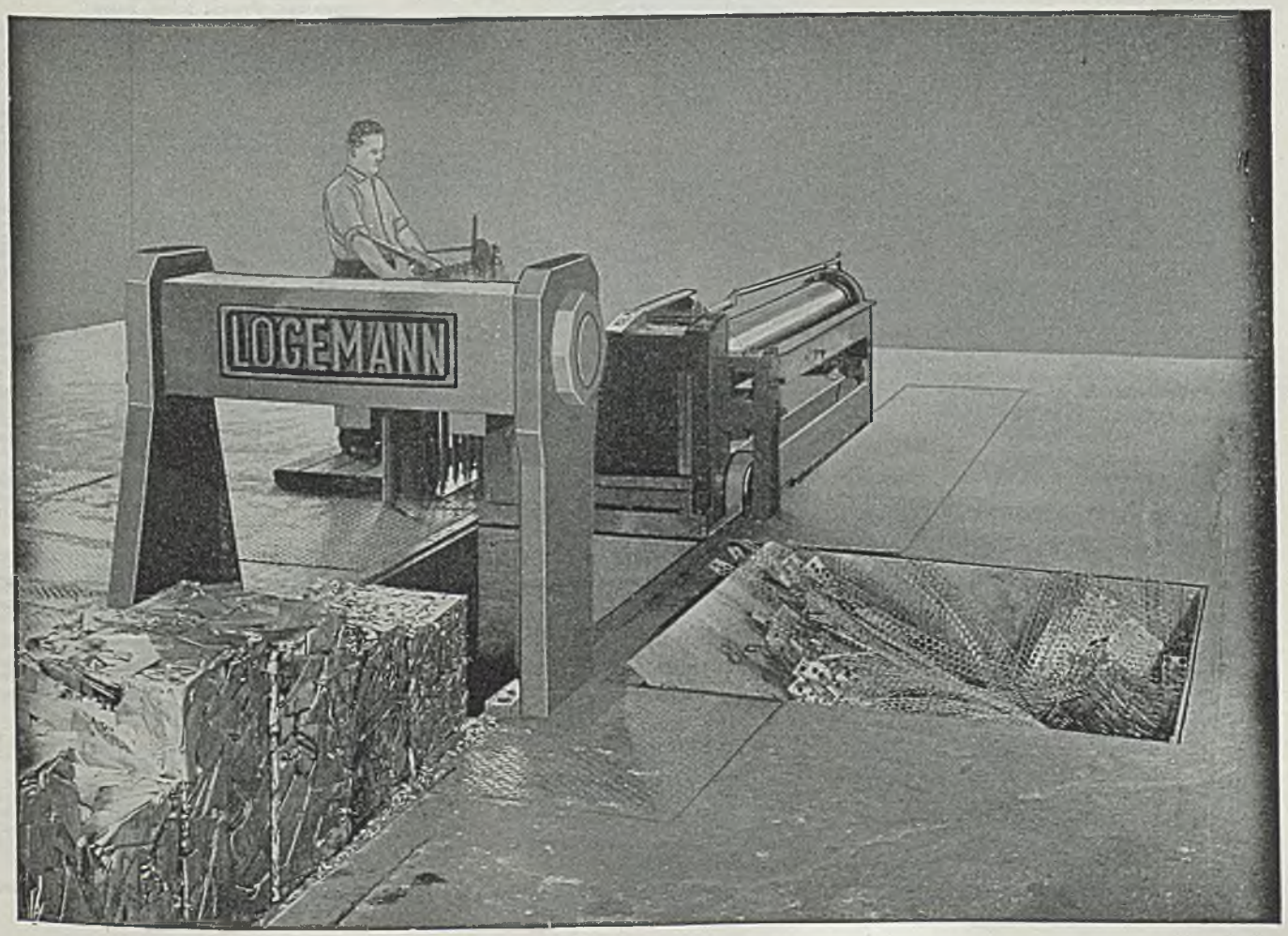


Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12,12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more. 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.45c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.00c to 8.25c, Grade 4 (85-90%) 7.75c; any other ingot containing over 1% iron, except PM 754 and hardeners, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Price for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, $108-$110 per 76-lb. flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 70.625c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.48c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%; Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.785
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz Metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	8.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Price f.o.b. 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 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross; die cast slab 5.80c any quantity.

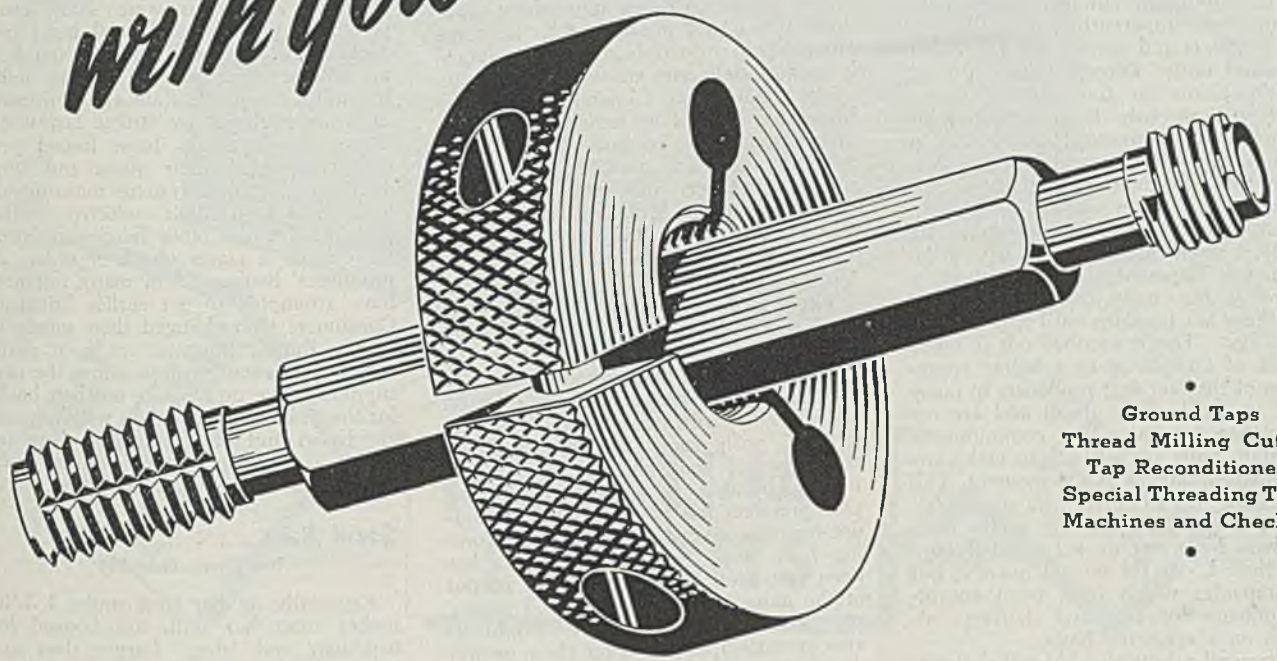
Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Don't get caught with your tolerances down



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CHICAGO 12, Ill.....KEdsie 3170
CINCINNATI 2, O.....MAin 2544
CLEVELAND 13, O.....CHerry 3520
DAYTON 2, O.....FUlton 6161
DENVER 2, Colo.....KEystone 7229
DETROIT 11, Mich.....MAdison 0260
FLINT, Mich.....Flint 4-3661
HOUSTON, Tex.....CApitol 5487
INDIANAPOLIS 9, Ind.....FRanklin 2456
LOS ANGELES, Calif.....ADams 1-4381
MILWAUKEE 2, Wisc.....DAily 4256
MINNEAPOLIS, Minn.....MAin 1488
MUSKEGON, Mich.....Muskegon 248
NASHVILLE 6, Tenn.....Nashville 6-3647
NEWARK 2, N. J.....MArket 3-1493
PITTSBURGH 19, Pa.....ATlantic 3011
ROCKFORD, Ill.....MAin 2243
ST. LOUIS 1, Mo.....CEntral 4435
SAN FRANCISCO, Calif....DOuglas 7711
SOUTH BEND 3, Ind...South Bend 3-0009
SYRACUSE 9, N. Y.....Syracuse 8-1462
TOLEDO 4, O.....GArfield 8302
MONTREAL, Canada.....MAin 5346
TORONTO, Canada.....WAverly 2688
WINDSOR, Canada.....Windsor 4-9229

History shows that industry never turns backward. This applies to tolerances, also. During World War II, thousandths and half thousandths shrank to one or two-tenths. Peace-time industry, in all likelihood, will continue to work to these—and even closer—tolerances.

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Sheets, Strip . . .

Sheet & Strip Prices, Page 134

Labor uncertainties have had the effect of increasing pressure for sheet and strip deliveries, consumers seeking to build inventories before supply is curtailed. Strikes in the electrical industry have not brought suspensions, consumers taking shipments and storing for use when production resumes. Mills generally are booked so far ahead that promises of delivery are difficult. Quota plans are in effect in most instances.

