STEEL

The Magazine of Metalworking and Metalproducing

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FEATURES

MARKETS

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Postwar Position of French Industry

Die Casting Methods in Germany

The Facts About Atomic Energy

Precision Finishing by Borizing Process

Bethlehem Modernizes Barmaking Facilities

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STEEL
September 24, 1945

Melodrama in Detroit

Occupying the center of the national stage at this moment is the labor policy mess. It is not a pretty sight.

Employers are virtually in the wings, withholding their appearance on the stage until the government and the unions clarify their positions. The unions are in something of a predicament because their strategy has back-fired. Not all union participants see eye-to-eye, as witness the spectacle of a union leader, candidate for mayor of Detroit, working feverishly to settle the 29-day old Kelsey-Hayes strike before the government's newly established conciliation personnel steps onto the scene.

As for the government, it has gone a long way toward cutting away the red tape which hopelessly complicated its previous efforts to handle labor disputes effectively. President Truman on Tuesday transferred the War Manpower Commission and the War Labor Board to the Department of Labor and abolished the Office of Economic Stabilization and transferred its functions to the office of War Mobilization and Reconversion under John W. Snyder.

This shake-up gives Secretary of Labor Lewis B. Schwellenbach more authority and effectively breaks up the confusing situation which existed when practically all labor matters were handled by numerous conflicting agencies which were responsible only to the President. Under that system, the late President Roosevelt literally formulated labor policy as he went along, changing it to meet each new emergency. Under the new set-up, the Secretary of Labor has enough authority to exercise the functions of his office freely and independently and he will not be embarrassed by the actions of conflicting agencies.

Secretary Schwellenbach's first act, under his clarified authority, was to appoint Edgar L. Warren director of the Labor Department's conciliation service. Mr. Warren immediately dispatched a number of conciliators to Detroit to seek solutions of the strikes in progress there.

As this is written, the tension in the hub of motordom seems to be easing. The sweeping move by President Truman to concentrate authority in Secretary Schwellenbach and the realization on the part of labor leaders that their position was precarious have brought an element of common sense onto the scene.

When the final curtain falls some days hence, workers probably will be awarded an increase of something like 10 or 12 per cent and the spectators will wonder why it was necessary to go through so much hectic play acting for a settlement which could have been reached promptly and easily if suitable government machinery had been available and had been functioning properly.

FOR A UNITED FRONT: Is American industry organized properly for the purpose of presenting its case to Congress and to the public effectively?

This question arises in connection with the functioning of the recently created "Clearing House Conference on Tax Problems." Members of this conference are the representatives of associations such as the United States Chamber of Commerce, American Institute of Accountants, National Association of Manufacturers, Committee for Economic Development and National Planning Association. The purpose of the conference is "to arrange for an exchange of views between representatives of various organizations on fiscal and tax problems in all their phases."

This effort to facilitate discussion on taxes is constructive. However, many persons will wonder whether the facilitated airing of views will lead to a unification of tax programs proposed by various groups. One experienced association executive believes such unification will be impossible, because

(OVER)

as now organized each branch of industry works through its own association and places major emphasis upon its own interests rather than upon the interests of industry as a whole.

Inability of business to agree upon tax matters is matched by its inability to present a united front on numerous other important issues. Perhaps industry should analyze its complicated system of associations. Possibly it can be revamped to advantage. —p. 94

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THE LONG ROAD BACK: Appointment of Senator Harold H. Burton to the Supreme Court has a number of aspects of interest to industry. In the first place, his elevation to a justiceship marks the initial move in the long two-decade job of the nation to live down the curse of the spiteful "court-packing" spree.

Secondly, Senator Burton will bring to the court a more intimate knowledge and a more sympathetic understanding of industry's problems than is possessed by any of the other justices. Throughout his entire career as a public official, he has represented the people of a community that is predominantly industrial.

Finally, as an author of a bill to amend the National Labor Relations Act, Mr. Burton was subjected to vicious attacks by the spokesmen of union labor. The prompt and unanimous confirmation of the Burton nomination by the Senate is in wholesome and significant contrast to labor's unwarranted attitude.

The appointment is excellent on every count.

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MECHANIZED MINES: Currently the prospect for an adequate supply of coal next winter seems brighter than at any time in months. Production has been mounting. This, with an easing in consumption since V-J Day, has brought about a marked improvement in supply.

However, the danger is not over. The mines need 30,000 more miners. European requirements, estimated at from 6 to 8 million tons, will cut deeply into tonnage needed at home.

If an acute shortage can be averted, we can credit our good fortune in part to the mechanization of our mines. Today 90 per cent of the coal output involves power-driven cutters and 50 per cent is loaded mechanically. Operators will spend $200 million for further mechanization during the next five years which will enable 85 per cent of the output to be loaded mechanically.

Several years from now, we may see clearly how superior is forehanded mechanization of coal in America to enforced nationalization of coal in England. —p. 85

POSTWAR POSTSCRIPTS: Indicative of the attention eastern manufacturers are giving to postwar markets on the West Coast is the estimate that 500 eastern companies contemplate branches in the San Francisco area (p. 92) and the report that during August 14 factories were built and 20 existing plants were expanded in the Los Angeles area. . . . Speaking to the New England Council, J. A. Krug, chairman of WPB, declared that his agency "is on the way out. Control of a few still critical materials such as raw rubber and tin will continue for a while," he said (p. 90), "then we will be out of a job". . . . . Good news for steel producers is found in the announcement by WPB (p. 91) that after the end of the year, they will not be required to file any of the numerous reports which plagued them during the war. . . . Colorado Fuel & Iron Corp. has submitted a proposal to DPC to lease the Geneva steel plant (p. 87) for five years. . . . Export-Import Bank has approved a loan of $20 million to Chile for construction at Concepcion (p. 94) of a steel plant comprising one or more electric furnaces, an open-hearth and rolling mills. . . . Japan's heavy industry was hard hit by American bombing and blockade. The enemy's steel production, which amounted to 4,500,000 tons in 1942 (p. 95), had been reduced to an annual rate of only 500,000 tons just before Japan surrendered. . . . As special investigator for federal government agencies, James P. Gill, vice president and chief metallurgist of Vanadium Alloys Steel Co. has prepared an excellent report (p. 120) on Germany's tool and special steel industry. Three German companies, one Czechoslovakian company and one company with a plant in Germany and a plant in Austria marketed practically all of the tool and special steels used in Germany. Analyses of the steels of these five companies show a wide range of product, except that little molybdenum steel was used. Certain of the tables reveal changes in composition caused by wartime scarcities. . . . Add to the growing list of important research projects the research center now building at Bound Brook, N. J. (p. 107), which is part of a $40 million expansion program of Johns-Manville Corp. . . . Market for stainless steel is momentarily confused (p. 91) as producers and consumers adjust their activities to the new multiple basing point system.

EDITOR-IN-CHIEF

Special duty trucks gather steel samples for the laboratory.

A truck is unloaded at the laboratory, and immediately starts another round trip.

Plate samples are punched to rough form, then milled. Others are sawed, turned, drilled etc., as required.

Many samples undergo rigid chemical tests.

Metallurgical tests are extremely important for quality control.

Inland Tests Steel by the Ton

Operator determining physical properties on one of the many tensile testing machines in the Inland laboratory.

Darting from mill building to mill building—many times a day, and at night—are Inland trucks on special duty, a duty of vital interest to every user of Inland steel.

They are the sample trucks which rush samples of Inland products to the main laboratory where all required tests must be completed, reported and checked against specifications before steel is shipped.

Samples are gathered for the laboratory at semi-finishing mills—pieces from billets, slabs, etc., that will be tested before the steel is rolled into final form. Also collected are samples of finished products. Depending upon requirements, every piece of steel delivered to the Inland laboratory undergoes rigid physical, chemical, and metallurgical tests. Many of these tests are special developments by Inland—tests that are fast and extremely accurate.

Yes, Inland daily tests tons and tons of steel to assure every customer that his order will measure up to every requirement.

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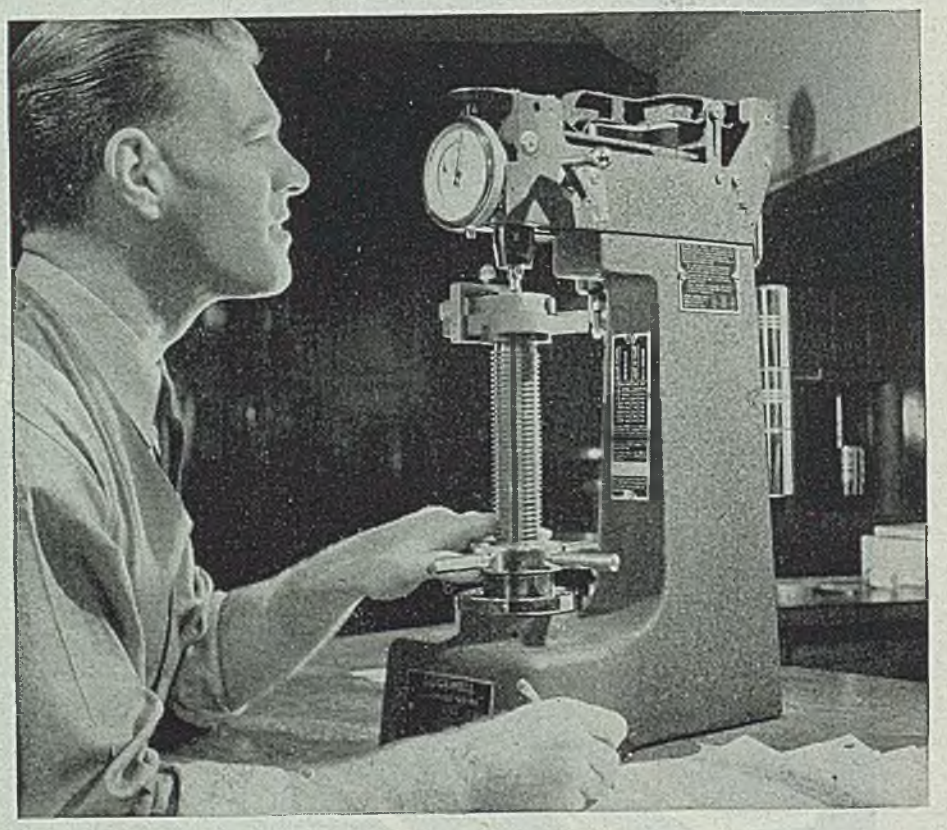

Every Department is Served

When your shipment of Ryerson alloy steels arrives, complete test data comes with them—data that enables engineers and designers to call for the physical properties listed, with confidence that they can be secured—that furnishes heat treaters with a guide to sure, accurate results and provides a detailed record for your purchasing executive.

As a part of the Ryerson Certified Steel Plan, this data is developed from actual laboratory tests. In addition to mill tests for chemical analysis and physical characteristics, Ryerson subjects samples from each alloy heat to four end-quench hardenability tests. From hardness readings of the test samples we interpret obtainable physical properties for various size rounds in the as-quenched condition and when quenched and drawn at 1000°, 1100° and 1200° F.

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Ryerson alloy service costs you nothing extra. It protects your products and production. It saves time and money. It is furnished by 11 Ryerson Steel-Service Plants, each located in a major industrial area. The Ryerson alloy plan is explained in detail in our booklet "Interpreting Hardenability". If you did not receive a copy write today. And get in touch with your nearest Ryerson plant when you need alloy steel from stock.

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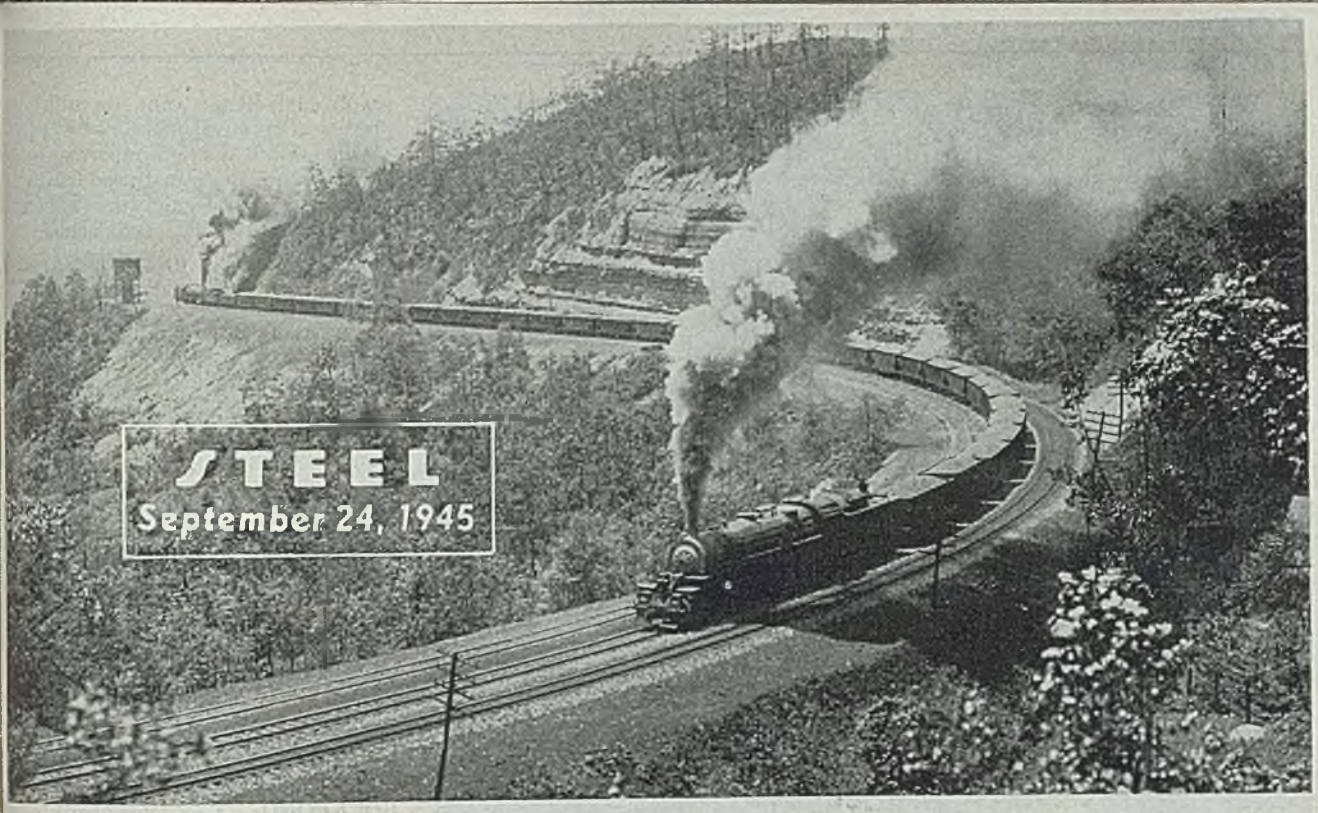


With a tight coal supply threatened for the coming winter, the railroads are rushing mine production to industrial and domestic storage piles. This view shows a Baltimore & Ohio train at Terra Alta, W. Va. Wide World photo

Coal Crisis Averted But Shortage Persists

Labor shortage continues serious threat to production adequate for anticipated needs. Mines require 30,000 additional workers. Consumption letdown eases supply situation. Mechanization of mines seen gaining

PITTSBURGH

INDUSTRIAL coal supply prospects have improved considerably in recent weeks, but threat of a shortage has not been completely eliminated with the mines urgently in need of additional labor. On a national basis it is estimated nearly 30,000 more miners are needed to assure supplies of coal sufficient to meet anticipated demands.

In the Pittsburgh district the supply situation has shown marked improvement since the end of the Japanese war. This largely reflects reduced consumption as a result of curtailed blast furnace operations and fewer interruptions in mining due to strikes. In the district only 44 out of 54 blast furnaces now are in blast which compares with practical capacity throughout most of the war period.

Indicative of the easing in pressure for coke production, a number of beehive coke ovens have been taken out of service recently with operations currently estimated at about 65 per cent of capacity. The E. I. du Pont de Nemours & Co.'s by-product coke facilities at Morgantown, W. Va., have been closed down.

One of the largest coke producing plants in this district has about 5 days' supply of bituminous coal on hand and some headway has been made in bolstering stocks in recent weeks. However, bituminous coal inventories at various steel plants here represent only 11 days' supply at the current rate of operations. Coal stocks at industrial plants average 19 days, while those at utilities equal about 35 days' supply.

While there is no immediate concern over adequacy of coke supplies throughout the winter months, consumers are trying to build up inventories as a hedge against future strike disruptions in coal mining operations and seasonal reduction in shipments that occurs during the winter months.

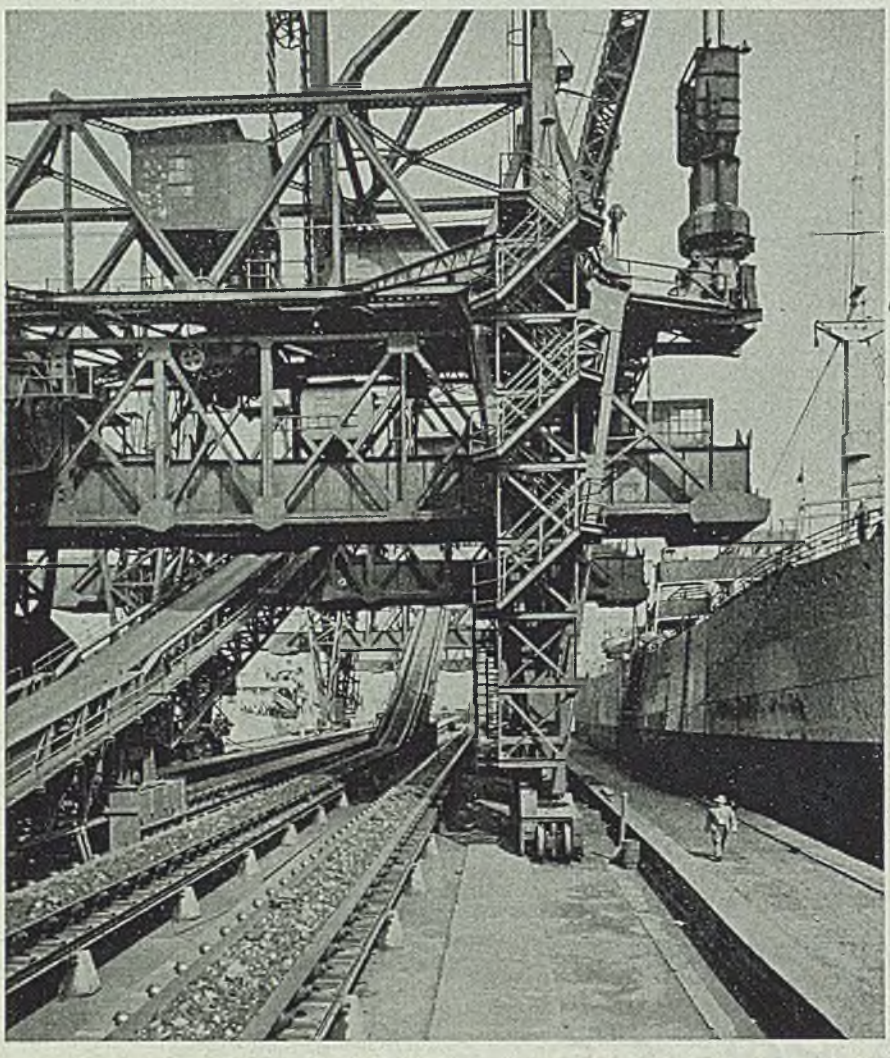
Some further improvement in overall coal supplies is expected to develop soon after the discontinuance of vessel shipments of coal to upper Great Lakes ports around Nov. 1. However, an offsetting factor is relatively heavy European requirements, estimated between 6 to 8 million tons, which are likely to be met over the remainder of this year. More than 350,000 tons of coal are scheduled to be shipped to Italy during September.

Production of bituminous coal to date this year is 7.5 per cent below output in the corresponding period of 1944. According to the National Coal Association, output from Jan. 1 through Sept. 8 totaled approximately 403,216,000 compared with 435,756,000 tons in the like 1944 period. In the week ended Sept. 8, the latest for which reports are available, output totaled 9,790,000 net tons.

The bituminous coal mining industry enters the postwar period facing a continued tremendous demand for fuel for all purposes. Industrial consumption is not expected to show any material decline for several years in view of the high promise of active industrial operations in catching up with the pentup demand for civilian goods of all kinds built up during the war years.

Facing this prospect of uninterrupted volume demand, coal mine operators are reported giving increased attention to programs for the mechanization of their properties. Estimated capital investments for such mechanization over the next five years go as high as $200 million, including installation of new equipment and rehabilitation of facilities.

Cutting of coal by machinery was in-



Shipments of coal to foreign countries or to other ports in the United States are made over great coal loading piers like this one at Curtis Bay in Baltimore. The pier has a loading capacity of 7000 tons an hour. Wide World photo

troduced sometime around 1890. Since then use of such machinery has increased steadily so that today it is estimated approximately 90 per cent of bituminous coal production involves power-driven cutters.

Mechanical loading has been gaining rapidly in favor in recent years. As a matter of fact, when workers and operators talk about mechanization in the mines they generally mean mechanical loading. According to the Bituminous Coal Institute, mechanical loading of coal, introduced shortly after the first world war, today has spread to about 50 per cent of the industry and expectations are that by 1960 fully 85 per cent will be using mechanical loaders.

Use of mechanical loaders in turn has led to the introduction of devices and equipment designed to clean the coal as it comes from the mine.

Midwest Industrial Centers Report Rapid Strides Toward Full Peacetime Production

REPORTS from thirteen district offices in Illinois, Indiana, Iowa and Wisconsin indicate full production for civilian use is closer than the public realizes, according to Samuel J. Campbell, regional director, War Production Board, Region VI.

It is estimated that of 21,172 regional factories checked, 16,143 are busy, while of the 14,000 plants in the Chicago district 12,600 are going at a good clip either at civilian work or turning out the substantial volume of war contracts necessary to keep the military establishment supplied. Of the 14,000 factories and shops in the Chicago district, it is estimated 70 per cent are working to the capacity of their available labor force, 20 per cent are hampered owing to the lack of certain materials still in short supply and 10 per cent are still in the process of reconversion.

Other WPB districts reporting a high rate of return to normal productivity besides that of Chicago were Milwaukee and Madison, Wis., Indianapolis and South Bend, Ind. Shortages reported were mainly in iron castings, some critical metal components, in machine tools worn out in war production, building materials (mainly lumber and brick), and in certain localities skilled and common labor was lacking at the peacetime wages certain factories were able to pay.

War Production Board districts made the following comments in their reports:

CHICAGO: "Civilian production hampered by lack of gray iron castings, light gage sheet steel, screw machine products and components as well as screw stock and machine shop equipment."

PEORIA: "Four distilleries still making commercial alcohol for synthetic rubber program. Shortage of gray iron castings. Production hampered by reluctance of labor to return to jobs paying less than wartime wages."

ROCKFORD: "Getting requests for assistance in finding sources to place forgings as well as castings of all types except nonferrous."

EVANSVILLE, IND.: "The only bottleneck we have is the scarcity of brick which hampers construction. Order backlog consists of 80 per cent of 1941 production."

FT. WAYNE, IND.: "Securing material is uppermost question and ceiling prices on these materials."

INDIANAPOLIS: "Many plants need assistance in getting materials; others need new construction and assistance on components and equipment."

SOUTH BEND, IND.: "Full employment expected by Oct. 1 with no difficulties foreseen in labor or materials market. Practically all plants in the district which takes in 12 northwestern Indiana counties, now engaged in civilian work."

DAVENPORT, IOWA: "The problem of securing malleable and gray iron castings seems to be the greatest obstacle. Also fractional horsepower motors. There is a lack of galvanized sheets."

DES MOINES, IOWA: "Principal difficulties are shortages of foundry production, particularly malleable iron castings and inability to get delivery on some controlled materials."

GREEN BAY, WIS.: "Shortage of castings, steel, machine tools, lumber, pulp rags, shipping cartons and labor."

MADISON, WIS.: "Many worn out machines need to be replaced from government surplus stock lists. Shortage of saw mill labor retarding the construction industry."

MILWAUKEE: "One of the large problems is the distribution of government owned tools, buildings, etc. Shortages of materials still continue."

Aluminum Co. of America Breakup Recommended by Attorney General

Clark contends independent companies haven't fair chance, even with modern government-owned plants. Alcoa counters by pointing out it has only 36 per cent of smelting capacity, while government owns 57 per cent. Assails subsidies

SPLITTING up of the Aluminum Co. of America into a number of competing companies as the "only solution" of the alleged aluminum monopoly was recommended to Congress last week by Attorney General Tom C. Clark.

Alcoa's position, according to Mr. Clark, is so strong that "independent enterprise, no matter how efficient or resourceful, could not overcome Alcoa's aggregation of advantages . . . ."

The company's strength, the attorney general says, stems from advantages in bauxite and power supply, plant locations, market and financial strength and connections with foreign producers.

Mr. Clark doubted that surplus government-owned aluminum plants could be disposed of in such a manner as to create the proper competition in the industry, for the following reasons:

"1. Alcoa has practically all the domestic high-grade bauxite available for aluminum production. The foreign deposits held by Alcoa and its private fleet of ships enable it to bring in bauxite at a lower net cost than anyone else has yet achieved.

"2. Alcoa has the best power for its own use. No one else can get as cheap power for aluminum production, not even from the government projects.

"3. The integrated system of private Alcoa plants is much better located and of more suitable size for economical postwar operation than any combination of DPC and independent plants."

In reply, the Aluminum company pointed out that the government-owned aluminum smelting plants are the most modern in the world and account for 57 per cent of the industry's capacity, with Alcoa having 36 per cent and Reynolds Metals Co., 7 per cent.

"There is no reason why the government-owned plants cannot be successfully operated if they are efficiently managed," the company said. The company assailed the idea that operators of government-owned plants should be subsidized.

"There is no shortage of bauxite, the raw material from which aluminum is made," the company contends.

"The dissolution of Alcoa as proposed by the attorney general would destroy property values running into millions of dollars owned by thousands of small investors and, in an unusually large proportion, by religious, educational and charitable institutions as well as insurance companies. Moreover, it would be directly contrary to the findings of the courts which tried this issue."

Present, Past and Pending

VACUUM CLEANER PRODUCTION EXPECTED TO RISE

WASHINGTON—Vacuum cleaner production may rise to 25 or 30 per cent of the prewar manufacturing rate by January, according to WPB. This means the rate may be to 100,000 or 150,000 in the fourth quarter. In 1940 the industry produced 303,000 units.

ASK FLOOR UNDER LCL FREIGHT RATES

WASHINGTON—Motor carriers have petitioned the Interstate Commerce Commission to place a floor under railroad less-than-carload freight rates. They claim the commission's class rate ruling of May 15 if adhered to will compel the railroads to charge rates which not only are not compensatory to the railroads but also will destroy or impair motor carrier transport service.

EVANS PRODUCTS CO. BUYS PLYMOUTH, MICH., PLANT

PLYMOUTH, MICH.—Sale of the government-owned munitions plant operated here by the Kelsey-Hayes Wheel Co. to the Evans Products Co., Detroit, has been announced by the Surplus Property Division of the RFC.

GE AWARDS CONTRACTS FOR ELECTRONIC DEVELOPMENT

SYRACUSE, N. Y.—General Electric Co. has awarded contracts to the Walsh Construction Co., New York, for erection of ten buildings at the company's projected Electronic Park development here. A 155-acre site is being developed at a cost of about $20 million.

NAVY STILL HAS $3.9 BILLION UNCANCELED CONTRACTS

NEW YORK—Although more than $8.3 billion in war contracts have been terminated by the Navy since V-J Day, about $3.9 billion still remain on the books which the Navy wants to conclude as quickly as possible. Schedule calls for filing of all claims by Oct. 15, review of claims by Nov. 15 and final settlement by Dec. 15.

WICKWIRE SPENCER WILL RETAIN IDENTITY

BUFFALO—The Wickwire Spencer Steel Co. will not lose its identity in the proposed merger with the Colorado Fuel & Iron Corp., according to President E. Perry Holder.

STEEL FOR SALE PRODUCTION DECLINING

NEW YORK—Production of steel made for sale in July totaled 5,214,074 net tons, compared with 5,597,631 tons in July, 1944, according to the American Iron & Steel Institute. Largest decline was in sheared and universal plates, which totaled 1,055,-[illegible]4 tons in July, 1944, and 615,484 tons last July.

SURPLUS PROPERTY SALES BY RFC INCREASE SHARPLY

WASHINGTON—Total sales of surplus property by the Reconstruction Finance Corp. in July showed an increase of $9,604,000 over the preceding month, while the amount of goods on hand increased by $36 million from June to July.

Colorado Steel Firm Makes Lease Offer on Geneva

Five-year lease of the Defense Plant Corp.'s Geneva, Utah, steel plant has been proposed by the Colorado Fuel & Iron Corp., it was reported last week. The Colorado company, in making its proposal, asked that the government install approximately $60 million of additional facilities needed to convert the plant to peacetime production. It offered to supervise the installation of the new facilities and operate the plant in its present condition during the installation period.

Under the plan as outlined by E. Perry Holder, representing the directors of the Colorado company, a new corporation would be formed to be known as the Geneva Steel Corp. It would issue preferred stock amounting up to $15 million to provide working capital.

Proposed rentals to be paid the Defense Plant Corp. range from 25 cents a ton on pig iron to 50 cents a ton on billets, and from 50 cents a ton on hot rolled strip steel to $1.50 a ton on tin plate. Net profits in excess of $3 per ton would be divided, half to the government to reduce the plant valuation and half to retire preferred stock.

Wartime Agencies Consolidated in Labor Department

Schwellenbach given additional authority to handle reconversion labor problems as strikes slow resumption of civilian goods production. Moves to rebuild conciliation service

LEWIS B. SCHWELLENBACH

CONSOLIDATION of most of the government agencies dealing with labor problems into the Department of Labor last week was hailed as a salutary step but was considered an incomplete answer to a troubled labor situation in which 200,000 were on strike and in which demands for large wage increases and threats of more strikes threatened to disrupt the reconversion program.

President Truman transferred the War Manpower Commission and the War Labor Board to the jurisdiction of Secretary of Labor Lewis B. Schwellenbach. These agencies have been operating independently during the war, and were responsible only to the President, a situation which seriously restricted the authority of the secretary of labor.

At the same time, the Chief Executive abolished the Office of Economic Stabilization and transferred its functions to the Office of War Mobilization and Reconversion under John W. Snyder. The head of the OES, William H. Davis, former chairman of the WLB, caused the administration embarrassment when he was quoted as favoring wage increases of 50 per cent within the next five years without any increases in prices. In announcing the dissolution of the OES, President Truman remarked that these views were those of Mr. Davis and not of the administration.

The reorganization of the labor agencies leaves the National Labor Relations Board and the Fair Employment Practice Committee as the only important labor agencies not under the jurisdiction of Mr. Schwellenbach. These two groups may be placed in the Department of Labor later.

Under the new setup, Mr. Schwellenbach is given more authority than any previous labor secretary has had. All indications are that he will need all the authority he can muster to resolve the pending and threatened labor disputes.

Demands for wage increases that would stabilize wartime take-home pay for shortened peacetime work-weeks already are pending in many of the basic industries.

The United Steelworkers of America-CIO has formulated a demand for a $2 a day increase, an advance which producers say would add $6 a ton to the losses they already are suffering on most peacetime products. Prior to the filing of the union's demand steel producers had applied to the Office of Price Administration for an increase of $7 a ton. Apparently this application will be stymied by the union's wage demands. Some observers believe it is unlikely that any action will be taken on the price relief request until steel wages are stabilized—at present or somewhat higher levels. This probably will be a task that will be handled at the White House level—by the President, Secretary Schwellenbach and Mr. Snyder.

Overshadowing the steelworkers' demands is the situation in Detroit where United Automobile Workers are demanding a 30 per cent increase in wage rates and where progress on reconversion has been slowed to a snail's pace by strikes in critical plants. Last week the autoworkers showed signs of retreating from their position and indicated a willingness to accept a token increase for the present (page 101).

—By Thomas, in Detroit News

One of Secretary Schwellenbach's f actions after the reorganization of labor agencies was to appoint Ed Warren, chairman of the Chicago regio WLB, as head of the United States C ciliation Service, which Mr. Schwell bach plans to build to new stature. first assignment to Mr. Warren was critical Detroit automotive situation.

The United Farm Equipment Metal Workers posed demands for flat per cent increases in hourly rates to le ing midwestern farm implement and r machinery manufacturers.

The Oil Workers Union asked a 30 cent increase of Socony-Vacuum Oil and some 500 workers at Chicago st to enforce their demand. The strike last week appeared to be spreading Texas and other oil centers.

Unrest continued in the rubber ce of Akron where workers are drubl for a 30 cent hourly increase. West house Electic Corp. salaried workers tinued on strike, affecting shipments that company's products to other dustries awaiting equipment for re version. Scores of other walkouts throu out the country accounted for m thousands of idle men.

Union Ignores Facts, Says U. S. Steel Finance Chief

Facts were ignored by the Un Steelworkers of America-CIO in a p phlet and publicity release charging the steel industry had made $2 bi in "open and concealed" profits du the war, according to E. M. Voorh chairman of the finance commi United States Steel Corp. The un pamphlet was issued in support o

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demand for a $2 a day wage increase.

"As far as U. S. Steel is concerned," Mr. Voorhees said, "its total earnings for the five-year period 1940-1944 inclusive, were $413 million, or an average annual income of 4.8 per cent of its investment. In the same five-year period, it paid dividends to its preferred stockholders of $126 million at the prescribed rate of $7 per share, and to its common stockholders of $174 million at the rate of $4 per share—a rate unchanged since 1940. Its wage, salary, social security tax and pension costs of $3¾ billions applicable to an average of 310,000 employees were more than 12 times as much as paid to its 225,000 stockholders.

"The 13 operating subsidiaries of U. S. Steel producing, fabricating and distributing steel products under war contracts subject to renegotiation of profits were found by the Navy Price Administration Board—acting for all government agencies—to have realized no excessive profits on war contracts."

Edward L. Ryerson, chairman, Inland Steel Co., Chicago, said the statement of Philip Murray dealing with the "hidden earnings" of the steel industry during war years represents a gross misstatement in so far as it relates to Inland Steel. For 1936 Inland showed a net profit of $12,801,000. During the period 1936 to 1939, Inland increased its ingot capacity by 1,100,000 tons or approximately 56.8 per cent and expended approximately $48,795,523 for that purpose. For 1944 Inland showed a net profit of $10,249,000.

All charges for depreciation, accelerated amortization and depletion made during the war years and previous years were in complete accord with the federal government's approval for such charges, said Mr. Ryerson, and no excessive reserves were set up during any of the war years for unknown contingencies.

Industry Estimates Wage Advance Would Increase Costs $6 per Ton

Spokesmen say union's demands cannot be met unless prices are raised materially. Two-thirds of carbon products now being made at loss, due to cost increases imposed during war. Application to raise steel product ceilings pending before OPA

STEEL wages cannot be increased unless steel prices are advanced materially.

This was the reaction of the steel industry to the demand of the United Steelworkers of America-CIO for a $2 a day increase. Industry statisticians figure the requested wage increase would boost direct steelmaking costs by at least $6 a ton, at a time when producers are losing money on two-thirds of the carbon steel products at present prices.

A request for a price increase to take care of wage and other costs imposed during the war years is pending before the Office of Price Administration.

The union's proposal for a 25-cent hourly increase, according to Benjamin F. Fairless, president, United States Steel Corp., means a 32 per cent increase in the basic steel labor rate, and a 21 per cent increase in the average overall straight time rate in U. S. Steel's steel producing operations.

"Wages cannot be considered separate and apart from steel prices. Wages paid in the steel industry and in the industries from which steel manufacturers obtain the articles and services needed for their operations represent a major cost of making steel. The Office of Price Administration now has data from steel companies making 85 per cent of the country's ingot tonnage which show that on an overall average basis these steel companies are losing money on two-thirds of the tonnage they produce.

"The reason is simple. It is because costs of making steel products, primarily labor costs, went up during the war far more rapidly than they could be absorbed, while, except for minor adjustments, OPA ceiling prices did not advance. Any national policy which is concerned with maximum employment must help to create conditions under which employment in private industry is possible. Industry cannot employ, much less expand employment, except as it is permitted to earn a fair return.

"United States Steel has on many occasions declared in favor of high wages, and wages today are certainly far from low in the steel industry. The average steelworker with an average hourly rate ranging about $1.15 per hour, without any consideration of overtime, will take home $9.20 for an eight hour day. Considering overtime, which in the steel industry is still very much in the picture, the average hourly rate is about $1.30 an hour. When you consider that two out of every three steelworkers make more than $1 an hour at present rates, without overtime, it ought to be clear that steel wages are not low.

Disadvantage Has Grown

"Cost and prices vary among steel products but I am convinced that on the average there has been a net change since 1940 of at least $7 or $8 per ton to the disadvantage of the steel producer. During the war period, some steel companies were able to stand these increased costs because of war products which they made. But the war is over. Anyone should be able to see what is bound to happen; any businessman or head of a family can understand very quickly that you cannot go on paying out more money than is taken in. It is just as simple as that.

"On top of this $7 or $8 penalty already incurred, the union wants wage increases which will raise the cost of producing steel at least $6 a ton on the average. Furthermore, the union wants the steel industry to absorb this additional cost, along with all other increased costs since 1940, without raising prices.

"We cannot today think in terms of more wage increases in steel, except in terms of material price increases. That is, we can't if we are to stay in business, because staying in business means staying out of the red. The matter accordingly is a question of government policy."

Hundreds of unfinished automobiles await parts on Ford assembly lines, closed because of a strike in a supplier's plant. NEA photo

Modernization Program Urged For Foundries

Speaker tells Pittsburgh group individual operators must be alert in meeting postwar competition

BENEFITS accruing from modernization of foundry operations as well as marketing practices were described by Lester B. Knight, consulting engineer, Chicago, speaking at the Pittsburgh Foundrymen's Association's initial meeting of the 1945-46 season in Pittsburgh last week. Mr. Knight spoke in similar vein before the Northeastern Ohio chapter of the American Foundrymen's Association at Cleveland, Sept. 13.

Every foundry must be constantly on the alert to modernize its thinking, production methods and facilities in order to insure quality products at low unit cost in meeting postwar competition not only from within its respective industry but from other industries, Mr. Knight said.

No two foundries present identical conditions so it is of paramount importance that the modernization program be developed to fit local conditions with sufficient flexibility to allow efficient operation under varying work loads. Until recently the jobbing or production jobbing type foundry believed modernization and mechanization was all right for the production foundry, but could not be applied to their conditions, he said. Some jobbing foundries did get into financial difficulties by trying to copy production equipment for jobbing requirements. Today, however, there are many modern, mechanized (to a degree) jobbing and jobbing production foundries that are highly successful.

After proper consideration of the overall layout, based on the mission the foundry is expected to accomplish, a detailed analysis of requirements and costs should be developed to illustrate the economies of the proposed changes, Mr. Knight stated. The foundry industry is a feast and famine business, hence any major expenditure should be self-amortizing in direct material and labor savings in not more than three years.

Foundry modernization involves the following four basic steps, according to Mr. Knight:

1. Personnel must be properly organized with clear cut lines of responsibility, and authority commensurate with that responsibility.

2. Establishment of closer control of the variables affecting the production of high quality castings at low cost, such as hourly or daily inspection of the scrap, etc.

3. Development of a more thorough knowledge of costs of the various operations in the plant, without which it is impossible to put emphasis on those operations or departments where unit costs are high and thus make the necessary changes in methods, procedures, personnel or facilities to secure low cost unit output.

4. Mechanization of facilities wherever possible but only after an analys and survey of each of the several d partments in the plant, with a clo check on production methods and cos

M. J. Kellner, superintendent of foun ry operations, Walworth Co., Greensbu Pa., will discuss steel foundry practi at the association's October meeting. Kellner is vice president of the St Founders' Society of America, Clevela and the Pittsburgh Foundrymens' As ciation.

OUTLINES BRITAIN'S ECONOMIC PICTURE: Lord John Maynard Keynes, left, economic adviser to the British Treasury, and British Ambassador Lord Halifax, center, give reporters a picture of Great Britain's economic status at a Washington press conference. At right is Harold Butler, representative of the British Ministry of Information. NEA photo

Krug Tells New England Council That He Expects Boom by June

SPEAKING before more than 200 industrialists and businessmen gathered at Hotel Statler, Boston, Sept. 14, for the quarterly convention of the New England Council, J. A. Krug, chairman, War Production Board, said the War Production Board "is on the way out," with no possibility of its perpetuation as a major industrial control agency under peacetime conditions.

Because of the success of overall scheduling and control of production as a wartime expedient, there had been—Mr. Krug admitted—some temptation to carry on similar activities in Washington after the war.

However, when all factors were weighed carefully, it became obvious to the would-be planner that the only way to achieve quick postwar prosperity, was to turn industry back to the "2000 or 3000 entrepreneurs" who understand the intricacies and peculiarities manufacturing and marketing the tho sand and one products which will bri prosperity now. Control of a few s critical materials such as raw rubb and tin will continue for a wh "then we will be out of a job."

Basing his assertions on reports by leading industrialists and on the acti plans of 375 companies, he express belief a nation-wide industrial boo will be under way by June of 1946 with the level then exceeding that 1939-40 by at least 87 per cent. December of this year, he expe activity at 12 per cent over the 1939 base period.

He stated that reliable authorit estimate construction volume for 19 at $6,500 million, which will be 44 p cent above 1945. Factory construct alone, in 1946, will reach $950 million

gest in history—if present plans are ried through.

In introducing Mr. Krug, Frederick Blackall Jr., president, Taft-Peirce fg. Co., Woonsocket, R. I., and presi-ent of the New England Council, made me significant remarks. In a strong ea for more vigorous national adver-ing and selling activities by New ngland industries, Mr. Blackall said: What is needed at this time is less of Calvin Coolidge and more of the ly Rose in our marketing methods. ew England must overcome its natural icence and shout the merits of its res continuously and vigorously."

Mr. Blackall sees in development of iation the answer to the argument, oc-sionally encountered, to the effect that ou folks are too far away." This al-dy makes it possible for men from e home office and vitally needed parts, ls, etc. to be at hand in distant places short order. The time is not far dis-t, Mr. Blackall believes, when the me thing will be true of items now ought of primarily as conventional ight shipments.

EETINGS . . .

Association of Iron & Steel Engineers: nual fall meeting, district sessions as ows: Sept. 26, Pittsburgh; Oct. 1, cago; Oct. 3, Cleveland; Oct. 6, iladelphia.

Oct. 19-20, Foundry Equipment Man-facturers' Association: Annual meeting, nestead Hotel, Hot Springs, Va. thur J. Tuscany, Engineers Bldg., eveland, executive secretary.

Oct. 23-24, Gray Iron Founders' ciety: Annual meeting, Chicago. W. Rose, 1010 Public Square Bldg., eveland, executive vice president.

Jan. 8-10, 1946, Institute of Scrap Iron Steel Inc.: Eighteenth annual con-tion, Jefferson Hotel, St. Louis. Ed-n C. Barringer, 1536 Connecticut Ave. W., Washington, president.

May 6-10, 1946, American Foundry-en's Association: Fiftieth annual Foun-y Congress and Show at Cleveland. W. Maloney, 222 West Adams St., icago, secretary.

ostwar Plans for Texas last Furnace Uncertain

Officials of the Lone Star Steel Co. anxious to learn the government's twar plans with respect to the $25 tion blast furnace and coke oven plant financed at Daingerfield, Tex. This born development is not in produc-because there are no facilities at ingerfield for converting pig iron into , according to John W. Carpenter, as, Tex., who is president of the ne Star Steel Co. He says construc-n of a cast iron pipe plant would pro-e a large outlet for the product of furnace.

War Production Board To Eliminate Rest Of Steel Industry Reports by Year End

STEEL producers will not be required to file any reports with the War Production Board after the end of this year. A total of 17 reports formerly required from various segments of the industry for prosecution of the war have been discontinued since Aug. 20, ten will be eliminated with reports covering operations in September, one in October and three at the end of the year, WPB has announced.

Discontinuance of the reporting forms was announced by William B. Todd, director, Steel Division, in a letter to all steel producers. He disclosed that for a short period it will be necessary for steel mills to file a report on a new form in which is to be incorporated some of the data now required on WPB-2633, Report of Shipments and Past Due Orders; WPB-2848, Steel Producers Monthly Production Directive Report; and WPB-3329, Tin Plate Inventory Report. The filing of these forms is to be discontinued with the reports covering September operations. The new form will be due in the Steel Division on Nov. 10, covering October shipments and accepted rated orders.

Filing of the following reports has been discontinued: WPB-689, Chromium: Stocks, Consumption; WPB-1583, Structural Shapes—Weekly Rolling Schedule; WPB-1770, Ferroalloys: Permission to Use; WPB-2362, Columbium: Stocks, Consumption; WPB-2871, Nickel: Stocks, Receipts, Consumption; WPB-2872, Nickel Chemicals: Suppliers Schedule; WPB-2933, Alloy Steel Melt Report; WPB-3452, Cobalt Sales Data; WPB-3453, Molybdenum Sales Data; WPB-3454, Vanadium Sales Data; WPB-3580, Scrap Consumption in Alloy Steel Production; WPB-3859, Production Service Report; WPB-3864, Sisal and Jute Quarterly Requirements; WPB-3867, Wire Rope: Producers Planned Production; WPB-4165, Tire Bead Wire Shipments; WPB-4167, Rail, Frog and Switch Requirements; and WPB-4298, Tungsten and Molybdenum Wire Application.

Reports to be discontinued with the report covering operations for September are: WPB-970, Steel Forgings Report; WPB-971, Iron Castings Report; WPB-1722, Steel Distributors Earmarked Stock; WPB-2633, Report of Shipments and Past Due Orders; WPB-2681, Steel Castings Report; WPB-2848, Monthly Production Directive Report; WPB-2888, General Steel Products: Distributors Report (Third Quarter); WPB-2892, Merchant Trade Products: Distributors Report (Third Quarter); WPB-3196, Application for Extraordinary Repairs; and WPB-3329, Tin Plate: Inventory Report. The pig iron producers report, WPB-3174, will be discontinued following the report for October operations, while the following will be discontinued with the report covering operations for December: WPB-2903, Scrap: Producers Report; WPB-2904, Scrap: Consumers Report; and WPB-2905, Scrap: Dealers Report.

It is understood that a minimum of reporting will be maintained by other government agencies in the following fields: Steel forging, iron and steel castings, general steel and merchant trade products distributors, and scrap.

Stainless Steel Market Seen Temporarily Unsettled by Multiple Basing Point Setup

MULTIPLE basing point system recently established by stainless steel producers is expected to cause some confusion in the market due to the highly specialized nature of the industry. Some producers, for instance, make only strip and narrow sheet and would not be competitive pricewise at their basing points with other companies so far as wider sheets are concerned. This lack of uniformity extends through various gages and specifications.

Following action taken by several producers recently in setting up production locations as their basing points, Republic Steel Corp., Cleveland, established Canton, O., as a basing point for stainless steel forging billets, hot-rolled bars, cold-finished bars and wire, hot and cold-rolled strip, sheets and plates.

Joslyn Mfg. & Supply Co., Ft. Wayne, Ind., has established Ft. Wayne as a basing point for stainless steel bars. The company announced that freight charges will be based not only from Ft. Wayne but from any other published basing point for this product.

Another producer of stainless steel products, Eastern Stainless Steel Corp., Baltimore, last week announced establishment of Baltimore as a basing point on stainless steel sheets and plates, effective Sept. 20.

The multiple basing point pricing system becomes a market factor at a time when demand for stainless steel from civilian goods producers is soaring to new heights. The armed services required stainless steel for the production of a multitude of items during the war. Even before the outbreak of war, however, the

(*Please turn to Page* 201)

More Eastern Industries Planning Branch Plants in Pacific Area

At least 300 companies are reported planning such action with at least 500 seriously considering the possibilities in their post-war programs. Industrial expansion in the district getting off to good start

SAN FRANCISCO

EASTERN industry is showing increasing interest in business possibilities on the West Coast. It is estimated that at least 500 eastern companies are seriously interested in establishing branches in the area, a number that is expected to grow. Southern Pacific Co., which recently surveyed such plans, found at least 300 companies actively planning such moves.

Meanwhile, in the San Francisco area, many industrial expansion programs are off to a good start. As illustration, the following are among the larger projects:

Crown Cork & Seal Co. plans a factory on a 33 acre site, which will cost $3 million and employ 1500 to 2000.

General Electric Co. is planning widespread expansion, including a $3 million plant at San Jose.

International Minerals & Chemical Corp., has projected a large plant near San Jose for processing sugar beet pulp waste.

Continental Can Co. will build another 350,000 can factory, and Pacific Can Co. has plans for a similar sized plant in this area. Glass Containers Inc., has just opened a large glass bottle and fruit jar plant near San Francisco.

One of the largest new projects will be Columbia Steel Co.'s $25 million sheet and tin plate rolling mill.

Many plants are planning modernization and rehabilitation of structures and equipment. For example, Paraffine Companies Inc., will spend $4,500,000 on improvement and expansion of its plant at Emeryville. In addition it will invest $1 million in a paper mill and power plant.

The San Francisco Chamber of Commerce recently said prospects are excellent for providing 40,000 to 46,000 more jobs in the postwar period than in 1940.

Industrial Expansion Going Ahead at Fast Pace in the Southern California District

LOS ANGELES

FOURTEEN factories were built in Los Angeles during August, with total investment of $1,385,000, creating 748 new jobs for factory workers. During the same period, 20 existing plants were expanded, additional investment being $1,995,000, with creation of 464 jobs.

Following are briefs of activities in the new development by companies engaged in metal or allied lines.

Electric Household Utilities Corp., Hurley Machine Division, Chicago, will begin manufacturing operations in Los Angeles and will be in full production by 1946 on washing machines, dishwashers and ironers.

Bendix Aviation Corp., Radio Division; home radios and radio phonograph combinations.

Rotor-Craft Corp., 4358 W. Third St., will start manufacture of helicopters on mass scale.

Vac-Seal Laboratories, 947 Yale St. (formerly of New Jersey), will start making special electronic devices and insulators.

Schrader Electronic & Coil Corp., 5732 Duarte St.; electronic equipment and coil winding.

Zirkite Refractory Products, 11320 S. Atlantic Blvd., Lynwood, is manufacturing crucible and furnace coatings. A. A. Ortega, manager.

Wedgelock Mfg. Co., 1682 W. 35th Place, making dies, tools, sheet fasteners for aircraft, garden tools.

Morris P. Kirk & Son Inc., 2717 S Indiana St., to start production of sheet lead and lead pipe.

Byron Jackson Co., 2301 E. Vernon Ave., expanded production of pumps and oil well equipment at main plant in Los Angeles.

Texas Co., Wilmington, will erect steel frame buildings with traveling crane at cost of $150,000.

Shepard Tractor & Equipment Co., 150 W. Jefferson Blvd., constructing 80,000 sq ft of floor space at 4647 Bandini Blvd. Fabricates dozers and assembles generators, marine and industrial engines and will represent Caterpillar Tractor Co., in this area.

Continental Can Co., 3820 Union Pacific Ave.; has permit for erection of warehouse at cost of $99,500.

Holly Heating & Mfg. Co., 1000 Fair Oaks, Pasadena; new 22,000 sq ft building at 875 Arroyo Parkway, Pasadena, to make residential hot air furnaces.

Paul G. Wanger Co., 2865 E. Washington Blvd.; building 17,000 sq ft additio for producing screw machine product aircraft tools and parts, fruit juice di pensers.

Coast Sheet Metal Works, 17 N. Ma nolia, Burbank, is constructing 10,5 sq ft building at 59 Orange Grove Ave Burbank, for making sheet metal produc and for machine and welding operation

Truck Bodies Co., 2865 E. 26th S to occupy new 9000 sq ft buildin' abo Oct. 1. Makes truck and trailer bodie

Los Angeles Brush & Mfg. Co., 22 E. 37th St., building an 8500 sq ft pla for increased production industrial a household brushes.

Absco Welded Products Co., 5244 Adams Blvd., expanding by 7000 sq for manufacture of oil field equipme and steel fabrication.

Zinsmeyer Co., 729 Turney St., buil ing 6500 sq ft addition for switc board, switches, lighting fixtures a motor control production.

Globe Products Co., 3380 Roberts Blvd., has purchased Machine To Division of Clayton Mfg. Co., Alhamb Globe now makes hand screw machin bed turrets, cross slides, vises, mille end mill holders, dividing heads, arbo step blocks, milling dogs and wo holding fixtures.

Peacetime Products Shown In Los Angeles Exhibit

Nearly 200 exhibitors displayed wa of many sorts at the second annual " dustry on Parade" exhibition held Los Angeles recently. Machine too castings, boats and household applian were shown either by Southern C fornia manufacturers of the various ticles or by local representatives eastern plants. Such goods form the majority of the displays.

According to many observers, th was a notable dearth of newer pea time goods on view at the show, majority of exhibits featuring artic and tools of the "old line," stand type.

Merchant Shipbuilding Drops to 36-Month Low

Merchant shipbuilding dropped a 36-month low during August w delivery of 84 vessels aggregating 82 817 deadweight tons from 30 shipya United States Maritime Commiss announced recently. Geographical tribution by yards on the basis number of vessels and deadweight t nage, respectively, was as follows: W Coast, 31 and 336,220; East Coast, and 286,106; Gulf Coast, 21 and 173,4 Great Lakes, 6 and 30,060. Eight of ships delivered were for military Other types were: 28 Victory ca 6 Liberty cargo, 10 C-type cargo, Liberty colliers, 18 coastal cargo, standard tankers, and 2 coastal tanker

WPB Tightens Restrictions on Use Of Tin as Supplies Drop Further

Cancellations of war contracts fail to release any appreciable amount of metal for other uses. WPB amends orders M-43, limiting general purchases and reducing quotas for specified uses, to conserve 95,000-ton supply

CANCELLATIONS of war contracts have not released any appreciable amount of tin for other uses. Supplies of the metal remain extremely tight and will fall short of covering total requirements, the War Production Board reports.

Tin plate will be required in even greater amounts than in 1944; bronze requirements are principally naval, and any setbacks in new naval construction will be partially offset by the rapidly mounting replacement and maintenance requirements. This will also be true of tin used in babbitt metal. If tin were allowed to be used for new civilian programs on an unrestricted basis, WPB believes consumption might reach an annual rate of 120,000 tons compared with 90,352 tons in 1944 and 81,840 in 1943. Since United States tin stocks total only about 95,000 tons, restrictions must be continued to prevent complete exhaustion of supplies.

Amendments of M-43

WPB has amended order M-43 in several important respects as follows: (1) quantity of pig tin that any user may purchase for use in accordance with the order will be three tons a month, instead of five tons; (2) maximum sale to any customer shall not exceed one ton, as compared with former limitation of three tons; all users of tin must file reports on WPB-412 if they use, or have in their possession, 3000 pounds or more, instead of 3000 pounds per month as formerly; (4) maximum permitted use of tin in solder has been reduced from 50 per cent to 40 per cent and quota amounts of pig tin for use in solders have been reduced to 90 per cent of the base period (fourth quarter, 1944); (5) quota amounts of pig tin in babbitts (for bearings) have been reduced to 80 per cent of the base period and the tin content of low tin babbitts from 12 per cent to 10 per cent; (6) quota amounts of pig tin in bronzes and brass alloys have been cut from 80 per cent of the base period to 60 per cent and wrought alloys from 80 per cent to 70 per cent; (7) quota amounts of pig tin in tin plate have been reduced to 95 per cent of the base period.

A considerable amount of scrap of high tin content is "backing up" which will be available to supply all expected requirements of copper-base alloys not requiring more than 6 per cent tin, according to WPB's Tin-Lead-Zinc Division.