New York — Strikes at leading electrical plants have not resulted in suspension of shipments. In fact, these manufacturers are apparently laying plans to take in sheets and strip to the full extent permitted under Direction 6 to PR 32. Certain plants in the Queens section of New York City have arranged for shipments to commercial warehouses in northern New Jersey, finding that warehouse rates in their immediate vicinity are too high to allow economical storage.

Postponement of the steel strike for at least a week resulted in a flurry of demand for shipment, although there is somewhat less new inquiry at present than there has been up until two or three weeks ago. This is ascribed not so much to lack of interest as to a better appreciation of the fact that producers in many cases are booked far ahead and are not in position to make firm commitments.

Certain mills are refusing to make any quotations whatever at the moment. This applies not only to sellers who are operating on a straight quarterly quota basis and who have not as yet officially opened their books for second quarter, but to companies which have been accepting tonnage for extended delivery, although on a restricted basis.

In general a buyer of hot-rolled sheets finds it difficult to obtain promises for shipment before late third quarter and on cold-rolled, fourth quarter. Deliveries on galvanized and electrical sheets extend well in fourth quarter, with some producers sold out for the year. There is also a shortage in enameling sheets, with an increasing number of applications for priorities noted in this and galvanized and the electrical sheet lines. Polished stainless steel shipments also are extended into next year, although unpolished stainless sheets can be had in early second quarter.

Boston — Efforts directed toward reduction of carryovers in narrow cold strip are hampered by increasing lags in hot strip deliveries; pressure for steel from fabricators is strong and orders for third quarter delivery are filling tentative schedules for that period. That more consumers are becoming short of material is indicated by pressure for shipments and uneven operations, which fluctuate with steel inventories, which for the most part are small. Demand for shoe shank steel is heavy, while in some lines fabricators are tooled up for higher production which steel mills are not meeting in full.

Beyond second quarter, regardless of the strike threat, much sheet tonnage is uncertain, notably electrical, polished stainless and galvanized. Divergence in policy as to scheduling and allocations adds to consumer confusion; some mills schedule on a monthly basis, others by quarters with tonnage allotments for the second still not determined. One large producer in the latter category is offering, warehouses included, sheets and strip in several finishes in two grades, one for normal commercial needs, ordinary drawing and forming and another, special killed grade for deep-drawing and severe forming. Work stoppages connected with the strike threat broke out first among fabricators in New England last week, affecting 5000 initially, mainly in the Worcester district. Affected were a stamping shop, textile equipment builder, the carbuilding shop, one foundry and an arms manufacturer.

Chicago — Demand for sheets and strip holds at a high level. While new orders in the past few days show some drop, this is not interpreted to bear relationship to a possible steel strike, largely because deliveries are weeks or months away. Fact that General Motors has suspended most of its January steel shipments from mills, because of the 45-day inventory directive of CPA, other consumers of sheets and strip may profit to some extent. Mills will be able to divert to them some of the material which otherwise would have gone to General Motors.

Pittsburgh — Selective selling and production are becoming more general among steel producers, due to heavy losses incurred on many products in face of rising costs under present ceilings. Galvanized sheet output has been restricted, with some interests avoiding this type of tonnage in 18-gage and lighter, because of high cost of zinc. One producer has not booked this product for over a year. Output of reinforcing bars, wire and other products has been restricted to permit greater output of the more profitable cold-rolled sheets, tin plate and alloy items. Producers also are attempting to alter their prewar distribution pattern in instances involving unprofitable items or excessive freight absorption. Withdrawal from merchant sheet bar markets by some interests is indicative of this policy. A number of producers already have restricted or cut out entirely shipments of wire and other products into areas remotely located, which would involve excessive freight absorption.

Cincinnati — Sheet mill schedules for first quarter have been lightened by suspensions entered by General Motors Corp. Some of this tonnage erased an overload on mill schedules and other tonnage was replaced by pressing orders for which position had not been previously found. A nonintegrated mill is maintaining a steady rolling schedule pending decision, which may follow quickly a settlement of the nationwide labor controversy, to reopen its steelworks. However, supply of semifinished is tight.

St. Louis — Sheet pressure continues to increase, aggravated by the recent refusal of some eastern mills to ship to this district. Rolling schedules are filled to the year end with possibility that some orders already on books may run over into 1947. Few new contracts are being accepted. Production continues to decline in worker anticipation of a steel strike, although the manpower supply is satisfactory for the first time in months. Currently deliveries are about 30 days behind promises.

Birmingham — Sheet production, while steady and in good volume, is not taking care of current needs adequately, at least, and gives little encouragement to prospective users in this territory.

Cleveland—Tonnage of sheets and strip involved in postponement of January and February deliveries to struck plants, including those of General Motors and its subsidiaries, has been small. Furthermore, only a portion of this freed tonnage can be rerouted to other consumers whose receipts are behind schedule. Sheet producers lost additional ground in bringing shipments up to schedule when many coke ovens, blast furnaces and open hearths were closed as a precautionary measure in anticipation of a possible strike. While the Jan. 12 weekend shutdowns were short, every pound of pig iron and steel ingot production lost now will be reflected later in smaller shipments to rolling mills. In addition some Buffalo and Worcester mills were closed by strikes last week. These developments have forced producers to apply their quota and other distribution control systems more closely and to extend their selective selling policies. On the other hand, consumers have made a closer check of orders on producers' books and in many instances have attempted to get earlier shipment. Consumers who changed their source of supply during the war are in a particularly precarious position, since the new suppliers have no tonnage on their books for the peacetime period on which quotas are based and the former suppliers are not in position to accept business from other than their regular customers.

Steel Bars . . .

Bar Prices, Page 134

Especially on bar sizes under 1 7/16 inches most bar mills are booked for first half and later. Larger sizes can be promised for May by some producers. Cold-drawn bars are less extended, some being promised for April. Alloy bars are easier than carbon.

Boston—Carbon bar deliveries against new orders before second half are rare and impossible in regular schedules on smaller sizes, two-inch and under. Relatively alloy bars are easier, with hot-rolled in March and cold-drawn in April, but on current shipments there is some lagging behind earlier promises. Buying is more spotty, extended deliveries and forward coverage, coupled with screening of inquiry as to destination involving freights, is a depressing influence. Ratio of volume directed to distributors is maintained, but on the whole, with some exceptions, consumer bar inventories are better off than other steel products. Forge shops have substantial backlogs for the automotive industry and suspensions are not serious. One has opened a wrench plant, having started production of that tool during the war. While production of wrenches and other small forged tools reached new peaks, most output for several years went to the services. The civilian market was depleted and current good demand is to fill the pipe line.

New York — While some sellers report a slight easing in schedules on larger sizes of hot-rolled bars, one leading producer now quoting 1 7/16 to 3½-inch rounds for May delivery, most producers are booked up for first half on all sizes and well into last half on sizes under 1 7/16 inches. Certain producers, in fact, are out of the market

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for the entire year on 5/8-inch bars and smaller.

Cold-drawn bar deliveries are generally less extended than hot rolled. One leading producer can offer shipments as early as April on larger sizes and can offer very small sizes for delivery in June. Hot alloy bars are being generally quoted for March shipment, although a little tonnage can be picked up in February.

Shipments have been temporarily suspended in some cases, as a result of Direction 6, to PR 32, cutting off deliveries to plants that have been shut down by strike and have built up inventories to a certain point, in order that steel can be diverted to other plants where it is badly needed. However, one exception, at least, appears to be a district plant which back in last November, at the beginning of a strike that has held up production ever since, promptly held up shipments, only to have them resumed later. This company is reported to be still taking in steel, apparently not having built up inventories to the level permitted.

St. Louis—Orders and inquiries for merchant bars continue to increase and schedules generally are filled six to seven months. Flat bar deliveries cannot be made until first quarter. New bookings are being declined. Rods are sold through first half and rail steel reinforcing bars through the first quarter. The labor supply has increased about 15 per cent, permitting mills to be fully manned without overtime.

Pittsburgh — Sellers of steel bars are gradually revising the distribution pattern on hot-rolled bars to cold finishers and other customers located within a reasonable radius of their plants. Rising costs and ceiling prices have forced careful scrutiny of freight absorptions on all tonnage. Cold-drawn bar deliveries generally fall in second quarter while small carbon bar sizes are extended well into third quarter, with second quarter on large rounds. Pressure has been acute for all bar specifications and some further improvement in forward commitments is noted for alloys. Some adjustments in rolling schedules, involving relatively small tonnages, have developed out of suspension orders resulting from the General Motors strike. If the strike is not settled soon the tonnage involved is expected to reach substantial proportions. Many auto partsmakers have neither the capital or warehouse facilities to continue much longer on the present basis.

Philadelphia — Hot carbon bar deliveries cover a wide range, with large sizes available late in second quarter and small sizes not before late in the year. Some producers, in fact, have nothing to offer this year in some smaller sizes. Cold-drawn carbon bar shipments range through second quarter and into third, with promises on smaller sizes also the most extended. Alloy bar deliveries fall generally in March and April, though some tonnage still is being promised for February, apparently out of stock.