The American government is making every effort to expedite the delivery of tin-producing equipment, which has been requested by the Netherlands government. WPB anticipates receiving less pig tin in 1946 than in 1945 from the present sources of Bolivia, Belgian Congo, French Cameroons, Mexico and the Argentine. Part of the Belgian Congo output will be diverted to fill needs of the liberated areas and neutral countries; no more will arrive from Portugal because of the end of preclusive purchasing in that country; the small receipts from China will cease and be diverted to consuming countries in that part of the world.

New Construction Expected To Increase by 44 Per Cent

A vast program of new construction, aimed at reducing unemployment and expanding peacetime production, is well under way, according to the War Production Board's first monthly report on "Construction for Reconversion."

Subsequent to publication of this report, limitations on home, commercial and public works construction were removed as of Oct. 15 by revocation of order L-41. WPB cautioned, however, that a shortage of building materials, including cast iron soil pipe, does exist and will continue for the next quarter.

A WPB survey of 41 selected industries, covering 4101 companies, showed the value of construction, tools and equipment projects now under way or planned for completion within the next 12 months totaled $520,225,000. It was pointed out that the industries covered in the survey do not constitute the entire reconversion field and that all reconversion industries as a group account for only a fraction of the total industrial plant and equipment expansion planned for the next year. Prominent examples of plant and equipment expansion, other than in the reconversion industries, are in the food processing and textile fields.

"During 1945," J. A. Krug, WPB chairman said, "more than 700,000 persons have been employed monthly in the construction industry. By 1946, this number is expected to increase to more than a million. This does not include employment generated by maintenance and repair activity.

The WPB report says total new construction in 1946 is expected to reach about $6500 million, a 44 per cent rise from the 1945 level. Bulk of the overall increase will be privately-financed activity amounting to an estimated $4350 million, an increase of 73 per cent over the 1945 total.

TRANSITION TOPICS

COAL—Ending of war averts crisis, but supply for winter months will be tight. Mines need 30,000 more workers. Between 6 and 8 million tons to be shipped to Europe during remainder of year. See page 85.

RECONVERSION—Midwestern plants report rapid progress toward large-scale production of civilian goods. See page 86.

ALUMINUM—Breakup of Aluminum Co. of America into several competing companies recommended by attorney general. See page 87.

LABOR—Consolidation of various war agencies into Department of Labor hailed as salutary step. Wage demands and strikes hampering reconversion. See page 88.

STAINLESS STEEL—Establishment of multiple basing points expected to have temporary unsettling effect on market. See page 91.

TIN—War Production Board tightens restrictions as supplies grow tighter. See page 93.

GERMAN STEEL—Reich potential still large despite Allied bombings. Half of capacity could be restored to production within three or four months and only 30 to 35 per cent needs complete rebuilding. See page 98.

AUTOMOBILES—Auto industry produced $29 billion in war goods, Automotive Council for War Production reports. See page 102.

GREATER HANDLING EFFICIENCY—Continued research in handling and stowage methods has led to important increases in versatility and flexibility of handling materials and finished products on pallets. New Navy 8-way pallet reduces space requirements, increases strength. See page 148.

Unification of Tax Proposals by Business Representatives Unlikely

Clearing House Conference on Tax Problems has no intention of submitting tax program for all business and industry. Aims to provide opportunity for discussion and interchange of ideas on federal revenue legislation revisions

HOPES that the newly organized "Clearing House Conference on Tax Problems" might bring about a unification of the tax proposals of different associations of manufacturers and businessmen when the present federal tax law comes up for revision this fall apparently are being dissipated.

For many years it has been the custom of these associations to send their tax experts before the House Ways and Means Committee and the Senate Finance Committee when new tax laws were in the making. Members of the committees frequently have complained that each expert looked at the problem merely in the interest of his own group. One expert would look at tax problems from the point of view of a manufacturer, another from the point of view of the small manufacturer, and others from the viewpoints of the distributor, the retailer, tax accountant, fiscal economist, etc. Views thus expressed often have been contradictory.

On several occasions, for example, Robert L. Doughton (Dem., N.C.), chairman of the Ways and Means Committee, has explained that it is difficult to legislate a tax program intended to help industry for the reason that industry never has agreed on a program for businesss as a whole.

Tax Program Not Undertaken

The first discussion meeting of the Clearing House Conference on Tax Problems was held at the Carlton Hotel, Washington, Sept. 13, and, according to participants, it reflected no attempt to pave the way for agreement on a tax program acceptable to business and industry in general. During a short visit with Secretary of the Treasury Fred M. Vinson, the group made it clear that the only purpose of its meeting was to provide an opportunity for a general discussion and interchange of ideas on federal taxation. When Judge Vinson asked specifically whether the group would undertake to evolve a tax program for all of business and industry, he was told that no such move was intended.

A trade association executive who long has studied the possibilities of obtaining agreement from all segments of industry and business on a tax program, told STEEL, following the meeting, that he doubts seriously whether such an objective is possible of accomplishment as industry is organized today.

"Each industry, business and profession," he points out, "has its own trade association and engages a staff which is paid to look after the interests of the group served by the association. You can get the experts of these different associations together physically, but it is another matter entirely to get them to reconcile their differences and agree on one program. An employee of a trade association likes to report to his members what he has done for them."

Members of the Clearing House Conference on Tax Problems are: Ellsworth Alvord, United States Chamber of Commerce; John Byler, American Retail Federation; Stewart N. Clarkson, manufacturing trade groups; Charles C. Fichtner, Department of Commerce Business Advisory Committee; Thomas J. Green, American Institute of Accountants; H. E. Humphreys Jr., National Association of Manufacturers; Harley L. Lutz, Tax Foundation; Maxwell McDowell, Associated States Chambers of Commerce; Beardsley Ruml, National Planning Association and Committee for Economic Development; Harold R. Scaff, Edison Electrical Institute; R. Gordon Wasson, Committee for Economic Development: James C. Willson, National Planning Association.

The charter of the new organization reads in part:

"The tremendous importance of the fiscal problems with which our federal government will be confronted during the postwar period is clearly recognized by everyone.

"It behooves all citizens enthusiastically to contribute everything possible to studying this problem, and to make recommendations to Congress for its guidance in finding a solution. Success can best be achieved if we view our endeavors from the standpoint of what is good for all citizens of our great country. Congress needs constructive suggestions as agriculture, capital, labor and management should bend their efforts to assist in every possible manner.

"In order more frequently and conveniently to arrange for an exchange of views between representatives of various organizations on fiscal and tax problems in all their phases (particularly as they may effect business activity and welfare and employment) a permanent organization for a Clearing House Conference on Tax Problems is established.

CHILE PLANS STEEL MILL

Export-Import Bank has approved a $20 million loan to Chile for construction of a steel mill, according to Chilean authorities. A Chilean steel mission has been negotiating with United States equipment companies for machinery for the proposed mill. Tentative plans call for one or more electric furnaces at Concepcion, an oil-fired open hearth of 100,000 tons annual capacity, and finishing facilities for plates, rails, structural shapes and galvanized and tinned sheets. Project is being handled by Fomento Corp., 120 Broadway, New York.

Surplus Plants Listed For Sale, Lease by RFC

Plants listed for sale or lease by the Reconstruction Finance Corp., the government agency designated by the Surplus Property Board to sell surplus producers' and capital goods, include the following (details may be obtained from regional RFC offices):

General Electric Co., Ft. Edward, N. Y. 64,000 sq ft factory, 11,480 sq ft office, machine tools, equipment.

Remington Rand Inc., Johnson City, N. Y. 564,000 sq ft, machine tools.

Schweizer Aircraft Corp., Elmira, N. Y. factory, machine tools, equipment, furniture.

General Electric Co., Syracuse, N. Y. plant with 23 buildings, of 609,767 sq ft, machine tools, production equipment.

General Electric Co., Schenectady, N. Y. radar plant, machine tools, production equipment.

Worthington Pump & Machinery Corp., Buffalo, four buildings, machine tools, equipment.

Worthington Pump & Machinery Corp., Buffalo, steel frame buildings, tools, equipment.

Republic Aviation Corp., Farmingdale, N. Y. 28 buildings, 841 machine tools.

General Electric Co., West Lynn, Mass. mill-type building of 65,200 sq ft, freight yard and docks, machine tools, equipment.

Great Lakes Carbon Corp., Chicago, fire house, coke silos, storage bins, kilns, conveyors, railroad switch.

General Electric Co., Decatur, Ind., building with 76,580 sq ft, railway spur.

Brown Fence & Wire Co., Adrian, Mich. 51,000 sq ft, machinery.

Manganese Ore Co., Las Vegas, Nev., acres with 20 frame buildings with 60,035 ft, equipment. Includes houses and dormitories.

Blanding Mines, Blanding, Utah, five acres with 11 buildings and equipment for production of vanadium oxide.

General Electric Co., Hamilton township, N. J., 272,400 sq ft, machine tools, equipment.

Hanchett Mfg. Co., Big Rapids, Mich., manufacturing building with 32,184 sq ft, railroad siding.

Ex-Cell-O Corp., Highland Park, Mich. 300,000 sq ft, machine tools, equipment.

National Instrument Co., Houston, Tex.

,000 sq ft, optical production machinery, laboratory.
Continental Aviation & Engineering Co., Muskegon, Mich., 763,000 sq ft, machine tools, laboratory.
Kenosha Brass Co., Kenosha, Wis., 174,900 q ft, tools and equipment.
American Type Founders Inc., Newark, N. J. 3,400 sq ft, machine tools, railroad siding.
Jack & Heintz Inc., Bedford, O., 51,000 sq ft, achine tools, railroad siding.
Jack & Heintz Inc., Bedford, O., 85,000 sq machine tools, railroad siding.
Sperry Gyroscope Co. Inc., Great Neck, Y., 2,210,800 sq ft, machine tools.
General Electric Co., Erie, Pa., 235,000 sq machine tools, railroad sidings.
General Electric Co., Erie, Pa., 228,000 sq machine tools, railroad sidings.
Chase Brass, Euclid, O., 568,400 sq ft, ma- ine tools, railroad siding.

Stabilized Construction Spending Recommended

When construction falls below a figure pproximately 12 per cent of our national come, depression threatens, according Charles M. Upham, American Road uilders' Association, Washington. He ecommends creation of a stabilization ard representing all construction gencies which, by controlling public estment, will maintain the 12 per nt figure as a minimum.

Construction in the past has gone be- w 12 per cent in times of depression d above that level in times of prosperity; 12 per cent has been the average. In times of prosperity about two-thirds of the construction has resulted from private investments and one-third from public investments. Taking into consideration a $300 billion debt which must be carried at enormous expense, says Upham, a better ratio for the post-war period might be three-quarters by private investments and one-quarter by public investments.

It would be difficult to control private investment, said Mr. Upham, which is swayed by enthusiasm or lack of enthusiasm, tax laws, buying power, availability of funds, rates of interest and other forces. Hence the part of the total program to be varied is that resulting from public investments, increasing or decreasing the amount of public construction according to fluctuations in the volume of private construction.

RFC To Offer Pipelines For Sale or Lease

Operation of the "Big Inch" and "Little Inch" will be discontinued within the next 30 to 60 days and the facilities will be offered for sale or lease by the Reconstruction Finance Corp.

The "Big Inch," a 24-inch line, runs from Longview, Tex., to the New York Harbor area, a distance of 1254 miles. It cost $78,535,000. The "Little Big Inch" is a 20-inch line extending 1475 miles from Beaumont, Tex., to New York. It cost $67,300,000.

Also to be discontinued are the following lesser lines:

The 200-mile, 8-inch Florida Emergency line from Carabelle to Jacksonville.

The 175-mile, 8-inch Queensboro-Richmond extension of the Plantation pipeline, from Greensboro, N. C., to Richmond, Va.

The 154-mile, 14 and 16-inch Southwest Emergency line from Corpus Christi, Tex., to Houston.

Census of Manufactures To Be Resumed in 1947

Bureau of Census is preparing estimates, to be submitted late this year for approval by Congress, for the regular Biennial Census of Manufactures to be taken in 1947 for the year 1946. This census was omitted for the years 1941, 1943 and 1945 because of the war. Bureau of Census also is preparing an estimate for a sample survey of population changes, to be taken early in 1947.

Bombings, Blockade Caused Collapse of Japanese Heavy Industry

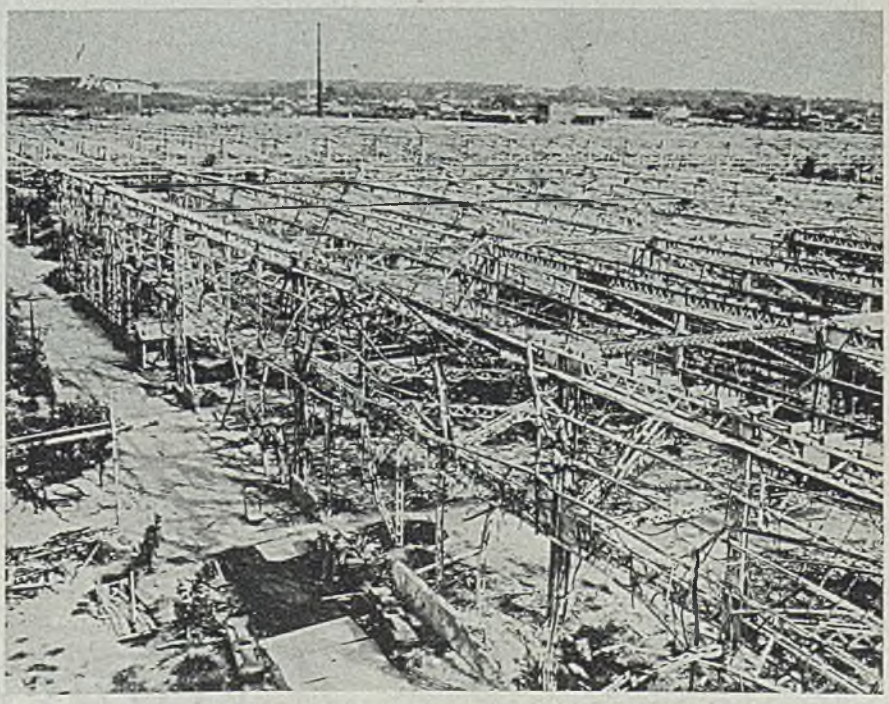
JAPAN'S steel production declined to 53,000 tons during April, May and ne, the first quarter of Japan's fiscal ar, and output was falling so rapidly at industry leaders doubted that oduction would exceed 500,000 tons r the entire year. In 1942, Japan pro- ced 4,500,000 tons.

Aiichiro Fujiyama, president of the panese Chamber of Commerce and In- stry, told American newsmen that e steel industry's difficulties began en the blockade cut off coal and iron ports from north China. "We had to pend on inferior Japanese coal and ore that had an iron content of only per cent. Then the railroads broke wn. Your people bombed the cities d the workers ran out into the country d never came back."

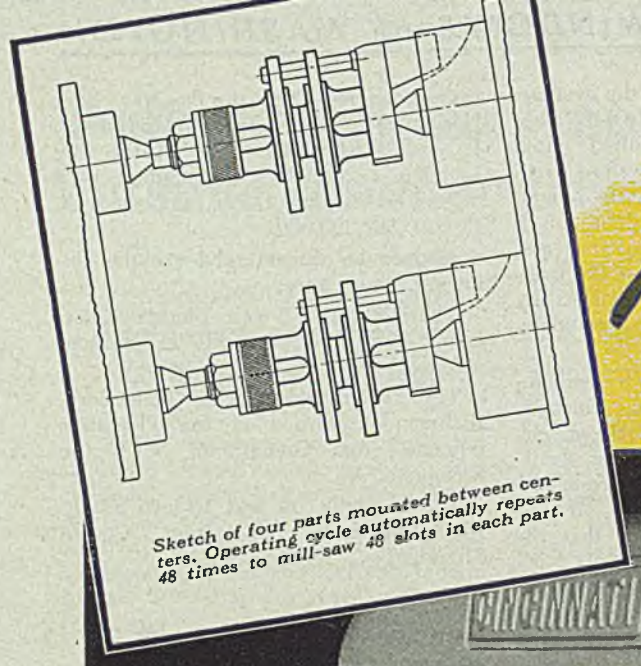
Shipbuilding fell off from 1,583,000 s in the year ended March 31 to 3,000 tons in the April-July period. In e closing months of the war shipbuild- g was at a virtual standstill.

The blockade severely restricted im- rts of bauxite and aluminum produc- n dwindled. As a result the Japs had urn to plywood airplanes.

Kiyoshi Miyasaki, president of Mit- i Co., said the greatest single factor Japan's industrial collapse was the bility to repair broken machinery. ck of spare parts paralyzed railroads, automobiles, trucks, streetcars and the telephone system. Thousands of workers who fled devastated areas were lost to industry because they had no means of transportation between the factories and the countryside.

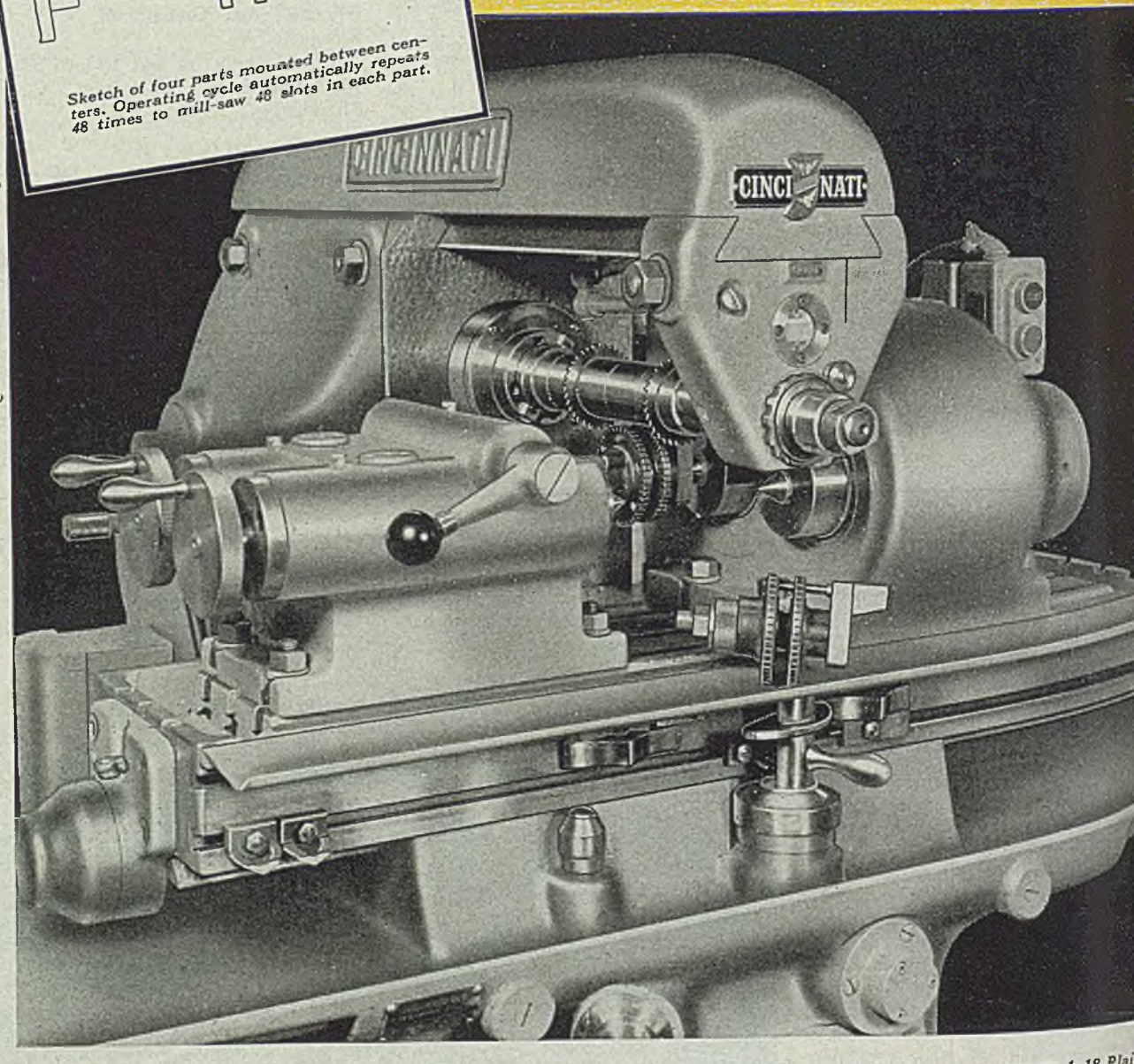


A mass of wreckage and twisted steel girders is all that remains of the Mitsubishi aircraft engine plant at Nagoya, Japan, after repeated raids by American Superfortresses. International News photo



Sketch of four parts mounted between centers. Operating cycle automatically repeats 48 times to mill-saw 48 slots in each part.

It's completely



Setup for the mill-saw operation described on the opposite page. The machine is a CINCINNATI *1-18 Plai Automatic Miller equipped with a special two-spindle Automatic Indexing Fixture. Work has not yet bee loaded in the forward station of the fixture. The parts are torus hubs for hydraulic drive in a transmissio*

THE CINCINNA

MILLING MACH

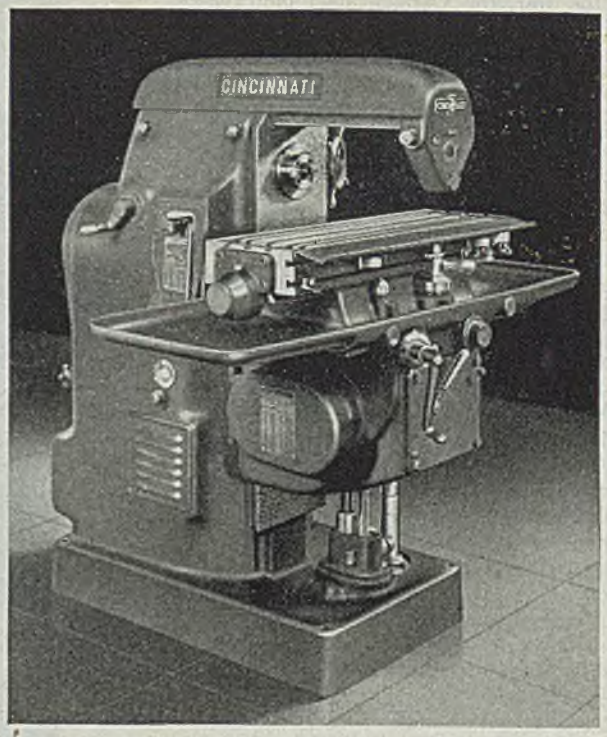
STE

automatic

MILLING 48 SLOTS IN 4 PARTS

at one setting!

Just imagine the time that can be saved by rapidly advancing to and retracting the work from the cutter at 300" per minute, and automatically indexing the work 48 times to mill-saw 48 slots. Multiply this time saving by four and you get some idea of the savings effected by the equipment illustrated at the left. The machine is a CINCINNATI No. 1-18 Plain Automatic Miller, tooled up by Cincinnati Application Engineers with a two-spindle Automatic Index Fixture for milling 48 slots in torus hubs. Each mandrel between the centers of the fixture holds two parts, making a total of four milled each loading. A cam controlled ratchet device (located at rear of fixture) and a spring lock take care of the automatic indexing. The operator merely loads the two mandrels, places them in the fixture, and starts the machine. *It automatically mill-saws 48 slots and then stops.* Investigate the 1-18 Automatic for your milling operations. You'll find that the operational features and rugged construction of this milling machine make it possible to handle a wide range of parts quickly, accurately and economically. Our engineers will be glad to talk over your milling problems and give you the benefit of their many years' experience.



CINCINNATI *1-18 Plain Automatic Miller. Complete information and specifications may be had by writing for Catalog M-848. Sweet's Catalog File for Mechanical Industries gives a brief description of this machine.*

CINCINNATI

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

BROACHING MACHINES • CUTTER SHARPENING MACHINES

Reich's Steel Potential Sti

Half of capacity could be restored to production within three or four months. Only 30 to 35 per cent needs complete rebuilding. Mills seldom were primary target of Allied planes. Transport system, supplying raw materials, badly wrecked

By GEORGE REISS
Editorial Correspondent, STEEL

DEFEATED Germany's big steel mills easily could grab a hefty chunk of the world's postwar steel business—if the Allies permit it.

Many of Germany's steel mills — and many of her other industrial plants, too —aren't nearly as badly smashed as one might gather from first reports of the air bombings. Given the opportunity, they could be put back into operation within a reasonable time.

Although badly disrupted at the end of the war, the German steel industry, if permitted and provided manpower, repair parts and equipment and raw materials were available, probably could get 50 per cent of its capacity into operation in three to four months, another 15 or 20 per cent going within six or eight months, turning out much of the steel needed to rehabilitate war-ravished Europe. Perhaps there might even be some to sell on the world markets.

The remaining 30 to 35 per cent would require complete rebuilding, if Germany were to be restored to its early-war steel producing capacity.

These are some of the impressions I received of the Nazi steel industry in a 20,000-mile air tour of Europe that took me into or over Germany's main heavy-industry centers, including the Ruhr Valley and other main industrial centers which made the war weapons that made Nazi Germany a powerful enemy.

Already, some of the comparatively undamaged steel plants are producing, making the steel that is being used to rehabilitate Europe, still more will soon get into operation under Allied control.

Steel fared better in Allied bombings than did the oil refineries, chemical and aircraft plants, which rated "top priority" in the air strategy.

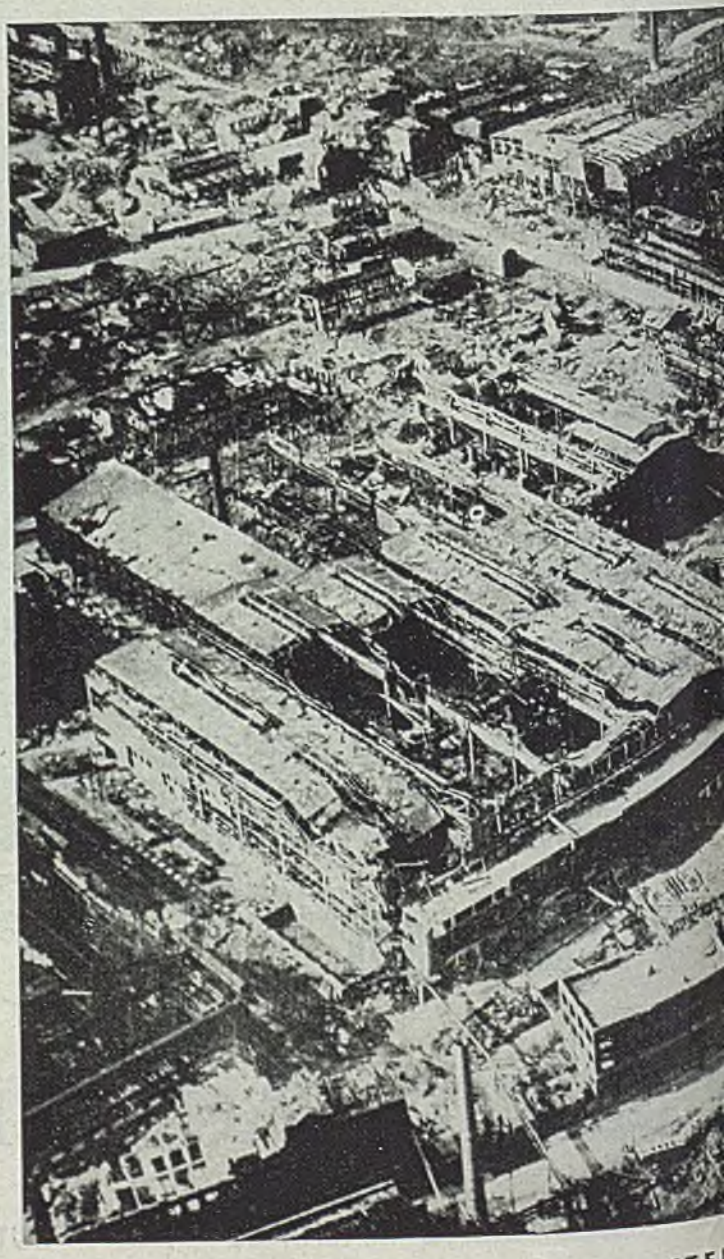
The bombers accomplished their mission of knocking out the German industry partly by cutting off the supplies of raw materials, manpower and parts, and partly by hitting the vital spots, such as the coke plants, hitting the superstructures.

Dr. Paul Maulick, managing director of the German steel syndicate, told Allied representatives that German steel output was cut from about 20 million tons a year in 1941 to virtually nothing early this year—chiefly by air bombing.

Railroads and canals were so badly damaged that raw materials couldn't move. That clipped off 80 per cent of the production; the rest was accomplished by hitting the plants themselv

"We were in a vicious circ'e," Maulick insisted. "We couldn't contin to repair the railroads because we h to have steel to make the rails; a we couldn't produce the steel for r because the railroads couldn't move ore and coal and scrap to the furnace

Germany, at the war's outset, w's world's second largest steel produc



STE

This is the third article of a series by Mr. Reiss on German industry.

arge, Despite Bombing Damage

econd only to the United States; in 941, it had 28 million tons of steel apacity, against the United States' more an 86 millions tons of annual capacity.

Part of the explanation of the steel lants' comparative minor destruction that steel never was on the high riority target list of the U. S. and itish air forces.

The only steel plants hit hard were ose hit incidentally to bombing other rgets, such as the chemical plants or refineries. The bombers did go after e by-product coke plants—not beuse of their value to steel, but to e chemical industries. They also were sometimes in the R.A.F. area bombg raids.

"Steel," explained one Air Forces intelligence officer, "was never on the high priority target list because we had too much else to do, too many other more vital targets such as the refineries, tire factories, chemical plants, aircraft and tank works.

"We preferred to let the Nazis expend their labor in making steel, and then we'd hit the finishing plants. That wasted much more manpower for the Nazis—and was a lot more useful to our war effort."

And those bombs landing in the steel plants exploded when they hit the superstructures, expending their force before they touched the more vital parts of steel producing equipment.

On a flight from Hamburg to Brunswick, we circled over the huge Hermann Goering steel works at Eisleben.

I was unable to get definite data on the Goering works capacity, the exact number of units it had—other than I could see it from the airplane's window. But it had a huge by-product coke works, 12 large blast furnaces, a large bessemer converter plant, some rolling mills, and it was served by an elaborate railroad network, and a branch canal to its raw materials stockpiles.

The plant shows comparatively slight damage. Its coke works were rather badly beaten, the result of a strategic bombing raid to cut off its shipment of chemicals to the Nazi's chemical industry; one of its blast furnaces was knocked over; but that was all.

The railroad yard and its roundhouse were pretty badly smashed, and the canal was blocked by wrecked locks and bridges.

In the Ruhr Valley, where is located the world's greatest concentration of heavy industry, the damage was much greater to steel than in other parts of Germany, chiefly because the Ruhr presented an easy target.

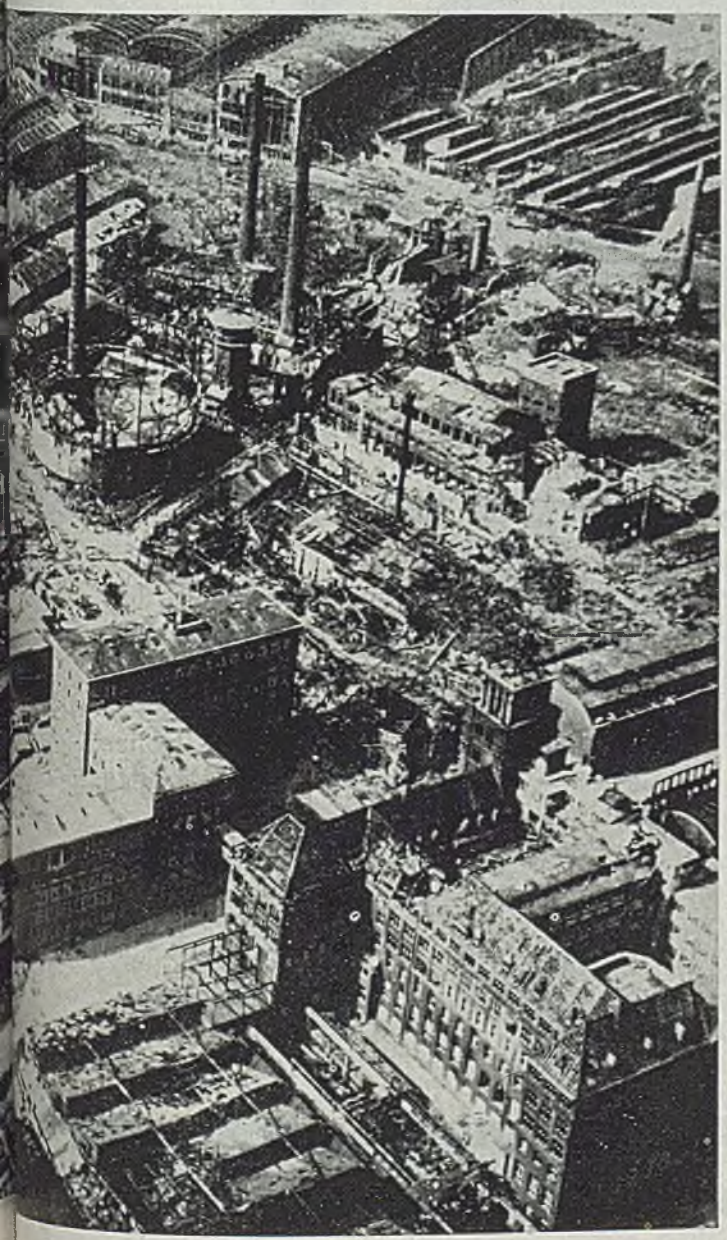
Much of the bombing strategy, designed to knock out German industry, was directed at the intricate network of railroads and canals.

Even the fighter bombers and the medium bombers joined the heavies in the railroad attacks; and by the war's end, rail traffic in and out of the Ruhr was cut 75 per cent; when the vital Dortmund-Ems canal was knocked out, Germany suffered a severe coal shortage—while enormous piles of coal were heaped at the Ruhr Valley mines.

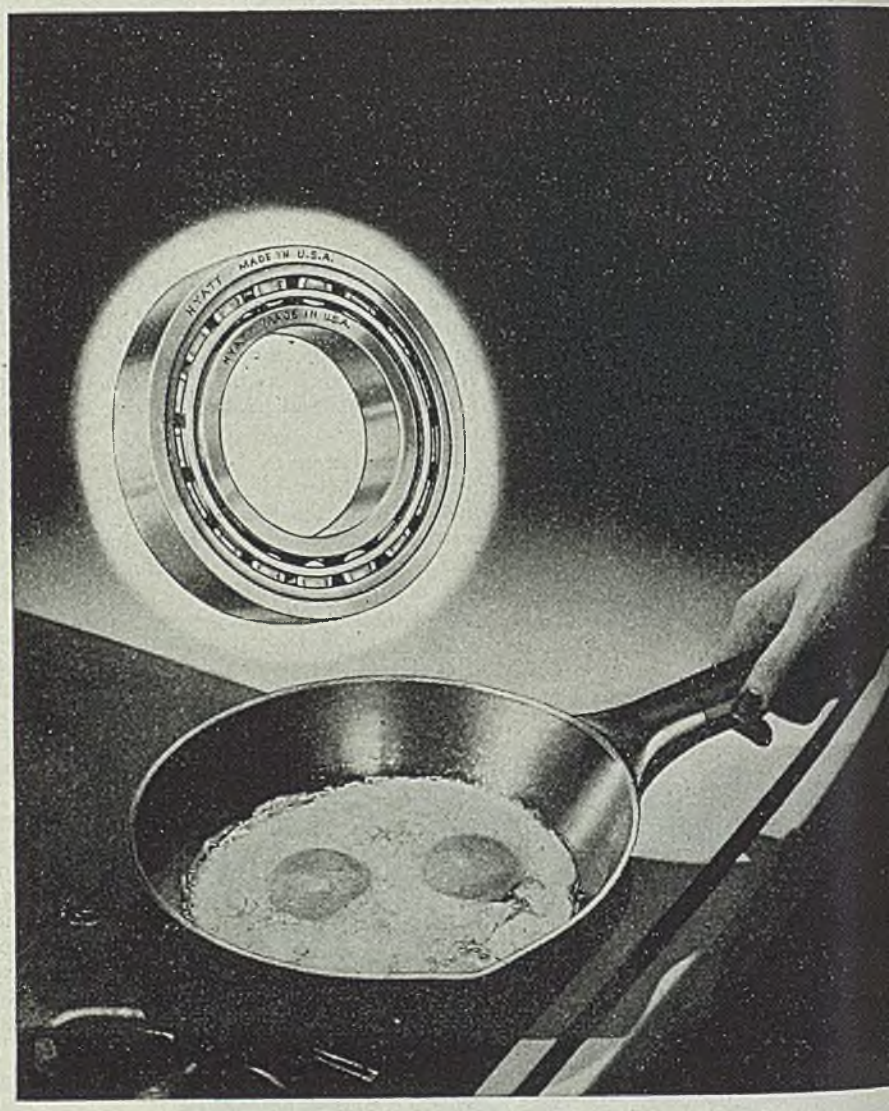
Already the transport bottleneck in the Ruhr is being broken—under the pressure of supplying coal to keep much of Europe warm this winter. Already some trains and barges are able to handle considerable coal moving from Duisburg, big Ruhr coal shipping port, after extensive railroad repairs were made. However, the supply of locomotives and cars is still quite short.

Some barge traffic already is moving on the Rhine river to Holland, but the Army's Bailey bridges, on which the troops crossed the river, provided a problem because of their low clearance. And

(*Please turn to Page* 201)



Great Krupp Works at Essen underwent repeated poundings by Allied bombers. This air-view shows the damage done to part of the steel works, fabricating and oil plants. NEA photo



Rollers Roll

AND THERE'S STEEL FOR SKILLETS AND SKYSCRAPERS

WORKING 'ROUND THE CLOCK, steel mill equipment faces one of the toughest assignments we know of.

Take ingot and charging cars for instance—consider the severe shocks imposed on the journal bearings—it's really tough. 75% of these cars are equipped with Hyatt Roller Bearings—mills have proved through the years that Hyatts can take it.

Rolling tables, cranes, mill motors and other equipment are likewise enabled to give longer, uninterrupted service because of the better bearings Hyatt has created for these applications.

Call in the Hyatt man to help you solve friction troubles. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Likelihood of long, widespread strikes for 30 per cent increase in pay discounted. Internal strife partially responsible for United Automobile Workers campaign. Automotive Council reviews war production of its member companies

BAD as the local labor situation continues to be, it is well not to become too excited over bald threats of the UAW-CIO to close down the automotive industry by strikes if its demands for a 30 per cent wage boost are not met immediately. Consideration must be given to background events and strategy.

Worst trouble spot in Detroit is the Kelsey-Hayes Wheel Co. where a strike of 4500 is now in its fifth week. By closing off supplies of wheels and brake drums, this tieup has resulted in suspension of passenger car, truck and tractor production at Ford, throwing 50,000 more out of work. International officers of the UAW-CIO realize they have a bear by the tail in the Kelsey local, which has refused to return to work after orders from the international and even after local officers were dismissed and an administrator appointed. The administrator called a meeting of the strikers, at which 350 out of 4500 were present, and said afterwards in effect, "I told them to go back to work, but they booed me."

Explanation is a deep factional cleavage in the ranks of the UAW, and no one knows this better than R. J. Thomas, union president, and his cohorts, who are in disfavor by an unruly element of the union with which the Kelsey strikers are associated. This gang would like to see Thomas out of his position, and is plumping for an early union convention to achieve this. Meanwhile they are giving the bird to Thomas and all orders emanating from his office.

Attacked Single Employer

Faced with this impasse, international officers went into a huddle at Flint and determined some grand strategy to try to get the Kelsey strikers, and a lot of others now out on strike, back on the job. They reasoned that if they could pick out a single large employer and drum up a campaign of hate against this company among their entire membership, they might achieve a unity of action and purpose that is now so sadly lacking. In other words, all striking members would return to their jobs and concentrate on attacking the single company selected as a target, while facilitating operations of all competitors.

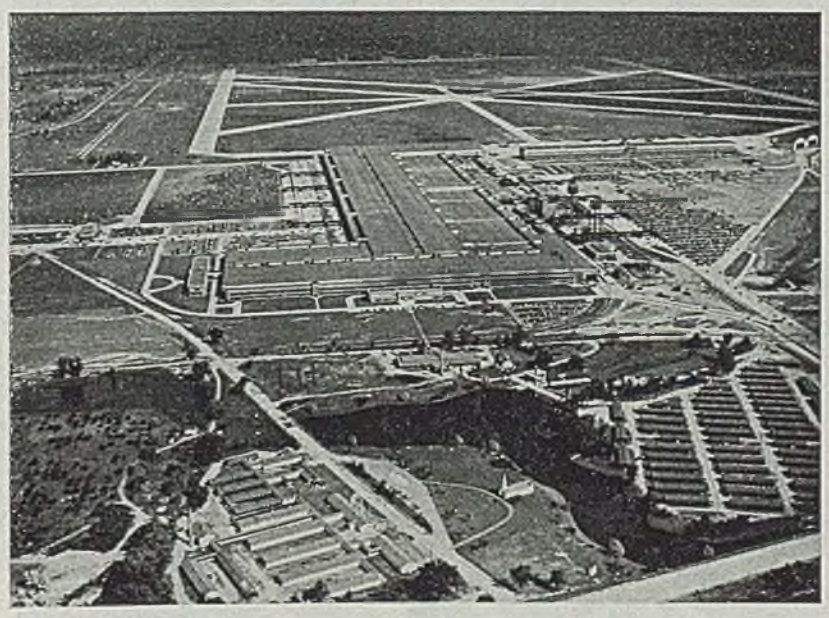
So ten days ago Walter Reuther, a UAW vice president, and head of the General Motors section of the union, came out via the newspapers with a virtual declaration of war on General Motors, throwing down a deadline of last Tuesday for GM to say whether it would negotiate on the 30 per cent wage increase demand, lacking which he would start the machinery at once leading to strike votes in the corporation's 135 plants. He got the headlines and threw news commentators and Washington into a turmoil of excitement. But the strategy backfired, for no sooner had Reuther made the announcement than the heads of the Chrysler and Ford Divisions of the UAW cried out, "Me, too." Then Reuther and Thomas had to backtrack and say they really did not want to call strikes and maybe they would settle for a stopgap wage increase now and some more later.

That left them in a pretty fix, because they had already sounded off about how they proposed to tie the automobile industry up in knots this fall and winter by widespread strikes, then they had to retreat from this precarious position because of public indignation, and still the Kelsey strikers walked the streets, along with scattered groups of strikers from a dozen other automotive and parts companies.

To make matters worse, the entire force of 10,000 UAW members at the Windsor plant of Ford Co. of Canada walked out and prevented, forcibly at times, 1200 office workers from getting to work, plus another 3000 in feeder plants. This Canadian affair appears to have the wholehearted support of government and police officials. Union demands cover about everything from more money to guaranteed security forever.

The UAW-CIO knows it can never get a 30 per cent wage boost from the automotive industry for once it were granted the employees of every single plant supplying materials and parts would demand the same thing or else, whereupon the entire cost structure of the motor industry would be in an uproar, the only solution to which would be general price increases all along the line. Union members then would be no better off than today.

A hint of what may eventuate is seen

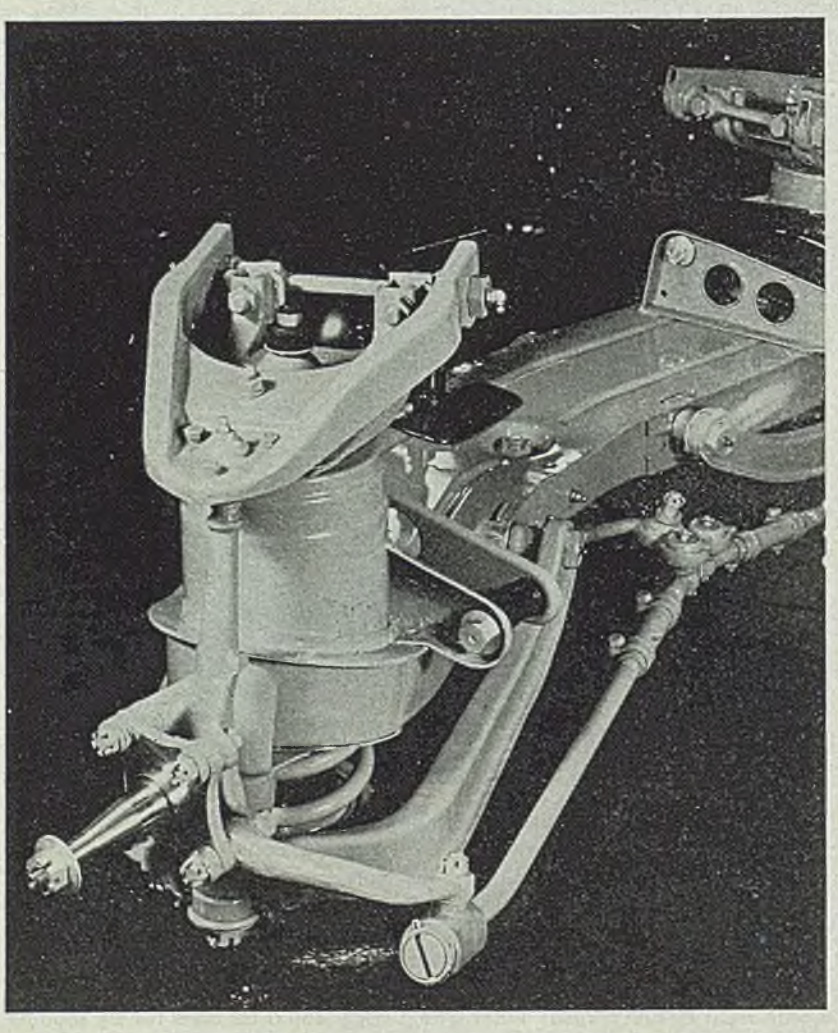


WILLOW RUN: First aerial view approved for publication shows the vast plant in the center, with the criss-crossing concrete runways of the airport in the background. In the foreground are worker housing projects. This view was taken while the plant was still operating, as may be judged from the thousands of cars parked in lots adjacent to the plant. Ford Motor Co. has just waived its option and purchase rights to the land and buildings of the $100 million facility, but retains a six-month right of first refusal under which Ford would be able for six months after Sept. 20 to meet the best offers obtained by the RFC for the plant or items of equipment. The company's decision to waive its option was influenced by the fact the rights cover the entire facility, including many tools and equipment not suitable for automotive-type production. During the operating life of the plant 8625 Liberator B-24 bombers plus large quantities of spare parts and assemblies were produced

in the Studebaker offer of 12 cents an hour increase in all wage rates which would average out to around 10 per cent. Even though in making this offer Studebaker agreed to meet any further increase beyond 12 cents which Detroit plants might subsequently approve, its management doubtless felt the 10 per cent would be accepted eventually by the rest of the industry, and by anticipating it a tieup of new car production in the early stages could be avoided.

At midweek, Thomas of the UAW gave out the alleged news that the late President Roosevelt had promised to maintain auto workers' take-home pay at wartime levels, but no one could be found in Washington who had any knowledge of such a commitment. Then Thomas added his locals might be satisfied with as little as 5 per cent increase in wage rates now but under no circumstances would less than 30 per cent be accepted as final settlement. Based on past performance, unions usually ask for at least twice what they expect to get, so 15 per cent might be an ultimate final settlement, if and when.

Widespread sentiment exists around Detroit favoring a complete shutdown of all industry until labor comes to the realization that wages do not come out of thin air and that in the present critical state of reconversion, automobile companies can see no profits at all for many months ahead. The foolish notion manufacturers are sitting on bursting sacks of wartime profits, from which they could dole out any desired wage increase and never miss it, has got to be exploded. Many are saying a six-month shutdown of all plants might clear the air of some of these strange phobias and might further bring home to union labor that the only way to earn more money is to produce more.



NEW SPRING SUSPENSION: Introduced on the 1946 Nash 600 model is parallel-arm type spring suspension. The entire front suspension system is a self-contained assembly, attached directly to the body structure by four rubber-encased fastenings. Interesting feature is the use of the kingpin as connection between upper and lower pressed steel supporting arms or wishbone members, thereby eliminating considerable unsprung weight

It is highly unlikely any such co certed shutdown will be engineered sinc if it were, government probably wou immediately proceed with prosecutio for violation of the Wagner Act, t antitrust laws or whatnot. And the Pre dent still has powers under the Smit Connally Act to seize plants made idle strikes, a right he retains until months after the legal declaration of t war's end. However, as stated befor the issue is not nearly as critical as is being painted. Until the UAW c demonstrate it has some measure of co trol over and responsibility for t arbitrary actions of dissenting locals, will steer clear of any major strike pr ects. Proof of this can be drawn fro the fact top managements of the mot companies are not saying a word at t moment, take no recognition of the a out strike threats being waved in t public's eye, and even refuse observ tions pro or con the Studebaker wa raise.

In its swan song, the Automoti Council for War Production reviews wi justifiable pride the war production re ord of its member companies. Summ up briefly, the total output is valued close to $29 billion, and included 5,83 980 guns and artillery, 745,980 aircra marine and tank engines, 191,160 tank armored cars and self-propelled artiller 2,000,000 trucks and related milita vehicles, 659,031 jeeps, 578,000 milita trailers, 21,835 bomber and fighter a planes, 4290 gliders, 2000 torpedo 2000 buzz bombs, 5500 marine gyr compasses and 12,777 amphibious jee —the latter incidentally abandoned f combat before being put to use.

Census Bureau Reports on Gray Iron Castings Output

Total production of gray iron castin in the United States in 1944 was 9 794,541 net tons, of which 6,173,714 to were for sale and 3,620,827 tons we for own use of makers, according to t Bureau of the Census, Washington.

Unfilled orders at the end of Decem ber, 1944, were 2,635,137 tons. D tribution of last half 1944 productio was as follows: Molds for heavy steel i gots, 1,028,033 tons, 22 per cent; chill iron railroad car wheels, 441,090 ton 9 per cent; cast iron pressure pipe, 29 827 tons, 6 per cent; cast iron soil pip 96,388 tons, 2 per cent; all others, 2,93 503 tons, 61 per cent.

The survey included 3167 foundries which schedules were mailed. Foundri included in the tabulation number 2410, of which 2366 were active in D cember, 1944, with 44 active part of t year but closed in December. The 73 foundries not included in the tabulatio included 164 which did not reply to t schedule, 467 reporting themselves o of business and 126 stating they we not gray iron foundries.

MEN of INDUSTRY

W. R. SHIMER

F. F. ALOI

C. S. LAWSON

W. R. Shimer, metallurgical engineer in charge of sheet, strip and tin mill products, Bethlehem Steel Co., Bethlehem, Pa., is resigning, effective Oct. 1. **Felix F. Aloi,** assistant metallurgical engineer, has been appointed to succeed him. Mr. Shimer had a part in originating and developing many metallurgical advances, and in 1912, participated in instituting the metallographic department, forerunner and nucleus of the present metallurgical department. Mr. Aloi joined the company in 1932 when Bethlehem acquired the Seneca Iron & Steel Co., Dunkirk, N. Y. Until 1938 he was located at the Lackawanna, N. Y., plant, when he was transferred to the Bethlehem, Pa., offices as assistant metallurgical engineer.

—o—

William M. Akin has been promoted from vice president to president, Laclede Steel Co., St. Louis, succeeding his father, the late **Thomas R. Akin.**

—o—

James K. Lamoree recently was appointed assistant chief engineer of the Pittsburgh district, Carnegie - Illinois Steel Corp., Pittsburgh. He started his service with United States Steel Corp. in October, 1912, at the Shenango works, American Sheet & Tin Plate Co. In September, 1936, he was transferred to the corporation's South works as development and estimating engineer, and in February, 1945, became senior staff engineer in the general offices in Pittsburgh. Mr. Lamoree succeeds **Fred H. Johnson** who has been transferred to the Chicago district.

—o—

C. B. McGehee, formerly a lieutenant colonel in the Office of Strategic Services, has resumed his position as general manager of sales, Truscon Steel Co., Youngstown, subsidiary of Republic Steel Corp. **W. D. Morehead,** formerly manager of the erection department, has been named chief engineer, succeeding **R. D. Snodgrass,** who has resigned after 36 years' service. **George McDermott** becomes manager of the erection department in Youngstown; **C. J. Gelhaar,** formerly assistant sales manager of the Window & Door Division, sales manager, Door Division; **G. J. Casey,** sales manager, Metal Lath Division.

—o—

L. H. Gegenheimer, after a four-year leave of absence for war duties in Washington, has returned to Timken Roller Bearing Co., Canton, O., as sales engineer, Industrial Division. He resigned from the War Production Board as chief, Bearing Branch, Tools Division.

—o—

John Howe Hall is resigning as assistant metallurgist, General Steel Castings Corp., Eddystone, Pa., and is resuming his practice as consulting metallurgical engineer. He is being retained by General Steel Castings Co. in a consulting capacity.

—o—

H. A. Byrns has been named general superintendent, Woodward Iron Co., Woodward, Ala., succeeding **Fred Osborne.** Mr. Byrns formerly was with American Steel & Wire Co., Cleveland.

—o—

P. M. Cobb, sales manager, Western Pipe & Steel Co. of California, San Francisco, has been named a director to succeed the late **O. B. Perry.**

—o—

R. J. Miedel has been elected president, Atlas Imperial Diesel Engine Co., Oakland, Calif. He formerly was Pacific Coast manager, Hazel-Atlas Glass Co., Wheeling, W. Va. **Svend Amdisen,** formerly with Adel Precision Products Corp., Burbank, Calif., has been named secretary, Atlas Imperial company.

—o—

Forrest J. Young has been appointed chief engineer and **Spencer W. Long,** assistant chief engineer, California Division, National Supply Co., Pittsburgh.

—o—

George L. Bladholm has become associated with **Ben Coplan** in the Chicago branch office which Construction Sales Co. Inc., Albany, N. Y., opened in July. Mr. Bladholm has been released from active duty as a captain in the Army which he served in the Redistributi and Salvage Branch, Office of Chief Ordnance, Washington. Prior to ent ing service, he was associated with Lu Bros. & Co. Inc., in Cleveland. Coplan had for many years conduct his own scrap brokerage business Chicago.

—o—

Claude S. Lawson recently was nam general manager, Sloss-Sheffield St & Iron Co., Birmingham. **Fred Osbor** formerly general superintendent, Woo ward Iron Co., Woodward, Ala., joined the Sloss-Sheffield company a succeeds Mr. Lawson as general sup intendent.

—o—

W. C. Johnson, formerly district gineer at Birmingham, Truscon St Co., Youngstown, and later with t company in Youngstown, has returned Birmingham as district engineer, C Steel Products Co.

—o—

N. B. Williams has been appoin superintendent of its new plant in Cle land, United Tube Corp. of Ohio. Williams has had more than 25 ye experience in the tubing industry, for four years was in charge of el tric welding of pressure tubing for airplane industry with the Bundy T ing Co., Detroit.

—o—

Controllers Institute of America, N York, has announced officers elected its local chapters. The iron and steel dustry is represented as follows: K. **Coates,** Great Lakes Steel Corp., pr dent, Detroit Control; **George H. Mas** American Chain & Cable Co., pr dent, Bridgeport, Conn., Control; J **Pugsley,** Tennessee Coal, Iron & R road Co., president, Birmingham C trol. **Cornelius Bolen,** Converse Bri & Steel Co., was elected secretary-tr urer of the Chattanooga, Tenn., Cont **Charles L. Jones,** Alan Wood Steel secretary, Philadelphia Control; Jos **B. Lauterman,** American Steel Foundr

secretary, Chicago Control; **J. B. Pollard**, Ingalls Iron Works Co., secretary-treasurer, Birmingham Control. Pittsburgh Control elected **R. C. Markle**, United States Steel Corp. of Delaware, secretary. The following directors were elected: **William F. Carey**, Edgewater Steel Co.; **J. Herbert Carson**, Pittsburgh Steel Co.; **Walter H. Dupka**, Jones & Laughlin Steel Corp.; **George W. Rooney**, United States Steel Corp. of Delaware; and **Paul E. Shroads**, National Steel Corp. **Robert G. Waring**, Butler Mfg. Co., was elected a director of the Kansas City, Mo., Control.