Cleveland—Supplies of steel bars continue to dwindle with little space still open over the balance of this year on 8 and 10-inch mills, although one producer is still booking third quarter business. Shutdown of Bethlehem mills in the Buffalo district due to a strike, following the recent curtailment due to

storm conditions and coupled with prospects of widespread shutdowns at other points, indicate that producers will continue to sell cautiously throughout 1946 and 1947 at the earliest. Producers who have restricted new business to definite quotas and to comparatively short periods ahead and who have escaped serious interruptions in production are in fair position. Those who have been accepting business more freely are in a tight position with only limited space still open for fourth quarter on their 12 and 14-inch mills and for third quarter on larger mills. Only a small part of the tonnage made available by postponement of January and February delivery to strike-bound plants could be rerouted to other customers whose orders had not been filled on schedule.

Steel Plates . . .

Plate Prices, Page 135

Plate orders have accumulated until most producers have little to offer before midyear, some being sold even further. Shipbuilders, railroad car builders and tank manufacturers are principal current buyers. Additional ship tonnage is coming out.

New York—Most plate producers have little tonnage to offer before the end of first half. One eastern seller is sold solidly into August on sheared plate, with only a little universal plate available for July. One large producer has some tonnage available for late May, but this is an exception.

Tank fabricators and railroad equipment builders are pressing particularly hard for tonnage, and most jobbers are still active in maintaining their inventories. Ship repairs are taking a fairly good tonnage.

Boston — More light plate deliveries are behind schedule, reflecting unbalanced backlog and production; heaviest load is centered in ¼-inch and under while on ⅜-inch some mills are booked into September. Export demand is also heavy in lighter gages. Heavier mills are less extended and some May-June tonnage is available. Demand for light plates holds well above earlier estimates, notably for small tanks, but miscellaneous industrial buying is also a factor. One leading fabricator is doing much more light work than before the war. Work has been stopped on two submarines under construction by Electric Boat Co., New London, Conn., and the Boston navy yard has dropped 5000, down to 23,000 employees. Schedules call for substantially higher plate requirements for the carbuilding shop at Worcester, Mass. Base of a heavy backlog is 180 passenger cars for the New York, New Haven & Hartford.

Some increase in plate requirements for new ship construction is being figured for four dry cargo ships, deadweight tonnage 24,000 each, C-5-AX-1 type, 560 feet, powered with 11,000 hp steam turbines. Vessels will be operated by the Ore Steamship Corp., New York, and bids close Feb. 11 with the Maritime Commission. Bids will also be taken March 28 on two 28-knot passenger vessels, 670 feet, with twin screw turbines. Yards may bid on one, two, three or four units.

Birmingham — Plate production approximates 80 per cent of capacity, with demand holding up even beyond ex-

pectations. Drum manufacturers continue major users, while shipbuilding at the Ingalls Pascagoula plant is using large tonnages.

Seattle — Two projects involving plates were up for bids last week. Pittsburgh-Des Moines Steel Co., represented by H. D. Fowler, Seattle, was awarded an elevated steel water tank by Lynden, Wash., low bidder at $26,475. Seattle opened bids for 500 tons or more of plates involved in 2541 feet of 78-inch electric welded steel water pipe, low bidder Paul Jarvis Inc., Seattle, at $164,-016.

Philadelphia—Assuming no prolonged labor disruption, plate production during first half is expected to average about 450,000 tons per month, up somewhat from the recent average. This would represent close to prewar capacity, possibly a little higher. While one leading producer still can take some tonnage for May shipment and some premium tonnage is available for not too extended delivery, some producers have little left for first half and at least two or three mills are out of the market completely for that period. In fact, one large producer has nothing to offer before August. Demand from tank fabricators, railroads and foreign buyers is expanding steadily and inquiry from jobbers is at least sustained, if not increased. Contributing somewhat to prospects of better production in the current half is increase in output at the Kaiser plant at Fontana, Calif., for handling 43,000 tons of plates for France. This plant also started production this month of 55,000 tons of semifinished for the same country.

Cleveland—Demand for plates continues active and far in excess of productive capacity. Volume of inquiry for light plates alone is so heavy many producers could fill schedules fully with these orders. As an alternative, they have apportioned certain percentages of facilities for light, medium and heavy gages. Some leading producers are out of the market for light plates with books filled through 1946 on 3/8-inch to ¼-inch plate. Delivery for medium plates extends through third quarter and that on heavier plate through first half. One reason for the extreme tightness in light plate, is the fact that producers are not rolling as much light plate on strip mills as normally, due to heavy demand for strip and the more favorable prices prevailing for the latter.

Tubular Goods . . .

Tubular Goods Prices, Page 135

Pittsburgh — A number of large pipe lines are in the offing but are held up pending disposition of government lines built during the war. Producers here are keenly interested over the report that the American-owned Trans-Arabian Pipeline Co. has been granted a concession to build a 1000-mile oil pipeline across Palestine from Saudi Arabia to a Mediterranean port. However, pipe shipments for this line are not expected to be made until 1947.

There is a large potential demand for standard pipe for home construction, although this program will be delayed somewhat by shortages of construction materials. Much municipal work scheduled to come up for bids this spring will account for considerable tonnage of cast pipe in this district.

The Navy's Material Redistribution and Disposal office here took bids last week on the following substantial tonnage of tubing and billets located at the Babcock & Wilcox Tube Co.'s Beaver Falls, Pa., plant: 23,300 gross tons, 3-inch steel billets; 3424 tons, 4½-inch billets; 3667 tons, 5-inch billets; 1460 tons, 6-inch billets; 2691, 7-inch billets; and 43,769 feet of seamless steel boiler tubing in lengths ranging from 11 to 28 feet. The same office will close bids Jan. 22 on 270,000 feet of cold-rolled welded tubing unannealed, SAE-1020, 2¼-inch O.D. and 0.120-inch wall thickness, in lengths 15 feet 5½-inch to 17 feet 10-inch; tubing is located at the Porcelain Products Co.'s warehouse, Parkersburg, W. Va.

Seattle — Cast iron pipe is in good demand but deliveries are slow and uncertain. Market prospects are excellent as quickly as conditions are adjusted. Spokane has called tenders Jan. 17 for about 30 tons of 8 and 6-inch Class 150 cast iron pipe and accessories.

Cleveland—Pipe producers are still attempting to catch up on delivery schedules, which are lagging generally four to six weeks. Following withdrawal of many producers from the direct-shipment market and the establishment of jobbers' quotas, demand for small butt weld pipe increased sharply. Some interests are booked through 1946 on this item and are not accepting new orders. They are also out of the market on electric-weld pipe up to 6-inch. Lap-weld and seamless tubing deliveries are still

being promised for third quarter. Tightness of the market is attributed to interruptions in production, due to several periods of fuel shortage since October, as well as to slowdowns in mills. Some producers have not yet shipped tonnages that had been promised last month but may be able to bring deliveries up to date by the end of February, barring further interruption in schedules. Shortage of skelp also has been a factor in reducing output, especially by nonintegrated mills.

Wire . . .

Wire Prices, Page 135

Boston—Tightness in rod supply has not eased and in some cases is the major factor in restricted acceptance of forward orders for drawn wire. Not only are nonintegrated mills affected but also fabricators of finished products who draw their own wire. Limited arrivals of Swedish rods are not giving material relief, although imports have helped in scattered instances involving high-carbon specialties. Overall demand for wire is heavy, with some producers four to five weeks behind schedules on longer processed specialties. On the other hand, there is some easing and suspensions in automotive tonnage. Inventories with springmakers, including finished springs, are substantial, reflected in slackening in music wire. Some valve spring wire is also affected by suspensions. Supply of razor blade steel is also improved and while current production of razor blades is tremendous, inventories of that grade are up. Additional producers are curtailing on production of basic, concentrating on more profitable items. Rod supply is not only restricted by withdrawal of some producers from the Worcester, Mass., base, but also by the fact that normal suppliers are drawing more wire on selective schedules themselves.

Birmingham—Not a great deal of progress has been made in working off wire backlogs, new business materializing so steadily as to preclude the chance. Pressure for wire and other farm steel is expected to increase as weather conditions improve. Several small industries in the immediate district report inability to get sufficient tonnage of drawn wire.

Rails, Cars . . .

Track Material Prices, Page 135

New York — The French Supply Council has issued letters of intent for the purchase of 36,500 freight cars and is expected to sign contracts momentarily. Between 160,000 and 200,000 tons of steel, including wheels and axles, will be required. It is understood that six car builders will share in the business.

Following the active business of last month, domestic freight car buying since the first of the year has been light and spotty.

The New York City Board of Transportation may ask for bids within the next 60 days on subway cars costing approximately $34,000,000 to replace present ones, some of which are said to be 40 years old.

Tin Plate . . .

Tin Plate Prices, Page 135

Pittsburgh — Tin plate production has remained at practical capacity the past

ten days, despite interruption to primary steel operations Jan. 11 and 12 in preparation for the indicated steel strike. No tin plate tonnage is available until late second quarter. Pressure for shipments has been unusually heavy recently with consumers seeking to build inventories. Consumer inventories are restricted by CPA regulations to 60 days' supply for any given size can, and it is doubtful that there are many instances where consumer stocks are at the maximum. Domestic demand for tin plate has been so pressing that export requirements are crowded out to some extent. Accentuating this situation is the reported increase in export inquiries since the first of the year. Some further easing in order M-81 is indicated this quarter, with one of the revisions probably involving the choice of using 0.25 pound tin plate or terne plate in oil cans.

It is reported that Bethlehem Steel Co. will soon announce Sparrows Point a base on tin plate at $5.10 per 100-pound base box. This will result in a substantial saving for consumers in the eastern market. The freight rate from Pittsburgh to Baltimore, for example, is 30 cents, which on the old basis meant that consumers at Baltimore had to pay the Pittsburgh base price of $5 per base box, with the additional 30-cent freight charge.

Structural Shapes . . .

Structural Shape Prices, Page 135

Chicago — Structural fabricators continue to operate busy shops within the limits of steel supply and manpower. Both factors are critical, thus sharply limiting business which can be accepted. New projects come out every day for estimating, but most fabricators must pass them by until they satisfy commitments already assumed. Steel is available to them from mills under a quota system. Featuring new inquiries are one-story manufacturing buildings, involving from 100 to 200 tons individually. Awards made last week in this district totaled less than 1500 tons, a sharp reduction from late December.

Boston — Placing of fabricated structural steel contracts here this year will be heavy for erection in other areas; Stone & Webster Engineering Corp., Boston, has firm commitments which will eventually take close to 100,000 tons. Active inquiry includes 10,500 tons for a 26-story insurance building. Turner Construction Co., contractor, but lull in new tonnage parallels uncertain general economic outlook involving prices and costs. First sizable postwar inquiry for sheet piling is out for a sea wall at Hampton Beach, N. H. Mills producing smaller sizes are filling for the third quarter and fabricators, most with heavier backlogs, are draining warehouses of light shapes.

Philadelphia — Pressure for shapes, both current and prospective, is expected to force a greater diversion of steel to this product as the year progresses. Already there has been some priority assistance and appeals to Washington for such assistance are increasing. Demand for building construction, railroad equipment and export is broadening and jobbers are especially active.

Pig Iron . . .

Pig Iron Prices, Page 137

Pig iron supply is touch and go in most districts, supply being barely enough for requirements, made so by careful allocation by producers. Effect of blast furnace banking in advance of the expected steel strike has cut into supply and it will be some time before production at normal rates can be resumed. Little result has attended CPA investigation of melters to find those with inventory over the allowable limit.

New York — Labor disturbances at some local foundries have recently reduced the melt and has resulted in some suspensions in shipments of pig iron. However, sellers still have great difficulty meeting general needs, with consumers also having difficulty building inventories to even within the 30-day limit permitted by Washington. Most foundries find the labor supply a little easier, particularly with respect to turnover, and consequently are able to enlarge production somewhat.

Cincinnati — Furnace interests are unable to provide all the foundry iron sought by district melters. The pinch appears most severe in southern iron. Spreading of the tonnage among regular customers has been accomplished in a way to maintain the melt at previ-

ous levels. There is little or no tonnage for new accounts, for expanded programs or inventory as a hedge against strike effects.

Pittsburgh—Pig iron production recovered slowly last week from the sharp curtailment toward the close of the preceding week when most producers started to bank blast furnaces in anticipation of the expected steel strike. Because the time cycle in restoring certain operations involved more than 4 to 5 days and the remaining uncertainty of whether there would be a strike, steel interests in some instances did not attempt to put back into service early last week all banked blast furnaces. Prospect of a steel strike has created an abnormal demand for pig iron shipment the past few weeks, for most consumers' stocks are low in relation to present high level of foundry operations. CPA survey of excessive inventories has uncovered only a few violations of the 30-day limitation. A few violations are reported in Ohio and some New England states, representing relatively small tonnage. On the whole, pig iron supply continues in tight balance with demand and may become more critical should additional interruptions to production occur. The outlook is for increased pig iron requirements, reflecting easing in foundry manpower, which would permit greater output, and export needs continue to tend upward. Industry members are against enforced allocations, either for export or domestic use. No foundries in this district have yet been forced to curtail operations because of lack of iron, but the situation in other areas is considerably tighter, with some foundries operating with light inventories.

Buffalo—Labor disturbances have upset the local pig iron market. Production fell to 47 per cent of capacity as the Bethlehem Steel Co. Lackawanna mill was forced to shut down five blast furnaces because of a sudden walkout which left furnaces in such a condition that production may be curtailed for a considerable period even after the strike ends. Producers report suspension of shipments to consumers hit by strikes are acting to the advantage of those in operation who are able to get sufficient iron to increase operations. In addition, the leading merchant iron producer in the area reports total clearance of a substantial amount of stock piled during the severe December snowstorm.

Philadelphia—While two district blast furnaces got back into production quickly after a loss of a day or two, other stacks suspending because of the strike threat have not resumed so promptly and this loss of tonnage, combined with strong demand has made for a particularly acute shortage in pig iron. Pressure for foundry iron has been heavy, especially from soil pipe manufacturers, who are being fairly deluged with orders and who report a steadily improving labor supply. Basic consumers, except for one or two, have been active for iron. Temporarily, at least, pressure for coke has been even greater than for iron and speculation exists as to what extent western Pennsylvania beehive ovens may be called back into action.

St. Louis—Demand for pig iron has continued heavy during the steel strike threat. Some mill orders were suspended and the iron was diverted to other users. The delay enabled furnaces to catch up somewhat with demand, although it still far exceeds supply. Several mills reinstated orders after the strike postponement. Inventories are improving, although few approach the 30-day limit. Production is at capacity and labor is adequate. Iron producers expect to keep going some time even though a strike shuts down their principal regular customers.

Birmingham—Pig iron output is in uncomfortably close relationship to needs in this district. Demand for iron is greater than it was at time during the war and the picture has been further emphasized by an idle Woodward furnace, now scheduled for early resumption.

Cleveland—Shutdowns of coke and blast furnaces in anticipation of a possible strike in the steel industry, plus shutdowns in the Buffalo district due to actual strikes, caused an irretrievable loss in pig iron production. Blast furnaces banked during the week ended Jan. 12 alone lost from 36 to 48 hours output. As a result, deliveries are falling behind schedule and producers are accepting orders for first quarter delivery only after close inspection of the customer's position on their books. While the Civilian Production Administration's campaign to force compliance with its 30-day inventory regulation has brought forth cancellations of deliveries and postponement of orders, other consumers are still clamoring for early filling of their orders.

Boston—Improved deliveries from the Buffalo district have enabled furnaces to

regain schedules. Merchant iron sales by steelworks are slightly heavier, notably shipments by an eastern Pennsylvania unit. Most consumers over the 30-day inventory limit two months ago are now on shipping schedules. Several foundry strikes are affecting the melt. Demand for castings is heavy and some volume continues to be turned down. A steel strike would tie up shipments and if prolonged would halt such foundries as were not out in sympathy.

Scrap . . .

Scrap Prices, Page 138

Scrap holds its strength in spite of interruptions in the steel industry, melters looking forward to the time when large scale consumption will be resumed. General scarcity prevails and shipments are being taken to the fullest extent possible to provide inventory when full steel production is possible. Better weather has made possible heavier shipments from yards as preparation is speeded.

Pittsburgh — Leading consumers are accepting all good quality scrap offered and probably will continue to purchase tonnage on a restricted basis if the strike should materialize. The fact that steel mills have made plans for continuance of scrap shipments in case of a strike is strong evidence of the narrow stock margin. Production scrap volume remains disappointingly low, with automotive and other civilian goods programs tied up by work stoppages. Despite willingness of consumers to pay $3 springboard on open-hearth grades, $1.50 on machine shop turnings and $5.50 on cast scrap, little improvement has developed in movement of scrap.

The four bessemer units recently withdrawn from service at Edgar Thomson works of Carnegie-Illinois Steel Corp. are scheduled to be utilized for production of scrap. Bids go in Jan. 24 on 4000 tons of heavy unprepared scrap through the Third Service Command, Frederick, Md.

Chicago — Volume of scrap available continues far below demand from district steel mills and foundries. Inventories are running low and in at least one case a mill has lost some steel production for lack of scrap. Prices hold steady at ceiling. Flow of material to mills was little affected by preparations made for a steel strike Jan. 14. Little speedup was possible because quantities of scrap are limited. Actually a mill shutdown would have served as a breather for yards and supply interests. Auto wreckers are seeking higher ceilings on scrap now that the war is over, claiming that lack of cars to wreck has reduced volume to the point where profit margins are too lean.

Philadelphia — Shortage of scrap is as pronounced as at any time in many months, with the possibility that the situation will become tighter before it improves. Some leading trade interests see little chance of real improvement before spring, when better weather will prevail. There is shortage in all lines, especially in heavy melting steel, borings and turnings and cast.