—o—

H. A. Squibbs has been made assistant to the vice president, sales, American Steel & Wire Co., Cleveland, and **C. T. Gilchrist** succeeds him as assistant general manager of sales in Chicago. Mr. Squibbs has been a member of the American Steel & Wire organization and one of its predecessor companies since 1895 when he started as a clerk in Joliet, Ill. Since then he has held various positions in plants in Joliet, Chicago and DeKalb, Ill. He began sales work in 1905 and in 1929 became assistant general manager of sales in Chicago. Mr. Gilchrist has been associated with the company since 1907 when he started as a cashier's clerk. Six years later he joined the sales department as a clerk in Cleveland. Since 1937 until his current promotion, Mr. Gilchrist has been manager of the Manufacturers Products Sales Division, Chicago.

—o—

W. J. Ehlers has been appointed plant manager, Gage Structural Steel Co., Chicago. He was sales engineer for the company and not sales manager as was inadvertently reported by STEEL, Sept. 17 issue.

—o—

George J. Callos has resigned as advertising and public relations manager, Allis-Chalmers Mfg. Co., Milwaukee, to become vice president and account executive, Klau-Van Pietersom-Dunlap Associates Inc., Milwaukee, an advertising agency.

—o—

Russel A. Schultz has joined the Robbins Engineering Co., Detroit, as vice president in charge of engineering and sales, and **J. H. Hagen** has been elected vice president and factory manager. Mr. Schultz was associated with the Chevrolet Motor Division, General Motors Corp. for 21 years, his last position being master mechanic of that division's Tonawanda plant in Buffalo. Mr. Hagen has been with the Robbins company since it was organized in 1929 and as vice president and factory manager he is in charge of all production operations.

—o—

William M. Anthony has been named manager of sales, industry control section; **Edward S. Bush**, manager of sales, appliance and aircraft control section; **W. W. Dockstader**, manager of sales, general purpose control section; and **William J. Stock** in charge of marketing and promotion section of the newly named Control Division, General Electric Co., Schenectady, N. Y. **K. R. van Tassel** is manager of the division, which formerly was called the Industrial Control Division, and **R. S. Glenn** is manager of sales. The fifth section of the Control Division is the electronic control section with **A. E. Bailey Jr.**, manager of sales. **George H. Pfeif**, Schenectady, has been appointed manager, employe relations section, of the company's executive department.

RAY ELLINWOOD

H. W. WHITMORE

—o—

Ray Ellinwood, formerly president, Adel Precision Products Inc., Burbank, Calif., has announced formation of a new company, Ellinwood Industries Ltd., Los Angeles, of which he is president. His new organization includes: **Robert S. Furst, Robert Berns, Carl Campbell** and **Emil Setzler.**

—o—

Francis J. Holland has been elected secretary Ekco Products Co., Chicago, resigning recently as president and general manager, Little & Co. Inc., Chicago. **Ken Udell** has been named to the Housewares Sales Division.

—o—

E. F. Holtz, associated with the Albion Malleable Iron Co., Albion, Mich., since 1898, and superintendent since 1942, has retired.

—o—

Lt. Col. Malcolm S. Mackay is being released from active duty with the U. S. Marine Corps, effective Oct 8, at which time he will resume his former connections as partner of Laidlaw & Co., New York, and a director of American Car & Foundry Co.

—o—

T. D. Adams, for the past four years president, Newark Stove Co., Newark, O., has been named chairman of the board. **F. H. Guthrie**, vice president, was appointed president. Mr. Adams joined the company in 1937 as vice president and works manager and in 1941 was elected president. Mr. Guthrie became associated with the company in 1928 as foreman of the Enamel Division. In 1937 he was made general superintendent and was elected vice president and works manager in 1942.

—o—

Harley W. Whitmore recently was appointed chief engineer, Deepfreeze Division at North Chicago, Ill., Motor Products Corp.

—o—

John B. Cutler has been named chief engineer of the recently organized Hydraulic & Special Machinery Division, William Sellers & Co., Philadelphia.

—o—

Bently S. Handwork, executive vice president, Joslyn Mfg. & Supply Co., Chicago, has been elected president to succeed **M. L. Joslyn** who becomes chairman of the board. The founder, and with almost 50 years' service, Mr. Joslyn is retiring from active participation in the business.

—o—

Dr. Taylor Lyman has been appointed editor, American Society for Metals *Metals Handbook*. Dr. Lyman also will serve as secretary of the Metals Handbook Committee, and as editor of the *Buyers' Guide and Data Book*.

—o—

William T. Kelly Jr. has been elected president, Kellogg Division, American Brake Shoe Co., New York. Mr. Kelly has been executive vice president of that division since December, 1944, and has been general purchasing agent since 1940. He continues to hold that position. Mr. Kelly succeeds **J. F. Weller** as president. Mr. Weller will now devote full time as director of automotive sales for the Kellogg and American Brakeblok Divisions.

—o—

John R. North recently joined the Morgan Construction Co., Worcester, Mass., as engineer in its wire machinery department. Since graduating from Massachusetts Institute of Technology in 1929, he has been associated with the Wickwire Spencer Steel Co. at Palmer,

H. G. HOWELL

Who has been appointed vice president, production, Tube Turns Inc., Louisville, Ky., as noted in STEEL, Sept. 17 issue, p. 101.

S. P. WATKINS

New manager, Market Development Division, Rustless Iron & Steel Corp., Baltimore, as noted in STEEL, Sept. 10 issue, p. 94.

F. W. EISELSTEIN

Who recently was named general traffic ma ger, United States Steel Supply Co., Chica noted in STEEL, Aug. 6 issue, p. 102.

Mass., where he served for the past few years as assistant superintendent.

—o—

A. D. Shankland recently was named assistant general manager of the Bethlehem, Pa. plant of Bethlehem Steel Co., succeeding **J. M. Sylvester**. Mr. Shankland had been engineer of tests. In the caption under Mr. Shankland's photograph appearing on page 101 of the Sept. 17 issue of STEEL, it was erroneously stated that Mr. Shankland was engineer of tests.

—o—

Homer Kirtley has been named sales engineer, Agricultural Division, Maremont Automotive Products Inc., Chicago. He had been associated with Crucible Steel Co. of America in its Agricultu Division for the past ten years.

—o—

Trowbridge A. Warner has been pointed sales manager, Hendrick M Co., Carbondale, Pa., effective Oct. Mr. Warner formerly was sales manag Register & Grille Mfg. Co. Inc., Bro lyn, N. Y.

OBITUARIES . . .

William Llewellyn, 78, retired steel executive and pioneer Los Angeles industrialist, died Sept. 11 in that city. He was one of five brothers who founded the Llewellyn Iron Works in 1887, and he was vice president of the company when it was merged with Consolidated Steel Corp. in 1929, when he retired.

—o—

Campbell A. Young, 56, general sales manager, Sheffield Steel Corp., Kansas City, Mo., died Sept. 15 in that city. Well known in railroad and construction circles, he formerly was the company's sales manager in Chicago.

—o—

Tracy F. Manville, 65, vice president, Columbia Steel & Shafting Co., Pittsburgh, died Sept. 13 in that city.

—o—

Donald D. Smith, president and treasurer, Porcelain Steels Inc., Lakewood, O., died Sept. 13 in New York while on a business trip.

—o—

Norbert T. Jacobs, 53, manager of sales, Wood Shovel & Tool Co., Piqua, O., died recently in that city. Mr. Jacobs joined the company in 1933 and he became manager of sales in 1941.

—o—

Jay Moses Amsden, 68, who resigned a short time ago as general superintendent, Ohio & Western Pennsylvania Dock Co., and Lower Lakes Dock Co., both of Cleveland, and subsidiaries of the M. A. Hanna Co., died Sept. 11 at his home in Ashtabula, O. Mr. Amsden was a veteran of 52 years in the handling of iron ore and coal cargoes.

—o—

W. Chester Sayle, 58, president, Cleveland Punch & Shear Works Co., Cleveland, and the Cleveland Crane & Engineering Co., Wickliffe, O., died at his home in Cleveland, Sept. 15.

—o—

Frank Kitzelman, 61, president, Acorn Iron & Wire Works, Chicago, died Sept. 13 in that city. He was a past president of the Iron League of Chicago.

—o—

Glenn W. Files, 48, since 1934 director of the technical service department, General Electric X-Ray Corp., Chicago, died Sept. 11 in that city.

—o—

Charles Stichler, 70, president and owner, C. Gefrorer & Son, Philadelphia, died recently in that city.

—o—

Francis O. Wyse, 38, manager of the publicity department, Bucyrus-Erie Co., South Milwaukee, died Sept. 15.

—o—

Carl S. Neumann, 65, president, Union Mfg. Co., New Britain, Conn., and an authority on foundry practice, died at his home in that city Sept. 13.

—o—

Lt. James D. Lynch, 25, on military leave from the Monsanto Chemical Co., St. Louis, for whom he served as associate editor of its publications, died of malnutrition in a Japanese prison ca last Feb. 5.

—o—

Charles H. Wilson, 61, sales manag Railroad Sales Division, Fairban Morse & Co., Chicago, died Sept. 13

—o—

Ralph Ware, 68, part owner and s retary-treasurer, Ware Bros. Chic Roller Skate Co., Chicago, died Sept.

—o—

Edwin A. Kohlhase, 47, presid National Stamping & Electric Wo Chicago, died Sept. 15 in Highl Park, Ill.

—o—

Clifford Egan, 61, until five y ago president, J. A. Fay & Egan Cincinnati, died in that city recently.

—o—

Michael E. Dorner, president, Cle land Cutter & Reamer Co., Clevel died recently in that city.

—o—

George G. Hicks, 50, purcha agent, Detroit Diesel Engine Divis General Motors Corp., died in Det Sept. 11.

—o—

Carl H. Becker, 54, industrial s engineer, Brush Division, Baltim Pittsburgh Plate Glass Co., died rece in Detroit.

—o—

Charles T. Carlson, 82, founder vice president, Republic Stamping Enameling Co., Canton, O., died rec ly at his home in that city.

Chandler-Evans Moves to Plant Of Parent Firm

Need for additional capacity necessitates moving. Both companies will retain their separate identities

ALL OPERATIONS of Chandler-Evans Corp., Meriden, Conn., are being moved to the plant of the parent firm, Niles-Bement-Pond Co., West Hartford, Conn.

Peacetime requirements exceed the capacity of the Chandler-Evans plants at Meriden, but war contract cancellations leave the parent company with surplus plant facilities for postwar activity. Consequently, the Chandler-Evans operations are being moved to the parent company's plant. The moving is expected to be completed by the end of this year. There will be no change in the separate identities of the products or the companies.

During the peak of war activity, Chandler-Evans carburetors, fuel pumps, and other accessories were manufactured in four plants: The home plant at Meriden, a rented plant at Wallingford, Conn.; a government-owned plant at Dayton, O., and the West Hartford plant of Niles-Bement-Pond.

Moving of the Chandler-Evans operations will make the Meriden plant available for sale.

Research Center Planned By Johns-Manville Corp.

A new research center in which greatly expanded and accelerated development work will be conducted in the fields of building materials, insulations, and other construction products is planned by Johns-Manville Corp., New York.

The research center will be near Bound Brook, N. J., near the Johns-Manville plant at Manville, N. J. First unit of the center is under construction. Plans call for the center ultimately to occupy a group of six buildings.

The project is the first announced in a company-wide $40 million expansion program in the United States, Canada and abroad. The company hopes to employ 25 per cent more people than it had in the best prewar year.

First unit of the research center also will provide ten experimental factories under one roof. Projects initiated in the research laboratory may thus be carried all the way through their development and pilot-plant production stages.

"E" AWARD VICTORY CELEBRATION: Victory came between the announcement of an "E" award to the Columbus McKinnon Chain Corp. and the Chisholm Moore Hoist Corp. and the actual presentation, so the ceremony was turned into a victory celebration. Shown at the ceremony, left to right: Comdr. E. S. Smith Jr., U.S.N.; O. H. Hager and Leslie B. Powell representing industrial chain departments; Maj. John F. Hotchkiss, U.S.A.; E. J. Byrne representing hoist department; Robert E. Gerspacher, automotive chain division; and Don S. Brisbin, vice president in charge of sales for the affiliate corporations

BRIEFS . . . .

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

Industrial Hydraulic Corp. has established offices in the Cleveland Trust Bank building at Painesville, O. The new organization has designed a line of pumps, valves and cylinders, to be manufactured by Jacobs Aircraft Engine Co., Pottstown, Pa., and distributed through the Hydraulic Corp.

—o—

Lepel High Frequency Laboratories Inc., New York, has acquired the business, good will and assets of the Induction Heating division of Van Norman Co., machine tool manufacturer, Springfield, Mass.

—o—

Industrial Oven Engineering Co., Cleveland, has opened a branch office at 332 South Michigan Avenue, Chicago.

—o—

Wales-Strippit Corp., North Tonawanda, N. Y., planning to increase its plant manufacturing space by 50 per cent, has also established a Canadian subsidiary, known as Wales-Strippit of Canada Ltd., in Hamilton, Ont.

—o—

Howard de Franceaux Associates have opened a Washington office and service bureau for manufacturers handling such problems as reconversion pricing, contract terminations, renegotiations, together with U. S. and foreign government procurement.

—o—

Pemco Corp., Baltimore, is installing a continuous smelter unit and improving four units presently operating as first steps in a postwar expansion program designed to increase plant capacity for production of porcelain enameling frits and glazes by 50 per cent.

—o—

Rigid-Tex Corp., Buffalo, announces appointment of direct mill representatives as follows: Minneapolis district, E. L. Sandberg Co.; St. Louis district, Associated Steel Mills Inc.; Texas and Southwestern district, K. E. Luger Co., Houston.

—o—

Alco Valve Co., St. Louis, is quadrupling its capitalization and retaining all 500 wartime employees, with addition of more in prospect.

—o—

Western Electric Co. Inc., New York, has reduced its working force from 85,000 to 70,000 since Aug. 1.

—o—

Page Steel & Wire Division, American Chain & Cable Co., Bridgeport, Conn., has established a sales office in the General Motors building, Detroit.

WING TIPS

Drastic cutbacks in Army orders for B-29s create serious unemployment problem in Seattle area. More than 22,000 employees lose jobs. Seattle and Renton plants have produced 8200 planes since Pearl Harbor

SEATTLE

AN UNEMPLOYMENT problem of large dimensions was created in this area by the drastic cutback of Army contracts for Boeing aircraft, and company officials, government and civic agencies, and labor leaders are co-operating in attempting to formulate a plan for continuing Boeing's two plants here in operation.

Without previous warning, came the Army cancellation followed immediately by the lay-off of more than 22,000 employees. Already some have been taken back but until the company can adjust itself to the new situation and outline a future program no extensive rehiring is anticipated. Drafting and engineering forces have been retained as Boeing endeavors to perfect plans and designs that will fit into postwar operations.

The stop-work orders applied not only to the two local plants but to subcontracting firms including Pacific Car & Foundry Co., Puget Sound Sheet Metal Works, Kenworth Motor Truck Corp. and the Jensvold Co., of Olympia. It also included the six subassembly plants established in western Washington cities. The day before the order came, 29,300 men and women were on the Boeing payroll in this area, 20,400 in Seattle, 5900 in Renton and the remainder in branch plants. At the Vancouver factory of Canadian Boeing about 2300 employees were dismissed. The company's statement said it was "compelled to cease operations for a period which will permit adequate planning for work to be done in the future. As our plans materialize and we are able to continue work on our remaining production schedule, we will call back to work all employees who are needed.

"Under the radically revised contract schedule," it continues, "the company is instructed to cut September deliveries to 50 airplanes instead of the 122 previously planned and to cut deliveries for October through January to 10 per month instead of the 20 per month previously planned. Since production until today has proceeded on the basis of the earlier contract figures, all the airplanes required to meet the new contract for September are already completed and those for October, November and December are nearly so. Requirements after January on the new basis are reduced to eight airplanes per month until April and then fluctuate between five and six per month through the ensuing year. Three types of airplanes are involved in the remaining contracts—two advanced model bombers and a service test quantity of Boeing B-97 military transports."

The wartime record since Pearl Harbor of the Seattle and Renton plants includes construction of approximately 8200 airplanes, more than 1000 of which were B-29s, the others mostly B-17s. In the same period wages and salaries have totaled about $410 million including the state branch plants. The top payroll year was 1944 when employees received $135 million.

C. L. Egtvedt, chairman, pointed o that Boeing has been handicapped some extent in preparing for postwar pr duction because all its energies have be devoted to maximum production of B-2 "We do not consider," he added, "that t government business which remains u der contract constitutes an adequate p gram to protect the nation's investme in national defense and future security.

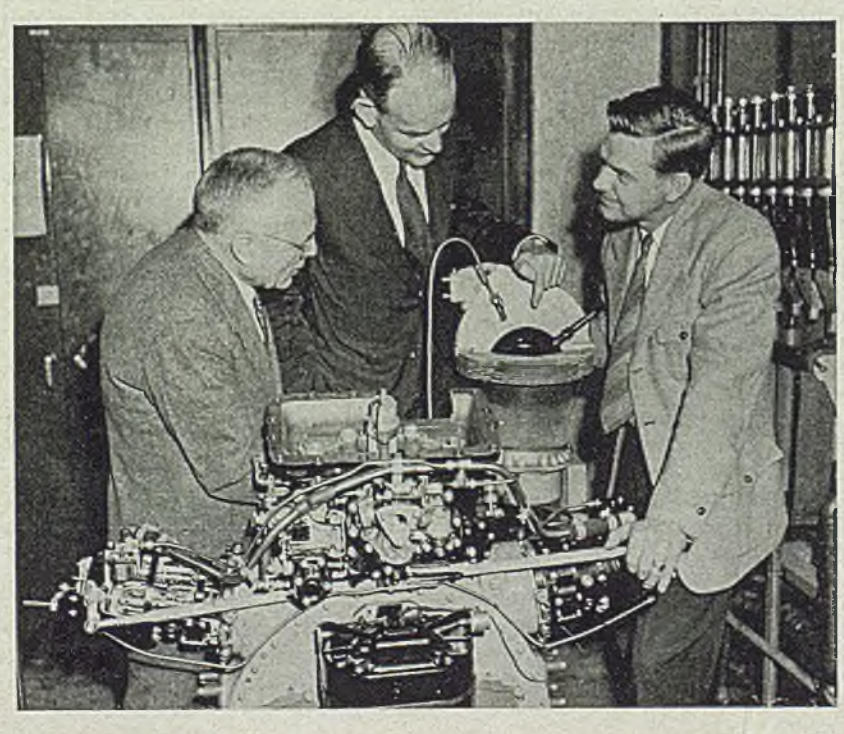
William M. Allen, new president Boeing Aircraft, stated: "Our immedi objective is to get as many people as p sible back to work and our long-range o jective is to build a sound and growi future business."

According to Sen. W. G. Magnus Washington, the program of the Ar Air Forces should be ready in the n future, predicting that Boeing will h "a very important part in it."

Because of the airplane cutback, ab 1150 workers were laid off at Puget Sou Sheet Metal Works, 100 at Kenworth M tor and about 200 at Pacific Car & Fou ry. These plants are long established can readily revert to prewar operati

Nearly half of Boeing employees w women. Meanwhile the offices of U. S. employment service and unempl ment compensation were crowded w former Boeing workers. Governm agencies reported about 9000 jobs av able in King county alone and predicti were made that with the number of plant workers leaving for their ho elsewhere the unemployment situat will not assume serious proportions h

Senator Magnuson explained that c rent airplane construction has been c tailed pending detailed plans for a p war air force. "We are going to hav permanent air force of substantial siz hope," he added. "This is subject to



DIRECT FUEL INJECTION: Cutaway mo illustrating the inner working of direct f injection system developed for Wright 3 radial engines used on B-29 Superfortres by engineers of Bendix Products Division Bendix Aviation Corp. Left to right Frank C. Mock, manager of Bendix-Str berg aircraft carburetor engineering, s and service; John Marshall, direct inject project engineer, and C. D. Manhart, m ager of aircraft fuel equipment sales. injection pumps, each synchronized with injection system, includes two small, comp main engine driveshafts, which accurat divide fuel into equal parts and pump at high pressure into engine cylinders airtight stainless steel lines. Each pu contains nine finely-machined plung which spray fuel into the 18 cylinders i series of "shots" at the rate of one sp from each plunger every twentieth o second, when the engines are operating maximum speed. Fuel accurately mete by the master control is injected directly the engine cylinders under pressure

MULTIPLE CUTS ON TOUGH S.A.E. 4140 STEEL

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More parts produced with accuracy and fine finish

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Type of Machine: New Britain-Gridley Automatic Screw-Machine, 2" Capacity, No. 61, Six Spindles.
Metal: . . . . S.A.E. 4140 Bar-Stock.
Operation: Forming, drilling, tapping, and threading.
Speed: . . . 85 SFPM
Feed: . . . . . .005".
Lubricant: Sunicut 209

Some manufacturers of this part were unable to perform the difficult tapping-operation all on one machine. A secondary operation was necessary, which resulted in the loss of production-time. Use of Sunicut 209 permitted all operations on one machine. Production was speeded up and fine-quality threads produced. Rejects were practically eliminated.

Sunicut 209 is a free-flowing, transparent, correctly balanced sulphur, lard, and mineral oil combination. It is the right combination to BETTER machine-tool output. For actual proof of what Sunicut can do for you, test it in your own shop under your own operating-conditions!

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proval by Congress. It is my understanding that they intend to use Boeing in Seattle for a lot of experimental work and to supply big airplanes. I know Boeing is an important factor in Army postwar plans. Boeing deserves special consideration. It has sacrificed, for its wartime job, building B-29s up to the end of the war while its competitors have had the opportunity to get started on commercial business."

Convair Tucson Division Modifying Big Bombers

The last B-24 Liberator bomber has been modified and delivered to the AAF at the Tucson Division of Consolidated Vultee Aircraft Corp., and current modification of B-29 Superfortresses is about completed.

Established soon after Pearl Harbor, the Tucson Division mushroomed on the Arizona desert into a plant which at its peak employed more than 4200 men and women and turned out as many as 300 planes in a single month. Total cost of the facility, which was built by the Army, was $7 million. The modification plant area covers approximately 145 acres and the remainder of the field 1705 acres. The field has three runways, two of them 6300 feet, and one 6000 feet.

Main hangars, all 700 feet long, have a total width of 760 feet.

Bell Aircraft Operations Include Special Machinery

Postwar operations of Bell Aircraft Corp. include production of a substantial quantity of commercial and military helicopters in its Niagara Falls, N. Y., plant and the entry into the special machinery and other commercial machinery fields with its facilities in Burlington, Vt.

Radio-Controlled Miniature Airplanes Developed by ATSC for Target Practice

THE "RESTRICTED" lid has been lifted from one of the Army's most ingenious training devices, the radio-controlled, pilotless target airplane developed at Air Technical Service Command Headquarters, Wright Field, O.

Able to fly at speeds ranging from 100 to 200 miles per hour and at altitudes up to 3000 feet, controlled by radio from the ground, the target airplane is the result of eight years of intensive research work by Lt. Col. Chester O. French Jr., and his Control Equipment Branch, Equipment Laboratory staff.

Two models are now standard equipment for the Army Air Forces, the OQ-3 and OQ-14. They are used as targets for aerial gunnery practice by B-29 gunners and also for antiaircraft practice by ground forces. The Navy is using the radio airplane target in its training program for automatic weapon target practice aboard combatant ships. Navy officers and enlisted personnel have been trained in the operation of the plane.

The radio airplane target has recently found another use, that of a training aid for students of radar in tracking flying objects in the air for gunnery practice.

Manufactured by the Radioplane Co., Van Nuys, Calif., and Globe Corp., Aircraft Division, Joliet, Ill., the OQ-3 airplane target is a high-wing monoplane, 9 feet long, with a wing span of 12 feet 3 inches. It weighs 100 pounds and is capable of flying 103 miles an hour. It is constructed of welded steel tubing covered with airplane cloth. The power plant is an 8-horsepower, 2-cylinder, 2-cycle gasoline engine.

The OQ-14, a later model, has a wing span of 11 feet, 6 inches and is powered with a 22-horsepower engine. This model will fly 140 miles per hour.

Take-off is accomplished by the use of a catapult, powered by compressed spring coils or rubber shock cord. After launching, the target is radio-controlled and is operated by elevator and rudder control only. Landing is made by parachute, released either by the control operator or automatically as a result of damage from vital hits.

The elevator and rudder controls remain in effect after the engine is stopped and the parachute released, providing the radio has not been damaged, so that "dead-stick" landings may be made in the event the parachute attachments are shot away.

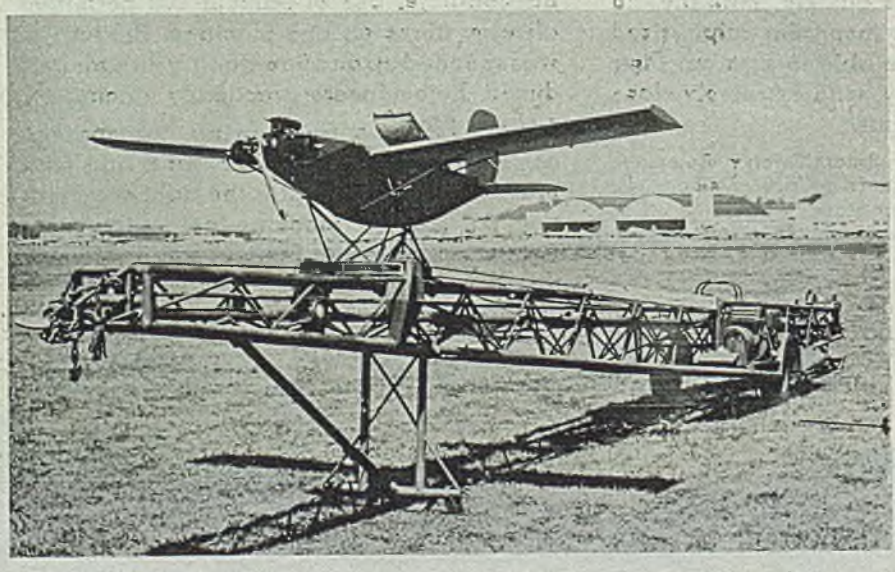
The basic system of radio control for the target involves the use of an ultra-high frequency carrier wave, modulated by five different audio frequencies. A small control box attached to the transmitter by means of a flexible extension cable, equipped with a stick to stimulate actual airplane control, is used to select the proper radio signals.

Four audio-frequency tones are used to control the target airplane in flight, one each for left, right, up, and down. A fifth frequency centers rudder and releases the parachute. Only one of these audio frequencies is used at a time. When one of the control frequencies is not in use, the fifth, or parachute frequency, is automatically switched on.

Installed in the plane is a radio receiver selector, which translates the radio waves and actuates, by electrical energy, the servo unit in the airplane. The servo unit provides the mechanical action to control the elevators and rudder. Operation has been so simplified that anyone without previous experience can learn to fly the target plane in 6 hours.

Use of the plane has provided a realistic target to student gunners because of its ability to simulate flight attitudes, dives and evasive action.

The development of the radio controlled pilotless plane started with an idea by Reginald Denny, stage and screen actor, who in the early 1930s built a radio controlled airplane model. Its possibilities became evident to the Army after a newspaper account of it appeared.



This light plane, poised on catapult prior to takeoff, is a radio-controlled target used at Wright Field for gunnery practice. It is capable of 140 miles an hour. NEA photo

New Fuel System Reduces Possibility of Accidents

Danger of airplane accidents from improper action of fuel systems has been practically eliminated as a result of a new continuous flow fuel system developed recently by Army Air Forces engineers at the Air Technical Service Command, Wright Field, O.