Boston— Demand for melting steel scrap holds strong, with few suspensions in shipments. Yard production is up slightly and contract-terminated material also, but industrial output is mainly light scrap. Cast grades are also wanted, with supply light. Prices are at ceilings except for three-way alloys, offerings of which are smaller.

Buffalo — Strength continues in scrap despite a complete shutdown of the strike-bound Bethlehem plant. The equivalent to an embargo on shipment exists at the Bethlehem plant. Dealers holding Bethlehem contracts report sales and shipments to other consumers. Concern is expressed over these inroads on supplies originally intended for Bethlehem, especially in view of the fact that the mill will be forced to cut its ratio of hot iron because of the condition of blast furnaces which were shut down suddenly by the unexpected walkout.

Cincinnati — Strength is maintained in scrap despite threats of a steel strike. Within the district there have been no suspensions and those in other districts have so far brought no reflection in easier supplies. Mills and foundries are eager for tonnage, but the volume coming out is disappointing. One district interest has re-entered the market after lapse of several months, in anticipation of a renewal of steelmaking.

St. Louis — Scrap movement remains virtually at a standstill under suspensions issued by users faced by the steel strike. The area's biggest sheet mill has re-entered the market but others and the large foundries are still out. Aside from this situation scrap demand is greater than supply, particularly in heavy grades. Mill reserves are two to four weeks. Some mills had arranged to stockpile scrap during the strike but an unimproved labor shortage and the weather have slowed shipments. Deliveries are as much as two weeks behind. Declarations of war surplus metal as scrap are increasing, some large lots of shell stock having gone on the market.

Birmingham—Even though steel mills eased scrap deliveries in view of the unsettled labor situation, scrap remains tight in this district. Considerable increase in foundry grades is reported, although that specification, with others, remains exceedingly tight.

Warehouse . . .

Warehouse Prices, Page 136

New York—Considerable tonnage due this month for replenishment of depleted warehouse stocks will be deferred four to six weeks and on some products longer. Even promises on some alloys are not being met. A wide range of products is included, flat-rolled, wire and shapes notably; one exception is bolts, on which deliveries are near normal. Warehouses are swamped with inquiries from regular and new customers, but sales are closely geared to limited stocks. Inventory of heavier hot-rolled sheets, 10 to 16-gage, inclusive, have been built up by some distributors, but light-gage sheets and galvanized are short, also strip.

Boston—How long and to what extent warehouses will be asked to absorb steel price increases granted mills is of growing concern to distributors. Based on experience following the last increase the outlook is uncertain; jobbers absorbed those except on nails and merchant wire products. Only recently was partial relief given as regards galvanized sheets, passing on half of the $4 advance. Meanwhile secondary distribution costs have

been mounting and increases in steel labor will be shared by warehouses. Demand for steel from warehouse is heavy, but stocks are depleted and out of balance.

Chicago—Until CPA announced that it was ready to cancel all priorities on steel in event of a steel strike and to channel products only to public utilities and emergency uses, warehouses had expected to see their inventories shrink to exhaustion in a buying scramble as consumers would press for every pound they could obtain. Under the CPA directive, existing supplies could be made to last for some time. Except for light sheets and light bars, current inventories can be sized up as only fair. Strike or no strike, prospects for building up stocks in the near future are dim, making it necessary for distributors to accommodate customers on some quota arrangement.

Cincinnati—Demand for steel from warehouse has been intensified by attempts at precautionary covering incited by steel strike threats. Because of this situation, jobbers have adopted an informal rationing plan to stretch supplies. Otherwise all inventories would be exhausted soon. Mill shipments on some items have improved in recent weeks. The pinch in structurals is severe.

Pittsburgh — Warehouse interests report some upturn in mill shipments of both alloy and carbon bars. Most sellers already are following the policy of discouraging bookings of odd sizes, in expectation that the Bureau of Standards soon will approve the proposed simplified recommendation. In most instances customer approval has been obtained. Design engineers have found they can do without many of these varied odd sizes formerly used and warehouse interests also should benefit by reduction in sizes.

Philadelphia — Distributors report heavy demand for most products and with incoming shipments from mills falling off are having difficulty keeping stocks in balance. Pressure for sheets, shapes and bars is especially strong.

Canada . . .

Toronto, Ont. — Buying is brisk, with demand widely diversified. With few exceptions bookings are for second quarter and only on a few items, including steel plate, are producers accepting orders for delivery before the end of March.

While there has been some easing in demand from the automotive industry, owing to labor troubles in Canada and the United States, which have affected production schedules here, these consumers continue to take delivery and are establishing inventory for future use. Car and locomotive builders maintain a steady flow of orders for steel, and buying has been more pronounced recently from electrical equipment makers and the agricultural implement industry. Labor troubles which threatened the steel industry a few weeks ago, failed to materialize, and it is believed that this problem has been overcome, for the present at least. Steel production in Canada is at about the lowest level in more than four years, but there is a possibility that higher production will be attained before the end of this quarter when equipment repairs have been completed.

Despite the fact that consumption of sheets by the automotive industry is low, there has been no easing in the supply situation for either black or galvanized sheets, both of which are in heavy demand. Sheet production is being increased in Hamilton, but so far has not reached a point where producers can fill all demands of consumers. Books are rapidly being filled for second quarter.

Merchant pig iron demand showed little change during the week with sales totaling approximately 11,000 tons. There have been indications of tightening in supply in the past couple of weeks as producers are making more extensive use of their own pig iron to offset the shortage of scrap. As a result of a possible shortage some of the larger melters have started to place contracts for future delivery whereas formerly most of the buying was on a spot delivery basis.

No improvement is reported in supply of scrap and dealers state that receipts are not sufficient to keep their yard crews fully engaged. Shipments to steel mills are running less than twenty-five per cent of requirements with the result that they are making heavy withdrawals from stockpiles to meet requirements. Receipts of cast scrap and stove plate are practically at a standstill, and melters in most instances have no surplus for current needs.

Output of steel ingots and castings in November rose to 207,981 net tons or 68.8 per cent of capacity, and compares with

205,846 tons or 68.1 per cent for October. The month's output included 200,932 tons of ingots and 7049 tons of steel castings. In the eleven months ending with November production of steel ingots and castings totaled 2,662,042 net tons, or 4.2 per cent below the 2,780,928 tons reported for the corresponding period of 1944.

November pig iron production fell to the lowest monthly total in more than four years, totaling 134,651 net tons, which was 58.3 per cent of rated capacity, and compares with 140,693 tons or 60.9 per cent for October. Production included 101,075 tons of basic iron of which 94,745 tons were for further use of producers and 6300 tons for sale; 23,231 tons of foundry iron and 10,345 tons of malleable iron, all the latter two grades being for sale. For the eleven months ended Nov. 30, pig iron production totaled 1,642,733 net tons which is 4.1 per cent under production reported for the same period of last year.

Following are comparative production figures for iron and steel in net tons:

	Steel Ingots, Castings	Pig Iron	Ferro-alloys
Nov., 1945	207,981	134,651	13,360
Oct., 1945	205,846	140,693	14,555
Nov., 1944	269,923	146,972	13,517
11 mos., 1945	2,662,042	1,642,733	171,522
11 mos., 1944	2,780,928	1,713,467	170,037
11 mos., 1943	2,769,156	1,621,009	201,649

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2700 tons, Du Pont building, Wilmington, Del., through Turner Construction Co., to American Bridge Co., Pittsburgh.

1350 tons, warehouse for Sears, Roebuck Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

700 tons, mail order warehouse, Minneapolis, for Sears, Roebuck & Co., to Bethlehem Steel Co., Bethlehem, Pa.; bids Dec. 19.

270 tons, plant for Italian Cooking Oil Co., Lyndhurst, N. J., to Bethlehem Steel Co., Bethlehem, Pa., through L. C. Bowers & Son, Princeton, N. J.

287 tons, Soelch overhead bridge, Dane county, Wis., for State Highway Commission, to American Bridge Co., Pittsburgh; Waterways Engineering Co., Green Bay, Wis., contractor; bids Dec. 11.

155 tons, boiler house, addition, Pekin, Ill., for Corn Products Refining Co., to Mississippi Valley Structural Steel Co., Decatur, Ill.; Sargent & Lundy, Chicago, engineers; bids Dec. 17.

155 tons, boiler house, bunkers, Chicago, for Armour & Co., to Hansell-Elcock Co., Chicago; bids Oct. 19.

STRUCTURAL STEEL PENDING

2010 steel superstructure, Pennsylvania railroad bridge, Tuscarawas river, local protection project, Massillon, O.; bids Feb. 12 to U. S. engineer, Huntington, W. Va.; work also takes 28 tons steel castings and 18 tons steel forgings.

1500 tons, structural fabricating shop and runway, Milwaukee, for Chicago, Milwaukee, St. Paul & Pacific railroad; bids Jan. 28.

1275 tons, grade separation structures, Klingle Road at Porter street N. W., Washington, D.C.; J. D. Hedin Construction Co., Washington low on general contract at $504,496.

750 tons, various buildings, Texas City, Tex., for Carbide & Carbon Chemicals Corp.