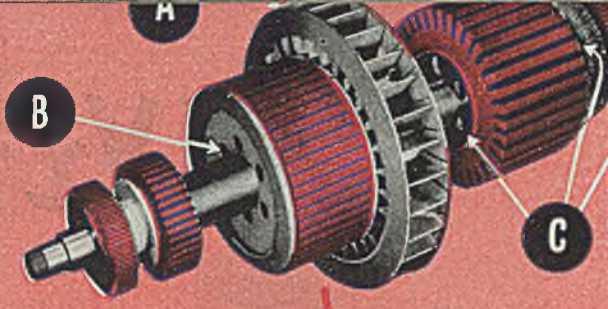
STEEL

as well as around the armature parts.

A — Specially designed, inbuilt fan.

B — Internal air paths in the motor rotor.

C — Internal air paths in both core and commutator of the generator.



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under all conditions, because Hobart's designing engineers specified plenty of copper to operate at normal speed, with effective two-way ventilation. A heavy duty, suction type fan of special design draws in the fresh air through the end louvres, bathes all parts with the cooling draft, then expels the heat-laden air through the center louvres . . . assuring you of cooler copper and better electrical characteristics. Just one of many reasons why Hobart's are known for long, satisfactory welding service under the mos severe conditions.

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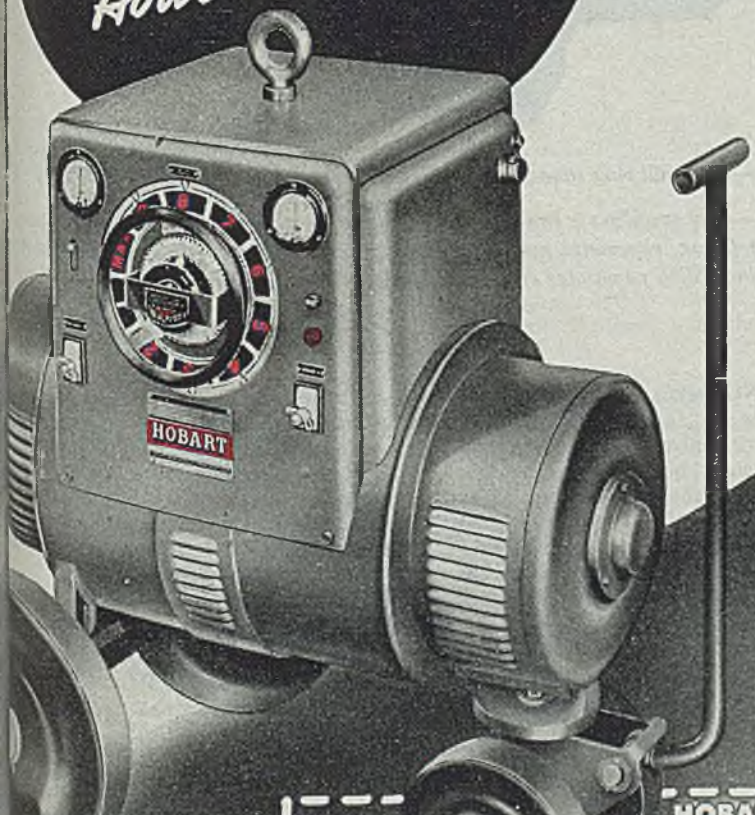

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☐ "Can You Patent an Arc Welded Design"?

☐ "Common Fault Welding Design

☐ "Welders' Vest Guide"

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SILVER BRAZING

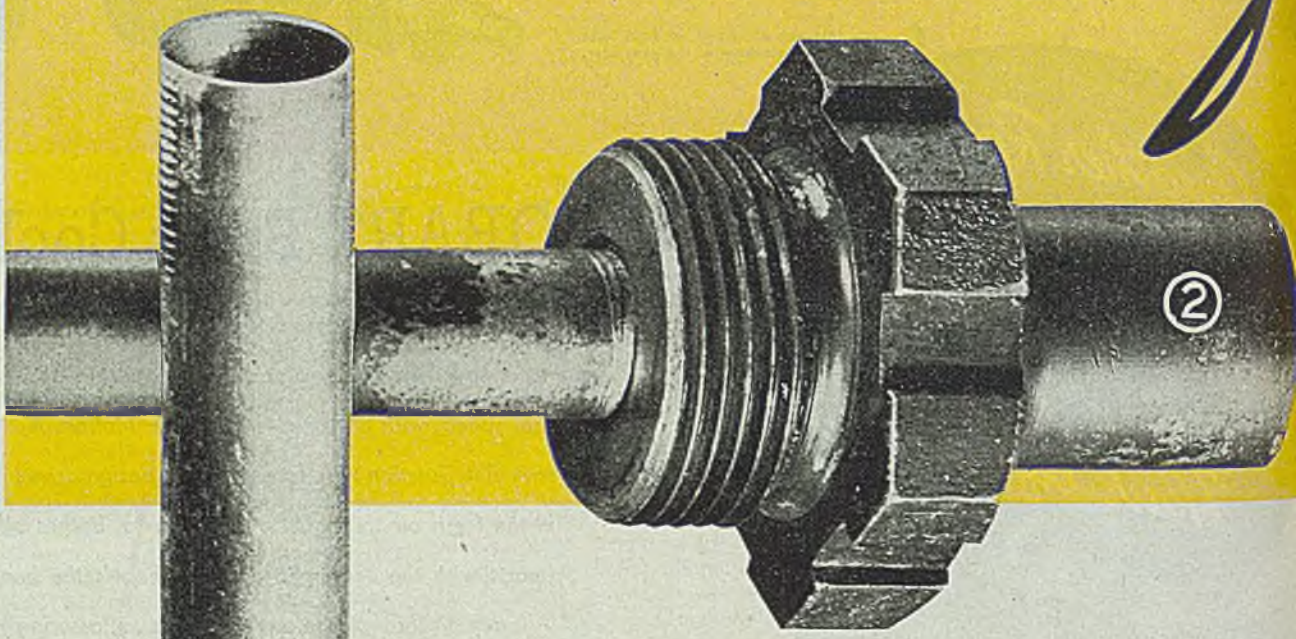


Fig. 1—Test pull ring silver brazed to tube. Note tube failed, not joint

Fig. 2—Gun recoil part. Brazing with 1/8-in. silver alloy wire, preplaced at tube end of fitting, eliminates need for set screw formerly used to supplement soft soldering. Alloy penetrates entire joint from tube end of fitting (center here) to open end of tube at right

JOINING metals with silver alloys has been done for ages, particularly in connection with silverware and jewelry. In more recent times, where strength and resistance to shock and vibration were required, it has been applied to joining band saws, shrouds and lacing wire for turbine blades, and in the assembly of products in which appearance as well as strength, was important.

In general, however, it was confined to the arts rather than industry, until about 1925 when the industrial use of silver solders for joining metals began to attract wider attention and the American Society for Testing Materials (to reduce to a few essential types the vast numbers of compositions available), drew up specifications for a set of standard alloys. Eight alloys were finally adopted, containing from 10 to 80 per cent silver, 16 to 52 per cent copper, 4 to 38 per cent zinc and up to 5 per cent cadmium.

Thus silver soldering (or "brazing" to use a more technically correct term) has grown from a process confined mostly to jewelry, silverware and a few highly specialized industrial applications to one which includes all industry in its scope. It has become an important factor in the production of almost anything made of metal which can be heated to the operating temperatures of alloys of this type. Although no figures are available, it is safe to say that today the great bulk of silver brazing is done on steel, copp or brass parts rather than on silver wh was once its principal field of applicati

This broadening of scope has co about for excellent reasons. In the f place, during recent years, new sil brazing alloys have been developed w important advantages:

Low working temperatures—1175 1300°F.

Exceptional fluidity.

Small amount of silver alloy requi per joint.

High joint strength.

The low working temperatures mak easy to raise work rapidly to braz temperature, resulting in fast prod tion, savings in time and a low heat cost. The low temperatures also prot the physical properties of the met joined, properties which high tempe tures might damage or destroy.

The exceptional fluidity of these loys gives them the ability to penetr into a joint in the minimum time, spre ing rapidly, filling the interstices, a with the aid of capillary action, eff tively covering the metal surfaces to joined. Consequently, the joints strong, gas-tight and highly resistant shock, vibration and temperature chang

Because of these properties, amount of low temperature silver braz alloy needed to make a joint is far l than the amount of base-metal alloy

Steel Parts

By A. N. SETAPEN
Industrial Engineering Division
Handy & Harman
New York

. . . . expanded rapidly under stimulus of war demands. Exceptionally satisfactory record of process seen as forecasting further peacetime acceptance. Advantages include high strength, gas tightness, fast production, low cost

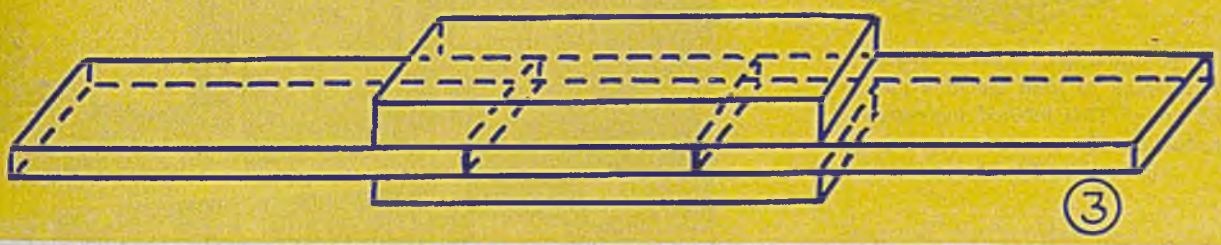


Fig. 3—Steel strips, 1/4 x 1-inch brazed together

quired by high temperature brazing. Only thin films, not fillets, of the brazing alloy are required to make the strongest and most ductile joints. Because it flows freely, no excess alloy is used, and little or none is left outside of the joints. Finishing costs are reduced to a minimum and are often eliminated.

The high strength of bonds made with these alloys makes it possible to use a minimum area of lap, thus effecting important material savings. The reliability and speed of operations make silver alloy brazing particularly suitable for production work, and because of the ease of application it is recommended strongly for maintenance and repair work.

Table I gives some typical tensile strength test results of joints made with the low temperature brazing alloy — Easy Flo. There are a few special features in this table which appear to have sufficient interest for further comment. It will be noted that in the case of Item 1 the steel was heat treated prior to brazing and that the strength of the heat-treated steel was maintained after the brazed joint was made.

Note also that with the exception of Item 4, it was the parent metal parts that failed rather than the joints. Therefore, in the table, it was necessary to indicate the shear strength to be greater than the value calculated from the breaking load of the material. Even in Item 4, although the joint did fail, the strength was well beyond the yield strength of the steel, indicating that this strength was beyond the normal expectancy of either the joint or of the steel itself, from a design point of view.

These low-temperature alloys give joints with high electrical and thermal conductivity because of their silver content, the thin films used in the joints, and their intimate diffusion into metal surfaces. Tests show that lap joints offer higher conductivity, with that of butt joints slightly lower than the base metals joined.

The salient factors of silver alloy brazing as a process may therefore be listed as follows:

1. Strength and ductility of joints
2. High electrical and thermal conductivity.
3. Leak-tightness
4. High speed production.
5. Low rejects, high efficiency
6. Low cost.

An important aid in the reduction of costs has been the development of improved methods of heating. Whereas, at one time, simple torches and furnaces were the important sources of heat we now have thermostatically controlled furnaces, improved burners and torches, controlled atmosphere furnaces, and most recently, induction electric heating units. These methods provide an almost unlimited combination for applying heat at pre-determined rates and open the way to the use of rapid handling methods.

Forms Preplaced in Joint

Coincidentally has come the development of preplacement of the silver brazing alloy. These alloys are formed into wire rings, or sheet is formed into washers, or strip or special shapes of the proper dimensions and size. These forms are preplaced in the joint and the assembly moved through heating station to make braze with minimum of hand labor.

As a result of these technical improvements, the applications of silver brazing alloys even before the war spread throughout a great many of our leading industries. In the electrical field, for example, silver brazed parts include transformer leads and taps, joints in bus bar installations, ground connections and cable joints. In the manufacture of electric motors, end rings are bonded to rotor bars. Also a large variety of small parts such as contacts, terminals and connectors used in electrical equipment are brazed with silver alloys.

Makers of refrigerators and air conditioning equipment have become important users of silver alloy brazing. The low temperature at which these alloys melt and the strong corrosion-resistant joints produced make them particularly desirable for joining the light gage metal sheets and tubing employed in these fields. The use of these alloys has eliminated the break-downs that occurred with soft soldered joints, as well as losses from the escape of the refrigerant.

Standard pipe and fittings are now joined with silver brazing alloys. Special Walseal fittings are made with rings of brazing alloy fitted into grooves cut in the fittings. This type of joint is specified for marine and navy piping, in public buildings, for railroad service, and in large steam plants.

Silver brazing is employed in the manufacture of many appliances for the home, made of steel as well as nonferrous metals, including cooking utensils, hot water tanks, water heaters, flatirons, metal furniture and other applications where soft solders do not give the necessary strength, and the temperature required for base-metal brazing alloys or welding rods would be too high.

It is also used in the manufacture of chemical equipment, dairy and creamery equipment, and in the dye industry. Applications in the electrical, automotive and airplane industries include many instruments, oil filters, oil coolers, gear shift levers, steering wheel spiders, contact joints, window frames, oil lines and radiator grilles.

The impact of the war on the manu-

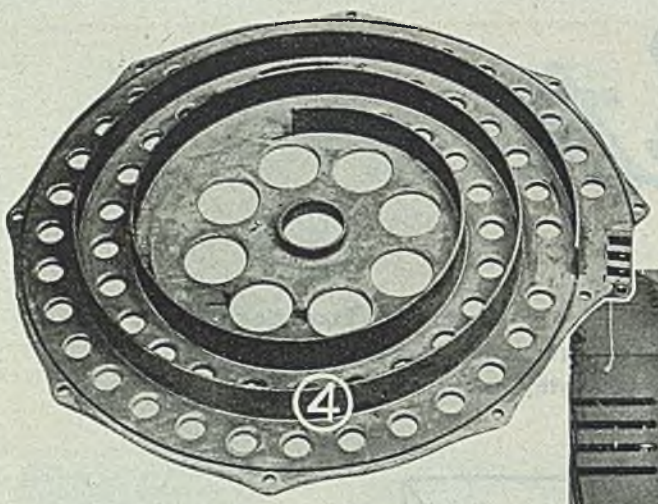


Fig. 4—Spiral strip is silver brazed to stamping to form machine gun end plate. This method increased production 500 per cent over use of machined forgings

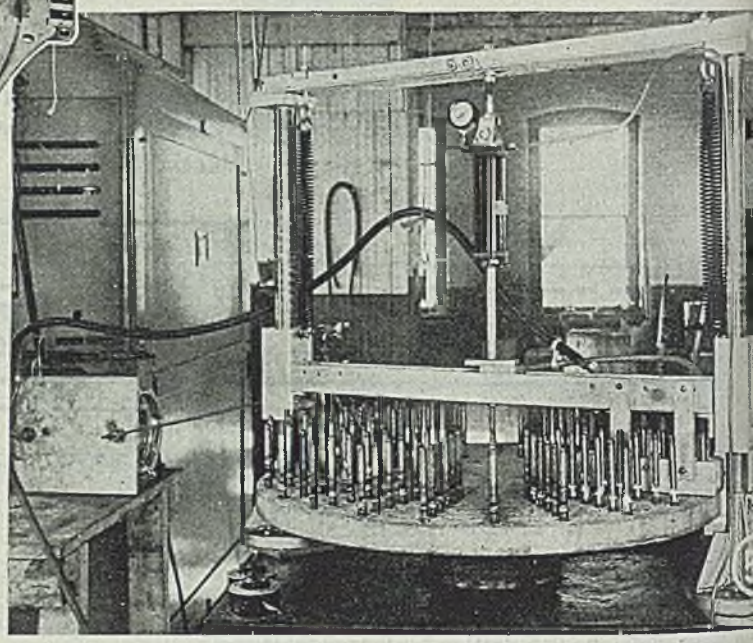


Fig. 5—Special setup silver brazes 11,000 steel burster tubes per 9-hr shift handling six at a time. Induction heating station makes braze in 2.7 sec

facture of metal products was staggering. The first and greatest result was the elimination for practical purposes, of most civilian products. Only the most necessary civilian items were permitted to be made. All productive facilities not absolutely indispensable to civilian needs were turned over to the war effort. Simultaneously, the production of metal products grew to astronomical quantities almost overnight. Of course, along with the expansion in volume came countless new items and products, and an amazing percentage of these new products called for silver alloy brazing in their assembly.

Naturally, in the production of war material, steel played a leading part. How to make parts and entire assemblies in fast time which would serve their purpose reliably was the problem. In a great number of instances advantage was taken of the speed with which joints of high strength, ductility and leak tightness can be made with silver brazing alloys. So, therefore, we find silver alloy brazing in use in airplane construction, in accessories and instruments, in airplane cabin heaters, ignition shielding, radiators and thousands of smaller parts.

In ordnance and chemical warfare products, silver alloy brazing was used on the assembly of aerial bombs, incendiary bombs, bazooka projectiles, smoke shells, unrifled projectiles, hand grenades, anti-personnel mines, chemical and mortar shells, rockets, machine guns, the 40MM Bofors gun, torpedoes, anti-tank guns, and a wide variety of miscellaneous gun parts, including torque tubes, fire control mechanism parts, driving spring tube bodies, ring stops on tubular guides, range finder fittings, gun turret parts, gun sights (front and rear), solenoid clamps, gun mount parts and elevation mechanism parts.

The vital necessity of silver alloy brazing in production of war items was proved by the fact that silver brazing alloys and flux are covered by specifications of the Navy Bureau of Aeronautics, U. S. Army Air Forces, the Navy, U. S. Army Ordnance Dept. and the U. S. Chemical Warfare Service. These specifications are shown in Table II.

Another huge consumer of silver brazing alloys is shipbuilding. These alloys are used in enormous quantities in the construction and repair of ships by the Navy, the Merchant Marine and private shipyards. Specific applications for silver alloy brazing in shipbuilding include:

Salt water lines
Lubricating oil lines

TABLE I
TYPICAL TENSILE STRENGTH TEST RESULTS OF EASY FLO JOINTS[a]

	Material	Type of Joint	Joint Clearance	Shear Area (in.)	Shear Strength psi (min)	Yie'd Strength psi	Tensile Strength psi	Remarks
1.	SAE X-4130 Steel[1]	Shear[2]	0.002[3]	0.296	67,000	126,000	135 000	Tube fail
2.	SAE X-4130 Steel[4]	Shear[2]	0.003[3]	0 296	49,000		93.000	Tube fail
3.	SAE 1020 Steel	Shear[5]	0 003	0.500	38,000		76,000	Steel fail
4.	SAE 1020 Steel	Butt[7]	0.003				66,000	Joint fail

[a] Data obtained from Handy & Harman Research Laboratory Reports.
[1] Steel heat-treated to a minimum of 127,000 psi yield strength and 137.000 psi tensile strength prior to brazing.
[2] A ring measuring 1" ID x 1-3/4" OD x 3/8" thick was brazed to one end of an 8" long tube, 0.049" wall x 1" OD. See Fig. 1.
[3] Same results were obtained with variations of joint clearance from 0.002" to 0.005".
[4] Steel in normalized condition—90,000 tensile strength.
[5] See Fig. 1.
[6] Steel strips 1/4" x 1"—brazed as illustrated in Fig. 2.
[7] Steel as received tested at 69,000 psi. Elongation of the brazed specimen was 13 per cent in 2" length; 5/8" round rod used for preparation of joint

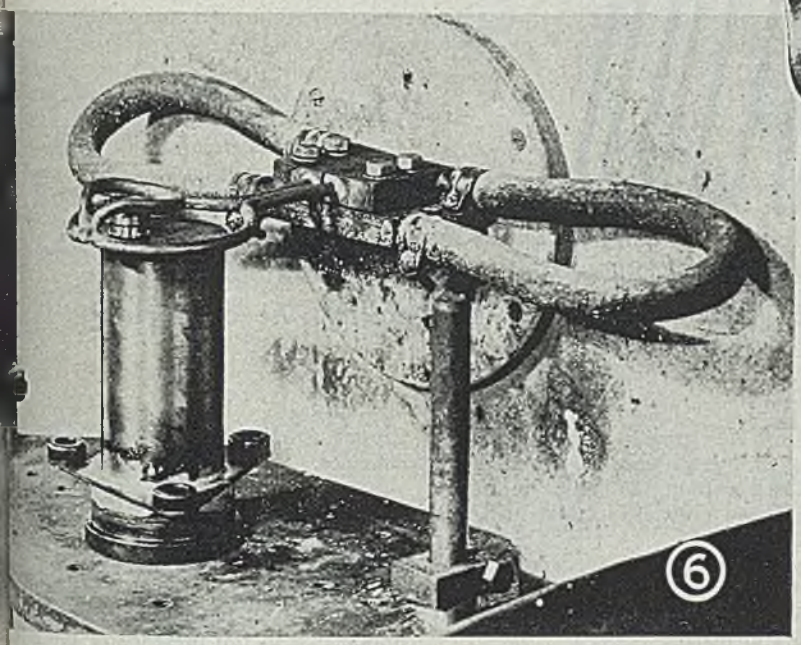


Fig. 6—Closeup of induction heating station for silver brazing the end cap to the cylinder tube of a steel airplane brake assembly

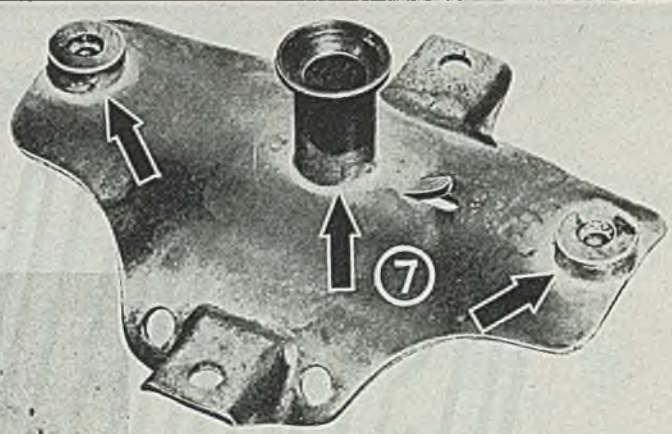


Fig. 7—Aircraft generator bracket made by silver brazing screw machine parts to steel stamping. Formerly this part was a machined casting

Low pressure steam lines
Hot water lines
Sprinkler systems
Drain lines
Compressed air lines
Condenser piping
Pipe fabricating
Vacuum systems
Systems containing inflammable liquids and gases
Bulkhead connections and nonferrous piping
Fresh water lines
Fuel oil lines
Steam heating lines
Cold water lines
Waste lines
Hydraulic lines
Refrigerant lines
Flanges and fittings
Expansion joints
3000 lb air lines

A comparatively young but fast-growing field for the silver alloy brazing of steel is the repair and maintenance of tools which have been broken or used to a point beyond their normal usefulness. Tools which are repaired or reconditioned by silver alloy brazing include metal slitting saws, broaches, forming tools, drills, carbide tipped tools, taps, milling cutters, end mills, reamers and lathe tools.

Other types of equipment made essentially of ferrous metals which use silver brazing alloys in their construction and maintenance include general machinery such as pumps, machine tools, diesel engines, gear reducers, dies, storage tanks and vats, gasoline pumps, gasoline stoves, heating equipment, hospital equipment, lubricating systems, textile machinery, and equipment for railroads.

The future of silver alloy brazing is unpredictable at this time because of its amazing growth during the war period and the thousands of new applications for which it has been found suitable. Experience has been gained in new fields which will stand us in good stead in peacetime when parts for civilian products made of steel which had never been silver brazed before, will be assembled by this process which has been proved eminently suitable.

Moreover, the experience gained in brazing airplane parts, ignition shields and the like in bombers, fighter planes, etc. will also be put to good use in the production of planes for civilians, passenger planes, sport planes and cargo planes.

What we have learned from the pressure of war needs is that this process provides us with a method of assembly which is speedy, reliable, and economical. The precious metal used adds little to the cost of production. The amount of silver used in the joint is reckoned in small fractions of an ounce; labor has always been the largest single element of cost in brazing. In the future silver alloy brazing will be used for joining ferrous parts to an extent far beyond pre-war practice, it is predicted.

TABLE II
SPECIFICATIONS FOR SILVER BRAZING ALLOYS

Type of Silver Alloy	Silver Content	Flow Point °F.	U.S. Navy Spec. 47-S-13 (INT)	U.S. Navy Bur. of Aeronautics Spec. 47-S-13 (INT)	U.S. Army Chem. Warfare Serv. Spec. 196-131-80	U.S. Army Ordnance Dept. Tent. Spec. AXS-741	U.S. Army Air Forces Spec. 11342	Fed. Govt. Agency Fed. Spec. QQ-S-56 Id	A.S.T.M. Spec. B-73-29	Soc. of Auto. Eng. Aeron. Materials Spec.
SF Brazing Alloy	15%	1300	III	III	3	...	A	3	...	...
FF Brazing Alloy	50	1175	IV	IV	4	4	B	4	...	AMS 4770
FF No. 3 Brazing Alloy	50	1270	V	V	5	...	...	5	...	...
TL Silver Solder	9	1600	...	...	...	...	...	...	1	...
AT Special Silver Solder	20	1500	0	0	0	...	...	0	2	...
ATT Silver Solder	20	1500	...	...	...	...	...	...	3	...
DE Silver Solder	45	1370	I	I	I	...	...	1	4	...
ETX Silver Solder	50	1425	...	...	...	...	...	...	5	...
Easy Silver Solder	65	1325	II	II	2	...	...	2	6	...
Medium Silver Solder	70	1390	...	...	...	...	...	...	7	...
IT Silver Solder	80	1460	...	...	...	...	...	...	8	...

STRESS DISTRIBUTION

By E. S. CLARK
Chief Engineer
Meehanite Metal Corp.
New Rochelle, N. Y.

The author presents a check list of current, accepted methods for determination of stresses which will prove helpful to those following the present tendency to limit weight by the more effective use of materials

OVER a long period, mathematicians have devoted much time and given much study to the subject of stress values in structures not subject to reasonably simple stress analysis. Such structures as simple beams, continuous beams, tension members and thinwalled hydraulic cylinders may be analyzed with considerable precision and reasonable simplicity by mathematics but the structures of more complex form do not lend themselves to such analysis.

By correlating tests with mathematics, some of the more complex forms have been so analyzed as to allow of the use of empirical formulae. Such methods and formulae have been advantageous but frequently have left much to be desired. Many designs have been predicated on a few tests to destruction with little knowledge of the actual primary or secondary stresses present under working conditions or of the real factors of safety provided.

The constant tendency to limit weight by the more effective use of materials and the introduction of materials less well known as to their physical attributes such as Meehanite, aluminum and magnesium, has further centered attention on more definite determination of actual stress conditions.

The mathematical determination of stresses has been so difficult and unsatisfactory in great numbers of instances that more precise and informative methods have been sought.

The trial and error method may also be unsatisfactory in precision and in any event requires so much time as to indicate the advantages of more precise methods.

Photo Elastic Method

The photo-elastic method of stress determination was conceived as offering an advantageous solution of the difficulty in many cases. This method presents a picture of the stress distribution in a structure through the form and pattern of the whorls and lines delineated as the loadings are applied. Indication of the value of the stresses is given by the spacing of the pattern. However, there have been certain difficulties in interpretation and difficulties inherent in the material used.

Therefore, the trend appears to have been toward methods which could be applied directly to the material and the structure involved.

Beyond photo-elastic methods, there are methods which use dissection, X-ray diffraction, "Stress Coating" and electric-resistance gages as indicators of strain. The normal extensometer method has been largely superseded by some one or a combination of the others.

Dissection Method

The dissection method has been mainly used in determining residual stresses in a piece of material and consists of measuring the dimension of a piece accurately, cutting small portions of the piece away, remeasuring and determining the magnitude of stress, after thus determining the strain, from the stress-strain curve of the material. The method is described in an article by Sachs and Espey in *Iron Age*, 1941.

X-Ray Diffraction Method

The X-ray diffraction method is a method mainly useful in determining surface stresses. After polishing a spot on the surface of the piece and loading the structure an X-ray photograph is taken vertical to the surface and another at a determined angle to the surface. The difference between the space of the lines of the two photographs is an index to the stress involved. The amount of stress must be determined by the spacing of such lines as determined by similar photographs of the same material under known stress and by correlation.

The preparation of the surface at the points where stress determinations are made by this method is very important since the penetration is on the order of 0.001-in. and the extent micro-roughness affects the diffraction. The surface is etched but must then be made smooth. Crystal size of the material is also an influence.

Drilling Holes Method

Drilling holes in a piece to allow determination of the stress below the surface does not appear to be feasible due probably to change in stress concentration due to the presence of the hole.

Indication of stress for materials harder than rockwell 45 C is not as reliable as for materials of lower hardness.

This method of determination of stress is of recent development and has not been used to such an extent as to have developed a good background of knowledge.

Stress Coating Method

"Stress Coating" is the application of a preparation to the surface of the material. After this coating hardens, if loadings are applied, cracks develop in the hardened coat. The spacing of these cracks indicates the degree of stress, and approximate determination of the value of the stress may be made by comparing the spacing with that developed on a piece of material under known stress.

This method was indicated as most valuable in determining the region of any structure at which more precise determinations might be made by other methods.

A method of strain analysis which has received a good deal of attention is the electric strain gage. There are two types at present, the magnetic type and the resistance type. There is said to be a inductance type in development.

Strain Gage Method

The strain gage consists of a small piece of wire with accurately determined electrical constants. If this wire is subjected to strain the amount of such strain may be determined by knowledge of the constants of the gage and by observation of indicated changes in the electric circuit.

In the case of a simple stress such as

(*Please turn to Page* 146)

Engineering NOTES

Tin, Antimony, Lead

Task teams have been alerted to go into Malaya to find new sources for tin and expedite production, since the stockpile in the U. S. will vanish by the end of 1946 at present restricted rate of use. A "few hundred tons" were found in Germany. So critical is the supply situation the Dutch and other tin mine operators will be given top AAA priority assistance for dredges and other equipment needed. Washington authorities are worried about lead saying U. S. can't produce enough and imports are insufficient to meet needs. Stockpiles of antimony in Central China soon will be made available now that Chinese coast ports are being opened up.

★ ★ ★

Glass Gaskets

Fine glass fibers—intertwined in random orientation and bonded to form a thin, highly porous felt-like material—are the basis for new gaskets and sheet packing manufactured by Owens-Corning Fiberglas Corp., Toledo, O. Glass Fibers have average diameter of 0.0005-in., while mats range from 0.010-in. to 0.050-in. in thickness and from 22 to 36 in. in roll lengths of 150 and 300 ft. Binders used are starch, gelatine, furfural or phenolic, depending on end use. Gaskets made from the material are reported to show high pressure resistance, chemical durability, and little flow under flange pressure.

★ ★ ★

Rubber

Investigators in Germany have found the famous Buna S synthetic rubber to be inferior to a similar type (GRS) produced in the United States and lacked uniformity of quality. In this country, synthetic rubber is here to stay. As STEEL pointed out Dec. 4, 1944, the synthetics are superior for many applications, especially in the industrial field where resistance to oil, light and heat are often required characteristics. In addition an executive of a leading rubber company declared off the record a few days ago that the rubber industry was resolved to use substantial quantities of synthetic rubber and, in fact, will improve quality through continued research.

Before the Japs quit, the U. S. figured on an available supply of 750,000 tons of synthetic and 100,000 tons of natural rubber for 1945. Nothing will be known for another 60 days about the condition of the rubber plantation and coagulating machinery in the Far East but estimated world supply of natural rubber had been placed at 350,000 tons for 1946 and might run 750,000 tons. As a result, WPB is mapping out a series of steps for improving the quality of rubber by compounding natural with synthetic. The 15,000,000 truck tires scheduled for production in 1946 will be made with progressively improved rubber and rayon cord. Passenger car tires will be made with cotton cord, with production placed at 66,000,000 for 1946, against about 25,000,000 in 1945. Truck tire output this year will be about 22,500,000.

Total U. S. rubber consumption next year is placed at a new record of 940,000 tons, comparing with 850,000 tons in 1945.

★ ★ ★

Packaged Nickel Oxide

Nickel recoveries vary widely in use of nickel oxide in production of open hearth alloy steels; on eight heats charged in one case, recovery averaged but 80 per cent. In electric furnace practice, however, satisfactory results are general, notably in the production of stainless steels in which nickel recoveries have averaged better than 95 per cent. Use of nickel oxide, a product from Cuban ores, in open hearth practice might be feasible if packaged in metal containers, open hearth metallurgists suggest.

★ ★ ★

Few Cancellaitons

One of the machine tool companies checked with all of its customers prior to V-J day with the result that a 40 per cent cancellation in machines on order was expected right after war's end. Much to their surprise, V-J day brought very few cancellations and it has been impossible to move up delivery dates a single day.

★ ★ ★

Under-Water Welding

If the SCHARNHORST had had a means of cutting off damaged hull plates which made her travel in a circle, she might have avoided sinking by the Allies. Such a method was developed in this country during the war and has been of great value in repairing battle-damaged ships, clearing harbors, removing sunken bridges. A hollow, coated electrode is used, which undoubtedly will find many peacetime applications for repair work. Excellent welds also may be made at considerable depths under water with new improvements in equipment and technique.

★ ★ ★

Care of Furnace Bottoms

Examination of lump samples and of drill cores of burned-in and cold-rammed open-hearth bottoms form old and new hearths shows that bottoms of the rammed type do not have as high a density as that of the burned-in type. On the other hand, beating rammed bottoms too thoroughly results in penetrating shrinkage cracks, and cracks due to thermal contraction when the bottom reverts to the temperature gradient under normal operation.

★ ★ ★

Plating Aid

Adjustable anode rod invented by Messrs. Evans and Shaefer, Glenn L. Martin Co., Baltimore, is responsible for faster plating of irregularly shaped parts and more uniform metal deposits in company plating operations. Anodes are removed quickly and easily to most advantageous position in relation to work, adjustment of rod accommodating several types of work without disconnecting anodes from power source.

★ ★ ★

To Lighten Farm Work

No larger than a man's two fists, an aircraft type pump has been made which runs off a tractor engine to provide hydraulic pressure for operating farm implements. At a flip of the handle, this unit of Pesco Products Co., Cleveland, reputedly can raise or lower tractor-mounted plows, harrows or cultivators. It is said to provide a smooth flow of hydraulic fluid, free from pulsations and surges. An adaptation of the gear type, pump and system are similar to those used on military airplanes to operate bomb-bay doors, landing gear, etc.

By A. H. ALLEN
Detroit Editor, STEEL

CARBURIZING and

. . . . carried out continuously in muffle-type furnace produce file-hard surface and dead-soft centers in thin-gage steel pieces, such as thrust washers and retainer rings

A COMBINATION of carburizing and nitriding, carried out continuously in a muffle-type furnace with special atmosphere, has made it possible to obtain clean, file-hard surfaces with dead soft centers on a variety of thin-gage steel pieces such as flat and spherical thrust washers, retainer rings, lock nuts, pins and the like used in truck axle assemblies. The dual hardening treatment further has permitted the use of alternate materials, with an annual saving of approximately $75,000 at the Timken-Detroit Axle Co., Detroit.

Each axle includes four spherical and two flat thrust washers which in service are required only to resist compression loads and surface wear. They are blanked from SAE 1010 hot-rolled strip steel, formed to spherical shape where required, then cleaned in an alkaline bath and washed before heat treatment. Stock thickness varies, but one of the smaller spherical thrust washers, for example, is approximately 0.0625-in. thick, 1 13/16 in. in diameter, with hole 7/8-in. in diameter.

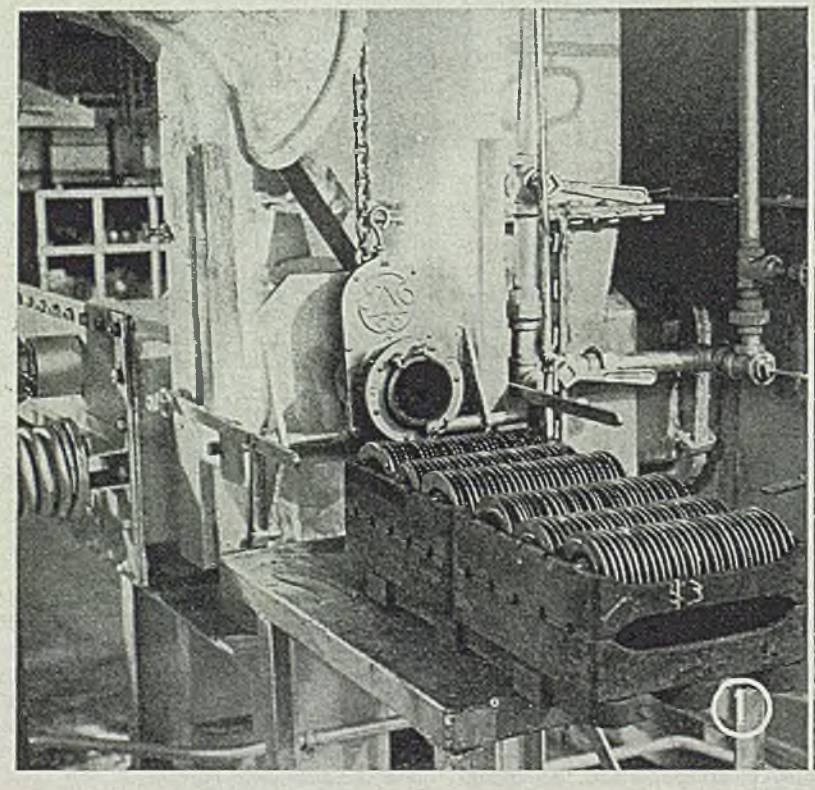
Heat treating is carried out in a tray pusher-type muffle furnace, with water jacketed cooling chamber at the discharge end. Each tray accommodates from 150 to 900 pieces which are set on edge in racks so that they do not touch in order that the entire surface may be contacted by the gas atmosphere. The furnace operates on a cycle of one push every 30 min, and one tray requires 8 hr to traverse the furnace—5 hr in the muffle and 3 hr in the cooling zone. Gas locks at the charging end, as well as at the discharge end, keep the furnace atmosphere sealed against the outside air. Temperature is maintained at 1425° F, plus or minus 5°, to obtain case depth of 0.004-0.006-in., although by raising the temperature it is possible to obtain as high as 0.012-in. case.

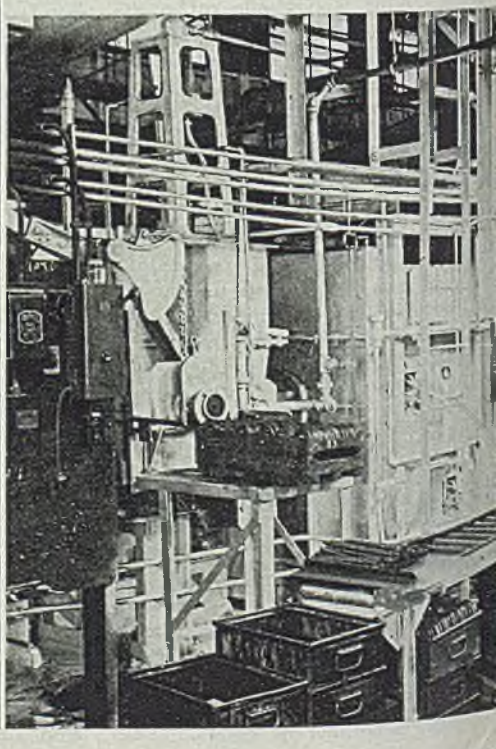
Originally this furnace was operated to allow 3 1/2 hr for heating and carburizing at 1500° F. followed by a 2 slow cool to 1375 and 2½ hr accel ated cooling to near room temperatu For present requirements better me lurgical results and improved product are obtained by holding uniform te perature of 1425° F throughout heating cycle.

The dry cyaniding atmosphere gas supplied by a standard RX type generator, cracking mixtures of air a natural gas, to which additional natu gas and ammonia are added to produ a mixture analyzing about as follo CO, 6.5 per cent; CH_4 (methane), per cent; H_2, 60.6 per cent; N_2, 30.0 cent, with no CO_2 or O_2 and only a tr of water vapor. Suitable muffle mixture is obtained by admixing cu ft per hour of natural gas and 8 lb of ammonia with 165 cu ft per h from an RX generator.

The "dry cyaniding" process utili both carbon and nascent nitrogen for

(*Please turn to Page* 166)





ITRIDING

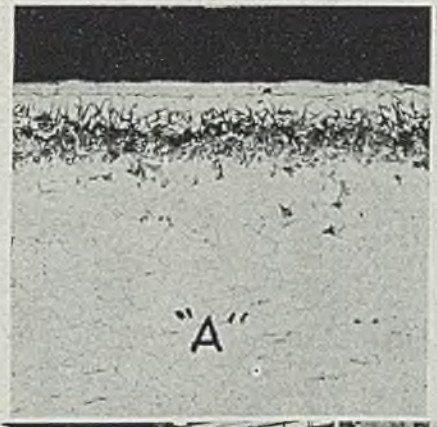
Fig. 1—*Tray of 104 washers ready to be moved into vestibule at charging end of muffle furnace for carburizing-nitriding treatment*

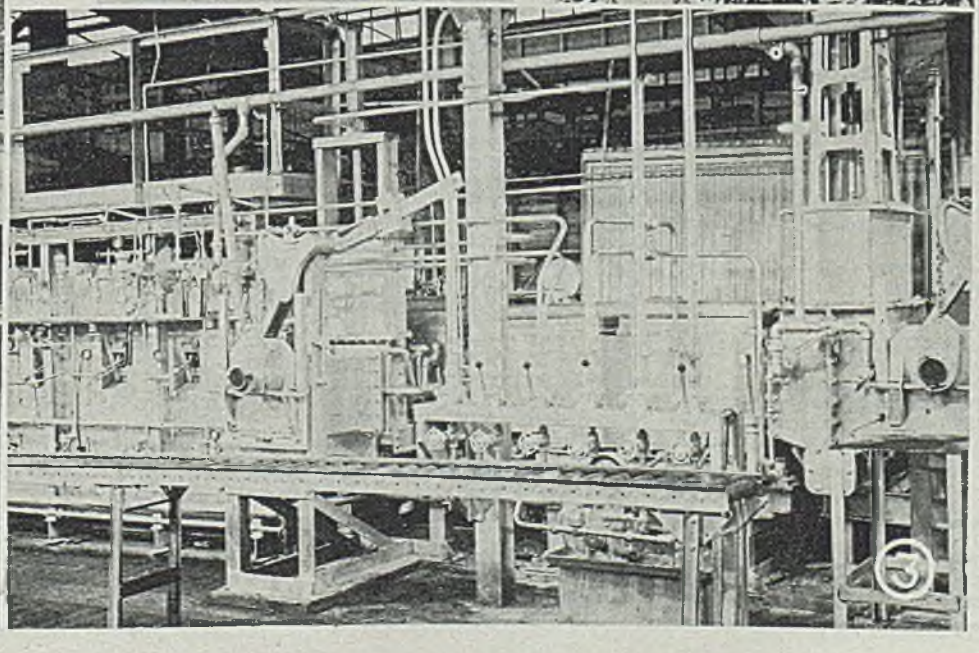
Fig. 2—*Side view of gas fired muffle furnace for dry cyaniding. Operator in background is at central valve station where furnace doors and pusher are controlled*

Fig. 3—*Discharge end of furnace at right has vestibule into which trays are pulled for removal after traversing cooling chamber shown behind six control valves*

Fig. 4 — *Photomicrographs showing carburized-nitrided surface of dry cyanided SAE-1010 steel washer. "A" is at 100 diameters magnification; "B" at 500 diameters. Note clear delineation of thin nitrided outer layer and darker carburized subsurface layer*

Fig. 5—*Here are typical thrust washers which have been given the dual hardening treatment*





GERMANY'S Tool and Special Steel

POLDI HUTTE WORKS

High Speed Steel

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
MK Special	0.65	0.20	0.25	4.20	17.50	....	0.70	1.60	15.50
Poldi MK	0.65	0.20	0.25	4.20	17.50	....	0.70	1.60	9.50
Poldi MK H	0.78	0.20	0.25	4.20	17.50	....	0.70	1.60	9.50
Maximum Special 55	0.70	0.20	0.25	4.20	17.50	....	0.60	1.40	4.75
Maximum Special 55G = Radeco D	0.85	0.20	0.25	4.20	12.50	....	0.60	1.85	4.75
Maximum Special 30	0.70	0.20	0.25	4.20	17.50	....	0.60	1.40	2.50
Radeco K	1.35	0.20	0.25	1.05	17.50	....	....	1.35	5.25
Radeco = Radeco 2	1.30	0.20	0.25	5.00	10.75	....	....	4.20	....
Maximum Special G Extra	0.85	0.20	0.25	4.20	9.75	....	....	2.40	....
Maximum Special	0.70	0.20	0.25	4.20	17.50	....	0.60	1.35	....
Maximum Special H	0.80	0.20	0.25	4.20	17.50	....	0.60	1.35	....
Maximum Special G = Maximum Special G3	0.82	0.20	0.25	4.20	7.75	....	....	2.00	....
Maximum Special MO	1.00	0.20	0.25	5.25	1.75	....	2.40	2.85	....
Maximum	0.70	0.25	0.25	4.00	17.50	....	0.60	0.50	....
000 Extra 6 = Maximum P	0.75	0.25	0.25	4.00	16.85	....	0.40	0.35	....
Maximum G	0.75	0.25	0.25	5.00	8.50	....	0.55	0.80	....
000 Extra	0.75	0.25	0.25	4.00	15.75	....	0.50	0.15	....
000	0.65	0.25	0.30	5.00	10.25	....	0.40	0.10	....

Chromium-Tungsten and Tungsten Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
301	0.32	0.35	0.30	2.25	9.50	....	....	0.25	2.40
KNO Extra	0.42	0.30	0.30	2.25	9.50	....	0.55	1.60	....
KNO	0.42	0.20	0.25	3.75	15.00	....	0.10	0.35	....
HPS	0.25	0.50	0.30	2.25	9.50	1.50	....	0.10	....
212	0.28	0.35	0.30	2.25	8.75	....	....	0.20	....
212 D2	0.30	0.35	0.30	2.75	4.35	....	....	0.55	....
425	0.30	0.35	1.10	1.45	3.75	....	....	....	....
425 D	0.32	0.35	1.10	2.45	1.90	....	....	0.35	....
Tenax NB	0.55	0.25	1.00	1.10	1.90	....	....	....	....
Tenax N = 895	0.45	0.25	1.00	1.10	1.90	....	....	....	....
Tenax NF	0.35	0.25	1.00	1.10	1.90	....	....	....	....
O Diamanthart	1.35	0.25	0.20	0.55	4.90	....	....	0.35	....
O Diamanthart D	1.35	0.25	0.20	0.70	3.35	....	....	0.35	....
O Extra	1.35	0.25	0.20	0.25	4.75	....	....	0.10	....
O Extra D	1.35	0.25	0.20	0.25	3.35	....	....	0.20	....
Solar	1.20	0.50	0.25	1.60	1.45	....	....	0.15	....
SPS	1.20	0.30	0.20	0.40	1.15	....	....	....	....
SP	1.20	0.30	0.20	....	0.70	....	....	....	....
SST	1.00	0.30	0.20	....	1.15	....	....	....	....
Duplex Extra	1.05	0.35	0.25	0.25	1.15	....	....	0.20	....

Chromium Special Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
2002 Special	1.35	0.30	0.30	12.5	0.75	....	....	0.30	....
2002	1.90	0.30	0.30	12.5	....	....	....	....	....
Magnet C	0.95	0.30	1.35	4.00	....	....	....	....	....
WP	0.40	0.65	0.25	2.50	....	....	0.60	0.45	....
GS 1	0.40	0.65	0.25	2.50	....	....	0.45	0.28	....
GS 2	0.42	0.65	0.30	2.50	....	....	0.28	....	....
GS 3	0.38	1.40	0.30	2.50	....	....	0.28	....	....
GS 4 = ML Special	0.33	1.90	0.25	3.75	....	....	....	0.18	....
B 200	0.38	1.90	0.25	3.75	....	....	....	0.18	....
LDM Special	0.28	0.30	0.35	2.50	....	....	0.60	0.28	....
LDM	0.25	0.30	0.35	1.20	....	....	0.65	....	....
LDM 2	0.22	1.00	0.25	1.20	....	....	0.28	....	....
LDM 3	0.20	1.40	0.25	1.90	....	....	0.26	....	....
LDM 3 Special	0.22	1.40	0.25	1.90	....	....	0.26	0.22	....
Decora	0.57	0.65	0.30	2.50	....	....	0.35	0.15	....
Decora W	0.52	0.65	0.30	2.50	....	....	0.35	0.15	....
CV=CZ=CZ Special	0.42	0.55	0.25	2.25	....	....	....	0.15	....
CX	0.30	0.30	0.90	2.45	....	....	....	0.35	....

Tool Steels With Nickel and Manganese

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
Orlo	0.90	0.30	0.25	....	....	....	....	0.20	....
5HN	0.85	0.45	0.25	....	....	....	....	0.05	....
1888	0.70	0.55	0.25	....	....	....	....	0.05	....
Stabil Special	0.85	1.70	0.25	0.30	....	....	....	0.20	....
Stabil	0.80	2.10	0.25	....	....	....	....	0.15	....

FIVE companies marketed pra cally all of the tool and special ste that were used in Germany. Three these companies were strictly Germ one was Czechoslovakian, and fifth had home offices and one pl in Austria with another plant in G many. The three German compan were the Deutsch Edelstahle at K feld, Krupp at Essen, and Rochli stahle Steel Works at Wetzler. Austrian company was the Bol Werkzeng Stahle with its main pl at Kopfenberg, Austria, and anot plant at Dusseldorf, Germany. fifth company was the Poldi Hu having its main plant at Klac Czechoslovakia. Apparently Bol enjoyed the largest sale of spe steels, closely followed by Deuts Edelstahle.

Each of the five companies had tween 8 to 12 branch wareho which were located in all of the la German industrial areas. The w house stocks were quite complete to sizes and grades, and aggreg amount of such steels in wareh stocks was large. Contrary to Am can custom, mills did not carry la stocks at places of manufacture un the location was in a heavily in trial area such as Krupp at Esse

Manufacture

A striking similarity was appa in the methods of manufacture tween all of the tool and special s companies. This statement is based

POLDI HUTTE WORKS

Special and Extra Tool Steels

Brand	C	Mn	Si
FS Special	1.20	0.25	0.15
EZH Special	1.00	0.35	0.20
S Special	0.75	0.30	0.25
FS'148	1.10	0.30	0.20
FSx	1.20 1.20	0.25	0.15
EZH	0.95	0.30	0.20
FZHx	1.05 1.05	0.25	0.15
Index	1.05	0.30	0.20
EZ	0.75	0.30	0.20
Deco	0.85 0.90 1.05	0.30	0.20

Note: No Cr, W, Ni, Mo or Co used.

By JAMES P. GILL
Vice President and Chief Metallurgist
Vanadium Alloys Steel Co.
Latrobe, Pa.

Industry

As special investigator for United States Government agencies, Mr. Gill obtained a first-hand view of this important German industry. Details on methods and analyses reveal strong preference for tungsten types and changing compositions

study of the methods of manufacture of Edelstahle and Rochlingstahl. All of the companies manufactured their product in the form of rolled and forged bars, cold drawn and ground bars, wire, plate, and sheet. Practically all of the steel was melted in electric furnaces, yet each of the companies had some open hearth capacity in which carbon and low alloy steels might be manufactured.

Rochlingstahl was equipped with one 30-ton open hearth furnace using coke oven gas and three electric furnaces. One of 20-ton capacity was manufactured by Demag, the second had 10-ton capacity, and the third 3-ton capacity. The latter two were

POLDI HUTTE WORKS

Tool, Drill and File Steels

Brand	C	Mn	Si
.....	1.20 1.35	0.30	0.20
.....	1.05 1.20	0.30	0.20
.....	0.90 1.05	0.30	0.20
.....	0.75 0.90	0.32	0.20
.....	0.65 0.75	0.35	0.25
.....	1.20 1.35	0.25	0.15
.....	1.05 1.20	0.25	0.15
.....	0.90 1.05	0.25	0.15
.....	1.20 1.35	0.30	0.20
.....	1.05 1.20	0.30	0.20
.....	0.90 1.05	0.30	0.20
.....	0.75 0.90	0.30	0.20
.....	0.70 0.80	0.30	0.12
.....	1.35 1.50	0.20	0.12
.....	1.20 1.35	0.25	0.12
.....	1.00 1.20	0.25	0.12

Note: No Cr, W, Ni, Mo, V or Co used.

POLDI HUTTE WORKS

Chromium Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
EX	1.40	0.50	0.30	1.60	....	....	....	0.15	....
ORI	1.25	0.70	1.15	1.20	....	....	....	....	....
DS Special	1.15	0.20	0.15	1.00	....	....	....	0.18	....
EPAZ	1.25	0.40	0.25	0.12	....	....	....	0.15	....
SC=REDI H	0.60	0.70	1.55	0.80	....	....	....	....	....
REDI=LDS	0.45	0.50	1.45	0.60	....	....	....	....	....
CR2	0.80	0.35	0.25	1.70	....	....	....	....	....
CR2W	0.70	0.35	0.25	1.70	....	....	....	....	....
CR1	0.90	0.35	0.25	1.00	....	....	....	0.10	....
CR	0.90	0.30	0.25	0.75	....	....	....	0.10	....
CRK	1.00	0.40	0.25	1.40	....	....	....	....	....
RCR=DS	1.20	0.20	0.15	1.00	....	....	....	....	....
RCR 1 = 1 Extrahart	1.50	0.25	0.20	0.75	....	....	....	....	....
3C	1.15	0.30	0.20	0.15	....	....	....	....	....

Tool Steels With Nickel

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
LDH	0.30	0.30	0.35	0.70	....	4.25	1.50	....	....
TPA	0.32	0.50	0.25	1.00	....	4.00	0.70	....	....
LDH2	0.22	0.30	0.45	0.50	....	3.75	1.25	....	....
LDH3 Special	0.30	0.30	0.45	0.70	....	2.40	0.75	0.30	....
LDH4	0.28	0.30	0.45	0.70	....	1.10	0.35	....	....
LDH4 Special	0.30	0.30	0.45	0.70	....	1.40	0.45	0.22	....
LDH5	0.26	0.30	0.45	0.70	....	1.10	0.10	0.22	....
LDH5 Special	0.28	0.30	0.45	0.70	....	1.10	0.30	0.22	....
CNF	0.35	0.50	0.25	0.90	....	4.85	....	....	....
CNB	0.38	0.50	0.25	1.50	0.60	4.25	0.30	....	....
CNBD	0.38	0.50	0.25	1.50	....	3.50	....	....	....
CNB4	0.35	0.30	0.30	5.00	....	1.70	0.48	....	....
TBM Extra	0.40	1.10	0.40	1.10	....	1.70	0.48	....	....
TBM	0.48	0.80	0.40	0.90	....	1.70	0.28	....	....
CNH Special	0.55	0.50	0.25	0.75	....	2.60	....	....	....
CN Special	0.38	0.50	0.25	0.75	....	2.85	....	....	....
TI Special	0.12	0.45	0.25	1.10	....	4.10	....	....	....
TE Special	0.15	0.50	0.25	0.70	....	3.35	....	....	....
BZ	0.39	0.60	0.25	1.10	....	2.00	0.15	....	....

Corrosion Resisting Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co	Ti
Antoxyd	0.20	0.50	0.25	21.0	....	38.5	....	....	....	....
Antoxyd 2	0.10	0.45	0.50	21.0	....	38.5	5.50	....	....	0.50
AKC	0.20	0.50	0.50	24.0	....	19.5	....	....	....	....
AKCM	0.45	0.50	0.50	18.0	....	19.5	3.25	....	....	....
AKCR	0.15	0.50	1.00	25.0	....	14.5	....	....	....	....
AKCF	0.10	0.50	0.80	21.0	....	10.0	....	....	....	....
AKV Extra	0.07	0.50	0.80	18.5	....	9.0	1.65	....	....	....
AKV Extra S	0.07	0.50	0.80	18.5	....	8.5	1.65	....	....	0.60
AKV	0.15	0.50	0.80	18.5	....	9.0	....	....	....	....
AKVS	0.10	0.50	0.80	18.5	....	8.5	....	....	....	0.60
AKVN	0.10	0.50	0.80	18.5	....	9.0	....	....	....	....
AKVU	0.15	0.50	0.80	18.5	....	9.0	....	....	....	....
L-ADVD	0.40	1.00	2.30	18.0	1.20	9.5	....	....	....	....