700 tons, highway bridge, Oakville, Iowa, for State Highway Commission; bids Jan. 8.

596 tons, highway bridge, Wapello, Iowa, for State Highway Commission; bids Jan. 8.

300 tons, highway bridge, Columbus, Tex., for State Highway Commission.

435 tons, Wolf Creek dam, Cumberland river, Russell county, Kentucky, bids Feb. 5 to U. S. engineer, Nashville, Tenn.; other materials, 805 tons penstocks, 170 tons miscellaneous metal work, 50 tons wrought iron, 26 tons hand railing and 110 tons black steel pipe.

500 tons, hangar, Chicago, for United Air Lines; bids Jan. 17.

300 tons, warehouse, Chicago, for Diamond Alkali Co.

300 tons, hangar, Crestview, Fla., for United States Engineers.

300 tons or more, 251-foot bridge Judith River, Montana; bids to highway commission, Helena, Mont., Jan. 23.

150 tons, nine hydraulic hoists, Grand Coulee dam; Pacific Car & Foundry Co., Seattle, low, $360,500.

140 tons, dam and appurtenant work, Delaware reservoir project, Olentangy river, Ohio; bids to U. S. engineer, Cincinnati, Feb. 14; other materials, 218 tons reinforcing bars, 30 tons miscellaneous metal, 10 tons steel grating, 22 tons five-inch bridge flooring, 189 tons crest gates, 36-ton gate operating machinery, hand railing, pipe and miscellaneous.

200 tons, building addition, Wildroot Co. Inc., Buffalo, Metzger Construction Corp., Buffalo, contractor.

125 tons, sea wall, Hampton Beach, N. H.; bids Jan. 24; also several hundred tons steel sheet piling.

115 tons, relocating Union Pacific Railway for Cascade dam, Idaho; bids to Reclamation Bureau, Boise, Idaho, Feb. 28.

100 tons or more, 75 to 125 thirty-foot steel towers and counterpoise towers and 20 to 50 thirty-foot extensions, also extra sets and parts, Civilian Aeronautical Administration, Washington; bids Jan. 18.

100 tons or more, 174-foot steel and concrete overpass near Great Falls, Mont.; bids to highway commission, Jan. 23.

100 tons, control tower, Coast Guard airfield, Fort Angeles, Wash.; Hendrickson Construction Co., Seattle, low at $19,600.

Unstated tonnage, hoists for penstock coaster gates, Grand Coulee dam, Bureau of Reclamation, Denver; McKiernan-Terry Corp., Harrison, N. J., low on f.o.b. basis at $360,500.

Unstated tonnage, 40-ton gantry crane, Keswick dam, Bureau of Reclamation, Denver; Judson-Pacific-Murphy Corp., low, $48,059 f.o.b. San Francisco.

REINFORCING BARS . . .

REINFORCED BARS PLACED

700 tons, apartment hotel, Evanston, Ill., for Northwestern University, to Joseph T. Ryerson & Son Inc., Chicago; R. C. Wieboldt Co., Chicago, contractor.

600 tons, research laboratory, Whiting, Ind., for Standard Oil Co. of Indiana, to Joseph T. Ryerson & Son Inc., Chicago; Gust K. Newberg Co., Chicago, contractor; bids Dec. 10.

REINFORCED BARS PENDING

2150 tons, Wolf creek dam, Cumberland river, Russell county, Kentucky; bids Feb. 5 to U. S. engineer, Nashville, Tenn.

300 tons or more, Washington state highway spans and passes; bids to Olympia, Jan. 22.

200 tons or more, state bridge Lewis county, Washington; Rumsey & Co., Seattle, general contractor.

242 tons, bridges, Louisa county, Iowa, for State Highway Commission; A. Olson Construction Co., Waterloo, Iowa, low; bids Jan. 8.

210 tons, highway construction, Linn county, Iowa, for State Highway Commission; Central Engineering Co., Davenport, Iowa, low; bids Jan. 8.

110 tons, power station, Kalamazoo, Mich., for Allied Paper Mills; Sargent & Lundy, Chicago, engineers.

PLATES . . .

PLATES PLACED

100 tons or more, elevated steel water tank for Lynden, Wash., to H. D. Fowler, Seattle, for Pittsburgh-Des Moines Steel Co.

PIPE . . .

CAST IRON PIPE PLACED

300 tons or more, 8 and 6-inch Class 150, bell and spigot, and fittings; bids to I. S. Fetterman, city purchasing agent, Spokane, Wash., Jan. 17.

120 tons, eight-inch, cement-lined, Panama, sch. 8129; bids in.

STEEL PIPE PENDING

500 tons or more, 2541 feet, 78-inch electric welded steel water pipe for replacement, City Light, Seattle; Paul Jarvis Inc., Seattle, low, $164,016.

100 tons or more, steel pipe line and concrete structures, Salt Lake Aqueduct, Bureau of Reclamation, Provo, Utah; Carl B. Warren, Pleasant Grove, Utah, low at $442,751.50.

RAILS, CARS . . .

RAILROAD CARS PLACED

Baltimore & Ohio, two lightweight trains, eight coaches each, to Pullman-Standard Car Mfg. Co., Chicago.

Boston & Maine, 20 seventy-ton steel covered hopper cars, to American Car & Foundry Co., New York.

Missouri Pacific, 100 seventy-ton steel covered hopper cars, to American Car & Foundry Co., New York.

Pittsburgh & West Virginia, 100 fifty-ton box cars, to American Car & Foundry Co., New York; previously reported as placed by the West Virginia Railway.

RAILROAD CARS PENDING

Cleveland Transit System, 50 trackless trolleys, bids Jan. 14.

Employment Reported at Highest Peacetime Level

(*Concluded from Page* 51)

result is a picture of sharp expansion in manufacturing and mining for civilians. Industrial production for civilians has increased by at least 50 per cent, perhaps as much as 75 per cent, since July."

Mr. Hoffman called our postwar achievements to date a tribute to the American system of free enterprise. However, he warned that "the behavior of employment, sales, production, and prices all point to the great demand for goods and services and the consequent danger of inflation. It underlines the warnings of history that great care will be required to prevent runaway prices in the transition. We cannot allow our progress thus far to be wasted away by inflation.

"Rapid as our progress has been thus far, there is still a considerable way to go before satisfactory levels of employment are reached. Employment of the men still to be demobilized will require several million more jobs. But barring continued widespread industrial disputes, it now appears that we shall reach satisfactorily high levels of employment more quickly than most of us would have thought possible six months ago."

CONSTRUCTION AND ENTERPRISE

MICHIGAN

BLISSFIELD, MICH.—Blissfield Lenawee Co-Operative, Blissfield, has plans by Shreve, Anderson & Walker, Michigan Bank Bldg., Detroit, for a steel and brick power plant costing about $200,000.

DETROIT—Redford Tool & Die Co., 17170 Rockdale St., is taking bids on steel and brick plant at Gardner St., and Telegraph Rd., to cost about $40,000.

DETROIT—Miller Laundry Machinery Co., 8427 Harper Ave., has been incorporated with 2750 shares stock no par value to manufacture machinery, parts and accessories, by Theodore Sirene, 528 Vinewood Ave., Birmingham, Mich.

DETROIT—Nor Jay Co., 2927 Puritan Ave., has been incorporated with $50,000 capital to manufacture automotive parts, by Roy Rotter, 18908 Cherrylawn Ave.

DETROIT—Huron Forge & Machine Co., 9041 Alpine St., has let contract to R. E. Dailey & Co., 9900 Northlawn St., for a one-story plant structure estimated to cost $100,000.

DETROIT—Nuera Gear Co., 2802 Barlum Tower, has been incorporated with $30,000 capital to do general manufacturing, by William Finnk, 18070 Northlawn Ave.

DETROIT—Abel Tool Salvage Co., 1264 Meldrum Ave., has been incorporated with $50,000 capital to service and salvage cutting tools, by William J. Abel Jr., 22410 Grosse Pointe Rd., St. Clair Shores, Mich.

DETROIT—Atomic Gear & Grinding Inc., 1532 National Bank Bldg., has been incorporated with $40.000 capital to manufacture machine parts and do grinding work, by Sam Licari, 19464 Helen Ave.

DETROIT—Parts Processing Corp., 2100 Howard St., has been incorporated with $50,000 capital to manufacture valves and metal products, by Arthur A. Bull, same address.

DETROIT—Franklin Tool Co., 1438 Franklin St., has been incorporated with $50.000 capital to manufacture tools and dies, by Maurice Dreifuss, 1619 Dime Bldg.

DETROIT—Rex-O Products Co., 12622 Woodrow Wilson Ave., has been incorporated with $25.000 capital to deal in metal products, by Rudolph F. Otto, 12225 Promenade Ave.

DETROIT—Production Welding Corp., 821 Penobscot Bldg., has been incorporated with $25.000 capital to deal in steel and cast iron products, by Arthur I. Gould, same address.

DETROIT—Orley Bros. Co., Inc., 680 East Fort St., has been incorporated with $100,000 capital to manufacture metal and wood products, by George Orley, same address.

DETROIT—Central Boiler & Mfg. Co., 5818 Rivard St., has been incorporated with $350,000 capital to deal in machines, tanks and boilers, by Harold C. McGregor, same address.

DETROIT—Delta Industries Inc., 914 Lafayette Bldg., has been incorporated with $25,000 capital to manufacture machine products, by Kenneth H. Meyerholtz, 505 McBride Ave., Jackson, Mich.

DETROIT—Intervale Screw Products Co., 1421 Springwells Ave., has been incorporated with $50,000 capital to manufacture metal goods and parts, by Luie Camden, 11723 Hubbell St.

GRAND RAPIDS, MICH.—Melin Tool Co. Inc., 1331 Phillips Ave., has been incorporated with $175,000 capital to manufacture cutting tools, by William Melin, 501 Edgemere Drive SE.

GRAND RAPIDS, MICH.—B. M. Baker Inc., 1661 Monroe St. NW., has been incorporated with $50,000 capital to do general manufacturing, by Bertrand M. Baker, same address.

GRAND RAPIDS, MICH.—Novel Products Manufacturers Inc., 900 Michigan Trust Bldg., has been incorporated with $50,000 capital to do general manufacturing, by Max W. Hofmeister, 1936 Francis St. SE.

GRAND RAPIDS, MICH.—Ottawa Steel & Mfg. Co., 1052 Ottawa Ave., has been incorporated with $100,000 capital to deal in metal and other stampings, by Pearl Berman, 1320 Sherman Ave. SE.

JACKSON, MICH.—Litemetal Diecast Inc., 437 Fern St., has been incorporated with $200,000 capital to cast, fabricate and machine light metals, by Hayes Industries Inc., same address.

MIDLAND, MICH.—Mid-State Engineering & Mfg. Co., 759 S. M. 40, Route No. 5, Midland, has been incorporated with $25,000 capital to manufacture tools, dies, fixtures and plastic products, by Stanley Stark, same address.

MIDLAND, MICH.—Fox DeLuxe Brewing Co. is having plans drawn for a three-story 100 x 225-foot brewery addition to house ageing tanks, to cost about $1 million, of which $450,000 is for equipment.

MASSACHUSETTS

CAMBRIDGE, MASS. — Cambridge Steam Corp., care Cambridge Electric Light Co., 384 Western Ave., plans a steam plant on First St. to cost about $3 million.

FITCHBURG, MASS.—Magnus Metal Division National Lead Co. has let contract to Farine Bros., 61 Bridge St., Newton, Mass., for a machine shop and furnace plant addition estimated to cost over $40,000.

CONNECTICUT

BRIDGEPORT, CONN.—Bryant Electric Co., 1421 State St., has let contract to Gellatly Construction Co., 25 Housatonic Ave., for a three-story plant building 95 x 240 feet.

DANBURY, CONN.—Danbury Industrial Corp., 205 Main St., has let contract to B. J. Dolan, 207 Greenwood Ave., Bethel, Mass., for a one-story 100 x 200-foot and 20 x 40-foot plant, to cost about $155,000.

NEW HAVEN, CONN.—Eastern Engineering Co., E. B. Stirlen, president, 45 Fox St., has plans by Leo F. Caproni, 1221 Chapel St., for a one-story 100 x 200-foot plant building costing about $100,000.

STAMFORD, CONN.—Peabody Engineers Corp., 93 Maple St., has let contract to DeLuca Construction Co., 322 Main St. for a one-story plant building 80 x 125 feet, to cost about $40,000. L. F. Caproni, 1221 Chapel St., New Haven, is architect.

WATERBURY, CONN.—Leah Mfg. Co., East Aurora St., has plans by Leo F. Caproni. 1221 Chapel St., for a one-story 100 x 400-foot brick, steel and concrete plant building costing about $150,000.

RHODE ISLAND

EAST PROVIDENCE, R. I.—Bird & Son Inc., Dexter Rd., is having plans drawn for a 40 x 45-foot power plant addition and replacing turbines, boilers, etc., to cost over $40,000. John A. Stevens Co., 16 Shattuck St., Lowell, Mass., is consulting engineer.

NEW JERSEY

TRENTON, N. J.—L. A. Young Spring & Wire Corp., 9200 Russell St., Detroit, has let contract to W. Ehret, 209 Academy St., for a plant building estimated to cost $250,000.

PENNSYLVANIA

AMBRIDGE, PA.—A. M. Byers Co., Clark Bldg., Pittsburgh, plans a plant addition 40 x 500 feet, to cost about $150,000.

CONSHOHOCKEN, PA.—Allen Iron & Steel

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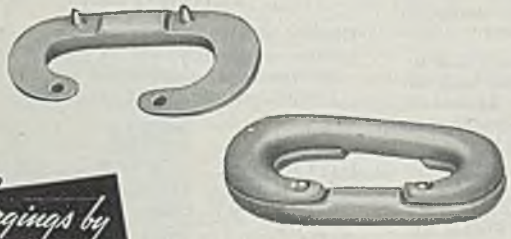

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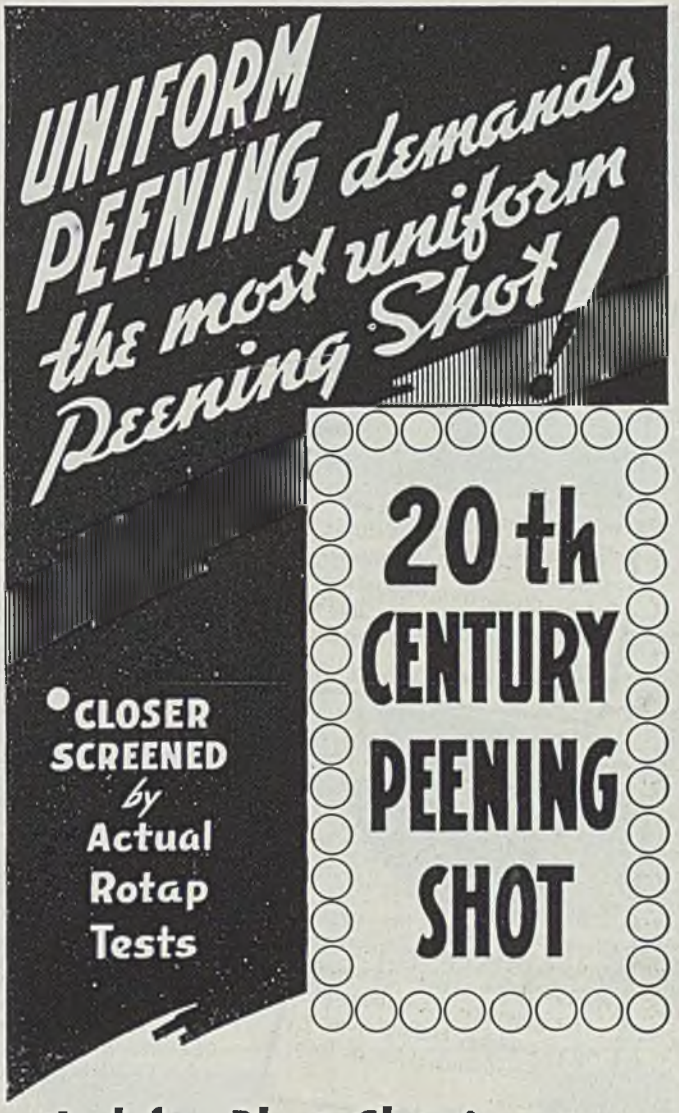

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Co., Norristown, Pa., is having plans made for a plant addition and alterations to cost about $50,000.

LESTER, PA.—Westinghouse Electric Corp., 339 Boulevard of Allies, Pittsburgh, plans additions and alterations to cost about $2,400,000.

PHILADELPHIA—Brown Instrument Co., Wayne Ave. and Roberts St., plans plant additions and alterations to cost in excess of $150,000.

PHILADELPHIA—E. G. Budd Mfg. Co., Hunting Park Ave. and 25th St., plans additions and alterations to its plant, to cost about $4 million.

PHILADELPHIA—Atlantic Metals Corp., 2117 East York St., is having plans prepared for a plant addition costing about $50,000.

PITTSBURGH, E. L. Wiegand Co., 7500 Thomas Blvd., plans a two-story plant 96 x 161 feet, including conveyors and other equipment and three tile silos, costing about $150,000. Prack & Prack, Martin Bldg., Pittsburgh, are architects.

SHARON HILL, PA.—Curtis Publishing Co., Walnut and Sixth Sts., Philadelphia, has let contract for design and construction of a boiler plant and publishing plant to Stone & Webster Engineering Corp., 40 Federal St., Boston, to cost over $750,000.

OHIO

BOWLING GREEN, O.—Grieder Machine Tool & Die Co. plans a new plant building and addition to present plant, at cost of about $100,000.

CLEVELAND—Kilroy Structural Steel Co., 13800 Miles Ave., will build an 85 x 400-foot plant at 8500 Union Ave., to cost over $100,000, for occupancy next spring.

CLEVELAND — Harris-Seybold-Potter Co., G. S. Dively, vice president and general manager, 4510 East 71st St., has expansion plans including additions to plants at Cleveland and Dayton, O., costing about $200,000.

CLEVELAND—Reliance Electric & Engineering Co., James W. Corey, president, 1088 Ivanhoe Rd., includes in expansion program an additional building with equipment, and another plant for small motor frames, new products and additional capital.

CLEVELAND—Buckeye Vacuum Cleaner & Supply Co., 10615 St. Clair Ave., Samuel Strauss, president, has been incorporated with $10,000 capital and 250 shares no par value to manufacture electrical supplies and equipment.

CLEVELAND — Hocking Valley Mfg. Co., Guardian Bldg., with plant at Lancaster, O., has been incorporated with 2000 shares at $100 each, by T. C. Alfred, president.

COSHOCTON, O.—Steel Ceilings Inc., recently incorporated, has bought a plant on North Third St., for which equipment will be bought for manufacture of steel acoustical ceilings. Wallace Sauer is manager.

ELYRIA, O.—Diamond Products Inc., care W. C. Weslon, 333 Prospect St., has been incorporated with 500 shares at $100 each and 1500 shares no par value to manufacture core and casing bits, shells and wheels, by Edgar P. Stocker and associates.

KENT, O.—Twin Coach Co., 850 West Main St., has bid approximately $500,000 for the former Curtiss-Wright plant at Buffalo airport, containing 200,000 square feet floor space. Plan is to use plant for construction of super-twin bus.

NORWALK, O.—Norwalk Chemical Co. has been incorporated with $100,000 capital and 1000 shares no par value to manufacture industrial chemicals; Carpenter & Freeman, Citizens National Bank Bldg., agents.

SANDUSKY, O.—Klotz Machinery Co., Robert Clark, general manager, Water St., will build a one-story 40 x 50-foot factory as fire replacement, costing $45,000.

ILLINOIS

CHICAGO—Screw Machine Engineering Co., 4125 West Lake St., has let contract to Enger Bros., 4910 West St. Paul St., for a one-story manufacturing building 125 x 126 feet. N. Rosenberg Co., 3906 North Harlem Ave., is architect.

CHICAGO—Central Steel & Wire Co., 300 West 51st St., will let contract soon for a one-story warehouse addition 100 x 600 feet from plans by Alshuler & Friedman, 28 East Jackson Blvd., architects.

MARYLAND

BALTIMORE—Maryland Steel Products Co., 1600 Ridgely St., is building a one-story addition 80 x 200 feet, with two traveling cranes, for work shop and garage.

BALTIMORE—Eastern Iron & Steel Co., 121 Colvin St., has bought a site at 6301 Erdman Ave. and will build a plant containing 16,000 square feet for manufacture of structural and ornamental iron work. Morris Zimlin is president.

BALTIMORE—Harry C. Weiskittel Co. Inc., 4901 Pulaski Highway, manufacturer of soil pipe and fittings and gas ranges, has let contract for an 80 x 120-foot plant addition.

BALTIMORE — General Refractories Co., Chesapeake Ave. and Seventh St., Brooklyn, manufacturer of magnesite and chrome brick and other refractory materials, is building an addition 100 x 250 feet.

BALTIMORE—Ellicott Machine Corp., 1611 Bush St., manufacturer of hydraulic dredges, dredging machinery, sand pumps, etc., has let contract for a one-story addition 30 x 128 feet for manufacturing purposes.

BALTIMORE—Locke Insulator Co., Charles and Cromwell Sts., General Electric Co. subsidiary, is building a plant addition of 30,000 square feet to enlarge production and house a complete ceramic pilot plant.

BALTIMORE—American Can Co., Hudson and Boston Sts., plans a manufacturing building at North Point Rd. and Erdman Ave. to cost about $5 to $6 million.

MISSOURI

ST. LOUIS—Car-Anth Mfg. & Supply Co., 6801 South Broadway, Julius C. Engbert, owner, has bought site on Michigan Ave. and will build one-story plant building with 25,000 square feet floor space for manufacture of electrical specialties. Plans are by A. F. & Arthur Stauder, 3608 South Grand Blvd.

ST. LOUIS—Dill-Hough Co., 608 South Main St., has let contract to A. L. Jackson, general contractor, 161 East Erie St., Chicago, for a one-story 52 x 78-foot warehouse, 20 x 24-foot pump house and alterations to warehouse building at 419 DeSoto Ave. J. E. Tarling and P. T. Siebke, 2807 North Grand Blvd., are architects.

WISCONSIN

GREEN BAY, WIS.—Wisconsin Public Service Corp., Green Bay, will let contract soon for superstructure of powerplant addition. A. A. Carson, care owner, is chief engineer.

TEXAS

DALLAS, TEX.—H. B. Williams, 3200 Worth St., plans three 64 x 100-foot machine shop and foundry buildings to cost about $40,000.

DAINGERFIELD, TEX.—R. G. LeTourneau Inc., Peoria, Ill., builder of earth moving machinery and roadbuilding equipment, plans a plant here to cost about $750,000.

IOWA

CEDAR RAPIDS, IOWA—Cherry-Burrell Co., Sixth St. and Wilson Ave., Des Moines, Iowa, has let contract to M. Mildenstein, 1714 E. Ave., Des Moines, and Weitz Co. Inc., Fleming Bldg., Des Moines, for a factory costing about $1,500,000. H. R. Green Engineering Co., Cedar Rapids, is engineer.

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5 Ft. to 8 Ft. — 3/4" to 1" Plate

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1—10 ton O.E.T. Crane, 2 trolley 75' to 80' Span A. C. or D. C.
1—Runway for above, 200' to 600'
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Model LD 1—8 feet—In good condition—exceptionally clean. May be inspected—Can load immediately.

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GENERAL FOREMAN—FOR SHEET METAL Fabrication and Assembly Division of an old established company in Western Pennsylvania. Must be capable of organizing for economic production, production processes involving sheet and tube fabrication, forming, and finishing. Contract or job shop experience desirable. Send photo, full resume of experience, education, references and minimum salary that would be acceptable at start to Box 372, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: DISTRICT SALES MANAGER WATER treating and process equipment for liquids. Must be familiar with these lines and have held similar positions. Location New York City. Write stating experience, education, age, companies worked for, references, positions held, salary expected, etc. Enclose picture. Address Box 351, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: SALES MANAGER EXPERIENCED ing process equipment for liquids and water treating equipment. Location middle west. Write giving age, education, experience, positions held, companies employed by, references, salary expected. Enclose picture. Address Box 377, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: TOOL STEEL SALESMAN FAMILiar with accounts in Cleveland area. Excellent proposition and prospects for the future. Address Box 363, STEEL, Penton Bldg., Cleveland 13, O.

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Must have previous experience in structural steel fabrication. Excellent opportunity for the man who qualifies.

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MANUFACTURERS' REPRESENTATIVE WITH long experience in sales and service, now contacting sheet metal fabricators and affiliated industries, can handle additional accounts—preferably copper and stainless tubing and sheets. Commission basis. Territory—Pennsylvania, New Jersey and Delaware. Address Box 381, STEEL, Penton Bldg., Cleveland 13, O.

SALES ENGINEERS — EX-NAVAL OFFICER and partner, each with ten years' experience and excellent contacts in steel and other industrial plants, especially in Western Penna. and Eastern Ohio, interested in becoming manufacturers' representative in this area. Address Box 375, STEEL, Penton Bldg., Cleveland 13, O.

Positions Wanted

MANUFACTURING SUPERINTENDENT SEEKing connection where the following experience would be of mutual interest: 8 years General Shop Experience, 3 years Purchasing, 3 years Chief Engineer Tool and Die Shop, 2 years Production and Material Control. At present and for past 2½ years, Manufacturing Superintendent of Ferrous and Nonferrous materials, in plant of approximately 5000 employes in middlewest. Age 34, height 6'3", weight 220 lbs. Married, one child. Address Box 367, STEEL, Penton Bldg., Cleveland 13, O.

FACTORY MANAGER; SPECIALIZED IN steel fabrication and well experienced in all phases of welding, stampings, structural iron and kindred machining operations, also well experienced in management, processing, cost and plant maintenance. Desires contact with medium size manufacturer. This position is for the purpose of advancement over present position. Age 35. Address Box 361 STEEL, Penton Bldg., Cleveland 13, O.

EXECUTIVE ENGINEER. M.S. METALLURGY, age 33. Eleven years background in the welding, gas cutting and heat treating industries as welding supervisor, engineer in charge of research and development and chief metallurgist. Desires responsible connection with medium-sized progressive concern, preferably in Midwest. Presently employed. Address Box 380, STEEL, Penton Bldg., Cleveland 13, O.

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COMBUSTION ENGINEER DESIRES SALES engineering or plant position in Northern Ohio area. Has had two years' plant experience and seven years of field work in industrial furnace and allied lines. Address Box 358, STEEL, Penton Bldg., Cleveland 13, O.

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