Corrosion Resisting Steels With Special Physical Properties

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Cu	Ti
AKR L-AKR	0.45	0.60	1.50	12.50	2.20	12.50	....	....	....	....
L-AKRD	0.45	0.75	1.50	15.00	2.30	18.00	....	....	....	....
AKRV	0.28	0.60	1.50	12.50	2.20	12.50	0.50	1.00	....	....
AKRVB	0.18	0.50	0.50	12.50	2.20	12.50	....	1.00	....	....
KAPTOR	0.35	0.60	1.50	12.50	2.60	12.50	....	1.25	....	....
KAPTOR D	0.35	16.00	0.40	13.50	3.20	.....	....	....	....	....
AKL	0.08	0.50	0.25	14.00	....	10.80	....	....	....	....
AKL1	0.15	0.60	0.30	12.30	....	10.50	....	....	....	....
AKS	0.35	0.50	0.25	4.50	....	22.00	....	....	....	....
AKS2	0.10	0.50	0.50	4.80	2.00	25.00	3.50	....	2.50	....
AK	0.15	0.50	0.25	....	....	9.50	....	....	....	....
N136	0.10	0.35	0.20	....	....	35.50	....	....	....	....
N125	0.45	0.50	0.25	....	....	25.50	....	....	....	....

Corrosion Resistant With Chromium and Manganese

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co	Ti
AKM	0.07	18.0	0.80	10.0	....	1.00	1.00	....	....	....
AKM 2	0.07	9.5	0.50	18.0	....	....	....	....	....	....
AKM 3	0.07	13.5	0.50	18.0	....	....	....	....	....	....
AKMF	0.09	15.5	0.50	13.0	....	1.00	....	....	....	....
AKMF 1	0.09	17.0	0.50	14.5	....	....	....	....	....	....
AKMF 2	0.09	17.5	3.00	8.5	....	....	....	....	....	....
L-AKMF 3	0.09	17.5	1.50	11.5	....	....	....	....	....	0.50
L-MS	0.29	18.0	0.50	1.3	....	....	....	....	....	....

POLDI HUTTE WORKS

Heat Resisting Chromium Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co	Ti
AKX8 L-AKX8	0.09	0.50	1.30	7.50	....	....	....	....	....	....
AKX	0.10	0.50	0.25	25.00	....	....	....	....	....	....
AKX Extra	0.10	0.50	0.50	25.00	....	4.70	....	....	....	....
AKX Special	0.09	0.50	0.50	25.00	....	5.50	1.70	....	....	0.40
AKX6	0.10	0.50	1.80	4.00	....	....	....	....	....	....
AKX12	0.09	0.50	1.00	26.00	....	....	....	0.30	....	0.50
AKX12 Special	0 09	0 50	1.00	23.50	0.50	1.30	0.40	0.25	....	0.20
GFE	0.60	0.50	0.50	25.00	....	....	....	....	....	....

Corrosion Special Steels

Brand	C	Mn	Si	S	Cr	W	Ni	Mo	V	Cu	Ti
AK1	0.12	0.50	0.25	....	13.0	....	....	....	....	....	....
AK1W	0.07	0.50	0.25	....	13.0	....	....	....	....	....	....
AK1U	0.10	0.50	0.25	0.20	16.5	....	....	0.33	....	....	....
AK1B	0.10	0.50	0.25	....	16.0	....	0.30	0.20	....	1.80	....
AK1BS	0.10	0.50	0.25	....	15.2	....	....	....	....	....	....
AK1B Extra	0.09	0.50	0.50	....	17.5	....	....	....	....	....	0.50
AK1B Special	0.09	0.50	0.50	....	17.5	....	....	1.40	....	....	0.50
AK2, L-AK2	0.20	0.50	0.25	....	15.2	....	....	....	....	....	....
AK2 Special	0 22	0.50	0.25	....	15.2	....	....	....	....	....	....
AK2S	0.22	0.50	0.25	....	13.0	....	....	....	....	....	....
AK3S	0 33	0.50	0.25	....	13.0	....	....	....	....	....	....
AK4	0.40	0.50	0.25	....	14.0	....	....	....	....	....	....
AK5 AK Special	0.47	0.40	0.25	....	15.2	....	....	....	....	....	....
AK5M, L-AK5M	0.42	0.50	0.25	....	14.8	..	....	1.85	....	....	....
AKH	1.00	0.50	0.25	....	14.5	1.80	....	....	....	1.35	....
702	0.45	0.40	3.00	....	8.5	....	....	....	....	....	....
702M	0.47	0.25	2.80	....	9.5	....	0.40	0.85	....	....	....
702D	0.45	0.40	3.10	....	8.5	....	..	....	....	....	..

Chromium-Nickel Special Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
AM	0.70	8.90	0.30	3.15	....	7.70	....	....	....
AMA	0.70	8.50	0.30	2.25	....	7.75	....	....	....
AMD	0.70	13.50	0.80	3.50	....	3.25	....	....	....
AM40	0.70	8.50	0.30	1.25	....	7.75	....	....	....
AMK	0.40	18.00	0.30	3.30	....	....	....	....	....
AMS	0.55	5.25	0.50	3.53	....	12.15	....	....	....
IHN	0.34	0.65	1.80	0.15	....	1.85	....	....	....
NIS	0.38	0.60	1.90	0.45	....	3.45	....	....	....
NIS2	0.36	0.60	1.90	1.70	0.50	2.20	....	....	....
NISC	0.34	0.60	1.80	1.10	....	2.40	....	....	1.30
TPE	0.28	0.40	0.25	1.50	0.50	3.00	0.30	....	....
Aquila L-Aquila	0.09	0.50	0.25	1.00	....	4.20	0.35	....	....
L-Aquila Extra D	0.16	0.55	0.25	1.55	....	1.75	0.23	....	....
	0.16	0.40	0.35	1.80	....	1.80	0.15	....	....
	0.20	0.60		2.20		2.30	0.25		
Victrix Special	0.15	0.50	0.25	1.00	....	3.65	0.35	....	....
L-Victrix Special									
Victrix Special 32	0.26	0.50	0.25	0.75	0.65	3.40	0.30	....	....
L-Victrix Special 32									
Victrix Extra	0.22	0.50	0.25	1.95	....	1.95	0.25	....	....
L-Victrix Extra	0.26	0.50	0.25	2.45	....	1.75	0.23	....	....
L-Victrix	0.26	0.30	0.50	2.30	....	1.30	0.15	0.10	....
Extra D	0.34	0.80		2.70		1.80	0.25	0.25	
Boz L-Boz	0.39	0.60	0.25	1.10	....	2.00	0.15	....	....

Chromium Nickel Steels

Brand	C	Mn	Si	Cr	Cu	Ni
CNL L-CNL	0.30	0.40	0.25	0.85	....	4.80
DIN 1662:	0.30	0.40	0.35	1.10	....	4.25
VCN 45	0.40	0.80		1.50		4.75
Fliegw. 1420	0.40	0.80	0.35	1.50	....	3.75
						4.75
CNLW L-CNLW	0.27	0.40	0.25	0.85	....	4.50
TEIN	0.14	0.45	0.25	1.10	....	4.50
L-TEIN	0.10	0.50	0.35	0.90	....	4.25
	0.17			1.30		4.50
TEI L-TEI	0.12	0.45	0.25	1.05	....	4.05
TEM	0.12	0.45	0 25	0.75	....	3.35
L-TEM	0.10	0.50	0.35	0.55	....	3.25
	0.17			0.95		3.75
TEMW L-TEMW	0.09	0.45	0.25	0.50	....	3.15
CNS	0.33	0.60	0.25	0.80	....	3.35
L-CNS	0.27	0.40	0.35	0.55	....	3.25
	0.35	0.80		0.95		3.75
CNSW	0.25	0.45	0.25	0.80	....	3.35
L-CNSW	0.20	0.40	0.35	0.55	....	3.25
	0.27	0.80		0.95		3.75
VCN	0.36	0.60	0.25	0.80	....	2.35
L-VCN	0.32	0.40	0.35	0.55	....	2.25
	0.40	0.80		0.95		2.75
VCNW	0.29	0.45	0.25	0.80	....	2.35
L-VCNW	0.25	0.40	0.35	0.55	....	2.25
	0.32	0.80		0.95		2.75

manufactured by Brown Boveri.

Edelstahle had nine electri arc furnaces between 6 and 30-t capacity, with two induction fu naces of some 4 or 5-ton capacity, a three basic open hearths of 35-t capacity.

Melting Practice: This was qu similar to procedure followed America, highly alloyed steels — su as high speed steel — being de melted: carbon and special steels such as ball bearing type—boiled the addition of approximately 10 lb of ore to a 10-ton charge. Sla were made by mixing fluorspar, c bon and lime, and usually two sla were used, although three slags ha been tried for some steels. Usua aluminum was used for deoxidati the average aluminum addition bei 4 lb for a 10-ton heat.

Both Edelstahle and Rochlingst cast tapered square ingots and taper round ingots, the latter sometim termed as "conical" ingots. The mo are open at both ends and set on cast iron flat stool about 6 in. in thic ness. Ingot size varied greatly, a parent intent being to cast small ing as consistent as possible with t size of the bar to be manufacture Ingots, therefore, varied from as sm as 300 lb to nearly 8 tons. The mol were given a wash of hot tar and hot top was used which consisted a large cast iron ring into which w set a tapered clay container, eith square or round in accordance w

POLDI HUTTE WORKS

Welding Rods

Brand	C	Mn	
S2	1.20	0.30	0
	1.35		
S3	1.05	0.30	0.
	1.20		
S4	0.90	0.30	0.
	1.05		
S5	0 75	0.30	0.
	0 90		
S6	0.65	0.30	0.
	0.75		
Azzalon	0.75	0.30	0
	0.85		
SR2	1.20	0.30	0
	1.35		
SR3	1.05	0.30	0
	1.20		
SR4	0.90	0.30	0
	1.05		
SR5	0.75	0.32	0
	0.90		
SR6	0.65	0.35	0
	0.76		
T5 Extra	0.65	0.35	0.
	0.75		
T5W Extra	0.52	0.70	0.
	0.60		
T6H Extra	0.42	0.75	0
	0.50		
T6H B	0.48	0.55	0.
	0.54		
MO	0.30	0.50	0.
	0.40		

the shape of the ingot. Mud was rammed between the clay container and the cast iron ring. The whole was heated to 600° C and placed on top of the mold before casting. Volume of the hot top generally was about 10 per cent of the ingot volume.

The standard square ingot at Rochlingstahl weighed 700 kilos and had a 300 mm cross section at the top, 340 mm at the bottom, with a length of 1200 mm. The molds usually were round on the outside, and the radii of inside corners was quite large, being about 3 in. A mold for casting a 700 kilo ingot weighed 1100 kilos. Round ingots were usually of three weights—200, 400, or 600 kilos, with major portion of the steel cast in a 400-kilo mold. The 400-kilo ingot had a top diameter of 300 mm, a bottom diameter of 235 mm, with an ingot length of 800 mm, not including the hot top. Hot top for this ingot had a dimension of approximately 240 mm at the bottom, 160 mm at the top, and a length of 300 mm.

All ingots, regardless of composition, were annealed immediately after casting, the ingots apparently being kept at a comparatively hot temperature until they could be placed in annealing furnaces. The hot beds were heated. After annealing, practically all ingots were rough turned, the amount of surface removed varying somewhat with composition of the steel. Turning equipment was available for both round and square ingots, the square ingots being turned on lathes manufactured by Waldrich of Siegen-Westfalen, and were of the profile type whereby the tool followed the contour of ingot. On ingots weighing 1200 kilos it was possible to turn 12 ingots of soft steel in 8 hr to 5 hard steel ingots such as high speed steel.

Equipment

Highly alloyed steels and nearly all types of tool steels, with exception of straight carbon steels, were hammered, while steels of the SAE type were pressed. At Rochlingstahl there was available one 1800-ton press, one hammer of 3000 kilo capacity, three hammers of 1500 kilo capacity, two hammers of 1000 kilo capacity, and a number of smaller ones. All heating was by use of coke oven gas. There was nothing unusual in the forging practice.

Rolling mill equipment of the Rochlingstahl works consisted of one blooming mill, 650 mm rolls, 3-high, 3-stand, with a constant speed; one 3-stand, 400 mm, 2-high mill with a variable speed; one 2-high, 7-stand,

POLDI HUTTE WORKS

Chromium-Nickel Steels (Continued)

ECN	0.13	0.45	0.25	0.80	...	2.35
L-ECN	0.10	0.50	0.35	0.55	...	2.25
	0.17			0.95	...	2.75
	0 30	0.60	0.25	0.90	...	1.95
ZY	0.25	0.80	0.40	0.50	0.30	1.80
	0.55			1.50		2.50
CNC	0.33	0.75	0.255	4.75	...	1.70
CNI	0.18	0 60	0.25	2.00	...	1.70
L-CNI	0.16	0.50	0.40	1.80	...	1.60
	0 22	0 80		2.20		1.80
CNE	0.14	0 60	0.25	1.35	...	1.55
TBOS	0.50	0 60	0.25	0 80	...	1.45
BO 4	0 35	0.45	0 25	0.60	...	1.45
L-BO 4	0.32	0.40	0.35	0.30	...	1.25
	0 40	0 80		0 70		1.75
	0.33	0.80	0.35	0 25	...	1.75
	0.40			0.75		
BO 3	0.28	0 60	0.25	0 65	...	1.45
L-BO 3	0.25	0 40	0.35	0 30	...	1.25
	0 32	0.80		0 70		1.75
	0.32	0.80	0.35	0.25	...	1.75
				0.75		
BO 2	0.24	0.45	0 20	0 65	...	1.15
BE	0.12	0.50	0.25	0.70	...	1.45

Note: No Mo, V, Co used.

Chromium-Molybdenum Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
CM 4	0.33	0.60	0.25	1.10	....	....	0.23	....	....
L-CM4	0.30	0.50	0.35	0.90	....	....	0.15	....	....
	0.37	0.80		1.20			0.25		
L-CM4W	0.30	0:50	0.25	3.05	....	....	0.40	....	....
CM3	0.30	0.60	0.25	1.10	....	....	0.20	....	....
	0.22	0 50	0.35	0.90	....	....	0.15	....	....
	0.29	0.80		1.20			0.25		
L-CM 3	0.25	0.60	0.15	1.10	....	....	0.20	....	....
	0.22	0.70	0.35	0.90	....	....	0.15	....	....
	0.28			1.20			0.25		
CM 2	0.20	1.05	0.25	1.20	....	....	0.23	....	....
L-CM2	0.18	0.90	0.35	1.10	....	....	0.20	....	....
	0.23	1.20		1.40			0.30		
	0.23	1.20	0.40	1.40	....	....	0.15		
CE-L-CE	0.10	0.55	0.25	0.75	....	....	....	....	....
	0.12	0.40	0.40	0.60	....	....	....	....	....
	0.18	0.60		0.90					
CA	0.13	0.55	0.25	0.40	....	....	....	....	....
	0.10	0.40	0.40	0.30	....	....	....	....	....
	0.16	0.60							

Chromium-Silicon and Silicon Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
SCH 1	0.65	0.70	1.65	0.85	....	....	....	....	....
SCH	0 55	0.70	1.45	0.60	....	....	....	....	....
SCW	0.45	0 50	1.45	0.60	....	....	....	....	....
ESL	0.45	0.50	1.80	....	....	....	....	....	....
ESH 1	0.65	0.75	1.75	....	....	....	....	....	....
	0.60	0.50	1.40	....	....	....	....	....	....
	0.70	0.90	1.90						
ESH	0.55	0.75	1.60	....	....	....	....	....	....
	0.50	0.50	1.40	....	....	....	....	....	....
	0.60	0.90	1.90						
ESW 2	0.45	0.60	1.65	....	....	....	....	....	....
	0.40	0.50	1.50	....	....	....	....	....	....
	0.55	0.75	1.80						

Austenitic-Manganese Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
HS	1.30	13.75	0.25	....	....	....	....	....	....
HS Special	1.30	13.75	0.25	....	....	2.75	....	....	....
HS2	0.70	15.50	0.25	....	....	....	....	....	....

Nitriding Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co	Al
AL 12 L-AL 12	0.33	0.45	0.25	1.80	....	1.00	0.18	....	....	1.10
AL 14 L-AL 14	0.44	0.55	0.25	1.50	....	....	0.23	....	....	0.95
AL 16 L-AL 16	0.35	0.75	0.30	1.65	....	....	....	....	....	1.10
	0.28	0.50	0.40	1.30	....	....	....	....	....	0.90
	0.38	0.90		1.90						1.30
AL 30 L-AL 30	0.32	0.70	0.30	1.10	....	....	0.18	....	....	1.15
	0.28	0.50	0.40	0.90	....	....	0.15	....	....	0.90
	0.38	0.90		1.30			0.25			1.30
NIT 2	0.27	0.60	0.30	2.50	....	....	0.25	0.20	....	....

(Continued on Page 124)

300 mm mill with a constant speed; one 2-high, 4-stand, 250 mm, constant speed; and one billet mill, 420 mm, 2-stand, 3-high, with a constant speed. The 2-stand billet mill was placed about 40 ft in back and slightly to one side of the 7-stand 300 mm mill so that billets reduced on the 2-stand billet mill could be taken direct to the 7-stand mill without reheating. Largest size of high speed steel rolled at Rochlingstahl was approximately 40 mm in diameter, and at Edelstahle approximately 50 mm.

The larger sizes were hammer finished, and the largest hammer finish type in high speed steel was generally about 125 mm in diameter. Sizes above this were made of upset forgings. The largest size of carbon and low alloy tool steel that was rolled at either Rochlingstahl or Edelstahle was usually in the vicinity of 150 mm, with larger sizes hammer finished. Smallest hot rolled sizes were 5.3 mm.

Sheet rolls at Rochlingstahl consisted of one 3-stand mill, the two outer rolls of which were 700 mm in diameter, and the middle roll was 500 mm in diameter. This mill was capable of rolling sheets with a maximum width of 1200 mm and a maximum length of 3000 mm. Finishing sheet

BOHLER WORKS

Carbon Tool Steels

Brand	C	Mn	Si	V
Extra Mittel-Hart	1.25	0.20	0.25	....
Extra-Zahhart	1.10	0.20	0.20	....
Extrazah	0.85	0.20	0.25	....
Extra H	1.00	0.25	0.25	0.10
Hart	1.40	0.30	0.25	....
Mittel-Hart	1.00	0.30	0.25	....
Azh	0.85	0.30	0.25	....
Weich	0.65	0.30	0.25	....

EDELSTAHLE WORKS

Blanking Die Steel

	C	Mn	Cr	W	V
Bora	2.0	0.4	12.0	0.7	...
Bora Special	1.6	0.4	12.0	...	0.2
Goliath Special	2.1	0.4	12.0	...	...
Goliath	2.0	0.4	12.0	...	...

Chrome-Tungsten for Trimming Dies

Brand	C	Si	Cr	W
Veresta	1.00	0.25	1.0	1.0

Low Tungsten Tool Steels

Brand	C	Si	Mn	Cr	W
WSPS	0.75	0.35	0.35	0.30	0.7
WS P	1.20	0.25	0.30	0.15	1.0
TP	1.00	0.20	0.30	0.10	0.9*
MSA	0.80	0.30	0.30	....	0.6

*(–WSW)

General Purpose Steels

Brand	C	Si	Mn	Cr	W
B MS	1.15	0.25	0.35	1.1	1.1
MAS	0.55	0.90	1.20	...	...
SA	0.60	1.80–2.0	0.90	...	...

POLDI HUTTE WORKS

Nitriding Steels (Continued)

L-NIT 2	0.24	0.40	0.40	2.30	....	....	0.20	0.15	....
	0.34	0.80		2.70			0.30	0.35	
NIT 4	0.27	0.55	0.30	2.50	....	....	....	0.26	....
L-NIT 4	0.24	0.40	0.40	2.30	....	....	....	0.20	....
	0.34	0.80		2.70				0.35	

Nickel With Tungsten Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	C
TY5M	0.20	0.50	0.25	....	....	4.85	....	....	
TY5W	0.12	0.50	0.25	....	....	4.85	....	....	
L-TY5W	0.10	0.50	0.25	....	....	4.85	....	....	
TY4M	0.27	0.60	0.20	0.20	....	4.00	....	....	
TY3H	0.32	0.60	0.25	....	....	3.00	....	....	
TY3M L-TY3M	0.23	0.60	0.25	....	....	3.00	....	....	
TY3W	0.12	0.50	0.25	....	....	3.00	....	....	
L-TY3W	0.09	0.50	0.25	....	....	3.00	....	....	
TY1W L-TY1W	0.11	0.40	0.25	....	....	1.35	....	....	
WO1	0.65	0.45	0.25	....	1.10	....	....	....	
WO2	0.65	0.45	0.25	0.25	2.00	....	....	....	
WO3	0.85	0.30	0.20	0.40	3.00	....	....	....	
WO3 Special	0.85	0.60	0.30	0.50	3.25	....	0.35	0.15	
WO3H Special	1.00	0.65	....	0.55	3.25	....	0.50	0.25	

Chromium-Molybdenum-Vanadium

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co
CVM1	0.40	0.65	0.25	2.50	....	....	0.45	0.28	....
CVM2	0.43	0.65	0.25	2.50	....	....	0.28	0.28	....
CVM	0.40	0.85	0.25	1.75	....	....	0.18	0.22	....
	0.38	0.70	0.40	1.60	....	....	0.15	0.15	....
	0.45	1.00		1.90			0.20	0.25	
L-CVMW	0.27	0.60	0.25	2.50	....	....	0.23	0.20	....
	0.24	0.40	0.40	2.30	....	....	0.15	0.10	....
	0.34	0.80		2.70			0.25	0.35	
CKVM	0.65	0.45	0.25	1.00	....	....	0.40	0.20	....
Hubertus	0.15	0.50	0.25	5.50	....	....	0.60	....	....
1555	0.12	0.45	0.35	5.00	....	....	0.43	....	....
HD50	0.17	0.60	0.25	0.90	....	....	0.50	....	....
	0.20	....	....	1.00	....	....	0.50	....	....
CM6L	0.37	1.40	0.30	2.50	....	....	0.28	....	....
L-CM6L	0.37	1.00	0.50	2.00	....	....	0.30	....	....
	0.45	1.20		2.30					
CM6	0.32	0.70	0.25	1.85	....	....	0.20	....	....
	0.25	0.80	0.40	1.60	....	0.50	0.15	....	....
	0.45			2.80			0.35		
CM 5	0.42	0.70	0.25	1.10	....	....	0.23	....	....
L-CM5	0.38	0.50	0.35	0.90	....	....	0.15	....	....
	0.45	0.80		1.20			0.25		

Chromium-Manganese and Manganese Steels

Brand	C	Mn	Si	Cr	W	Ni	Mo	V	C
2526	0.36	1.70	0.25	0.30	....	....	....	....	
To Extra Simplex	0.80	1.00	0.60	0.40	....	....	....	....	
T2 Extra	0.56	0.90	0.40	0.50	....	....	....	....	
T6H Extra T	0.44	0.90	0.30	0.25	....	....	....	....	
Extra TH	1.10	0.40	0.25	0.45	....	....	....	....	
L MV4	0.42	1.70	0.30	....	....	....	....	0.15	
	0.38	1.50	0.40	....	....	....	....	0.10	
	0.45	2.00						0.20	
L-M15	0.16	2.20	0.45	....	....	....	....	....	
	0.12	2.00	0.30	....	....	....	....	....	
	0.20	2.40	0.60						
SCM	0.45	1.80	0.30	....	....	....	....	....	
	0.45	1.50	0.40	....	....	....	....	....	
	0.55	2.00							
2526N	0.36	1.70	0.30	....	....	....	....	....	
	0.33	1.60	0.40	....	....	....	....	....	
	0.40	1.90							
L-M10	0.16	1.20	0.35	....	....	....	....	....	
	0.11	1.00	0.50	....	....	....	....	....	
	0.20								
2514	0.33	1.35	0.30	....	....	....	....	....	
	0.28	1.20	0.40	....	....	....	....	....	
	0.35	1.50							
2518	0.37	1.25	1.25	....	....	....	....	....	
	0.33	1.10	1.10	....	....	....	....	....	
	0.40	1.40	1.40						

STEELS OF KOMOTAU WORKS

Poldi-Brand	C	Mn	Si	Cr	W	Ni	Mo	V	Co	A
AK1B-GuB	0.20	0.60	0.75	16.0	....	....	0.40	....	....	1.
AK1BS-GuB	0.20	0.60	0.75	16 0	....	0.40	0.20	....	....	

mill consisted of a 2-high mill with 700 mm diameter rolls capable of rolling a 1200 mm sheet. The third sheet mill was a 2-high mill having 700 mm diameter rolls but somewhat more narrow in width than the other two mills, this mill being capable of rolling a sheet 1000 mm in width. Edelstahle, in addition to hot rolling sheet mills, had one mill for cold rolling sheets 1000 mm in width.

The cold drawn division of Rochlingstahl appeared comparatively small, even though management stated that its capacity was approximately 300 tons per month. There were four centerless grinders at the Rochlingstahl works for grinding wire or bars within the limits of 2 and 25 mm. Plant contained a large number of benches for wire drawing, most of them having drums individually driven. Edelstahle contained a much larger wire drawing department than that of Rochlingstahl, even though equipment was quite similar.

Rochlingstahl works contained no tube mill while Edelstahle had a tube mill of large size, capable of producing tubes as large as 8 in. OD. Apparently much of the tubing produced by Edelstahle was for bearings.

The Rochlingstahl works contained a battery of approximately 15 annealing furnaces, the largest of which was

EDELSTAHLWERKE

Jaw Steel

Brand	C	Si	Mn
CS 1-6	1.4–0.7	0.25	0.25
CPU	1.00	0.25	0.20
Best	1.00	0.2–0.3	0.4–0.5

Ball and Ball Race Steel

Brand	C	Si	Mn	Cr
KL 1	1.20	0.3	0.30	0.6
KL 3	0.05	0.3	0.30	1.0
KHL	1.00	0.3	0.40	1.5–1.6

High Alloy Tool Steels for Extrusion Purposes

	C	Cr	V	W
Special W	0.30	2.5-2.75	0.3-0.5	8-9
Special W 2	0.30	2.2-2.50	0.3-0.5	1.8-2
Special W 5	0.30	2.2-2.50	2.3-0.5	4-5
Diamant 3	1.35	0.1	0.1	2-2.5
Diamant 5 (x)	1.30	0.2	...	4.75

Note: X—indicates made recently.

Chromium Tool Steels

Brand	C	Si	Mn	Cr
Diamanta Special	1.40	0.25	0.70	1.40
KS	1.20	0.25	0.35	1.40
KRM	1.00	0.25	1.10	0.60
KRM Special	1.00	0.25	1.10	1.00
KRS	1.40	0.25	0.30	0.50
KRW	0.90	0.40	0.30	1.70
KSA	0.60	1.60	0.60	0.80
KSF	1.20	0.25	0.20	0.50
KSCS P	1.25	1.15	0.70	1.20
KZ D 3*	0.30	0.90	0.30	2.35
KVS 3	0.85	0.40	0.60	0.2–0.4

*Also employs V-0.4

STEELS OF KOMOTAU WORKS

(Continued)

AKX Special GuB	0.50	0.60	1.15	27.0	....	9.00	0.40	....	....	....	
AKX Special 1-GuB	0.28	0.60	1.15	27.0	....	9.00	0.40	....	....	....	
AKX Special M-GuB	0.50	0.60	1.15	27.0	....	9.00	2.00	....	....	....	
AKX Special 1 M-GuB	0.28	0.60	1.15	27.0	....	9.00	2.00	....	....	....	
AKX Special 20-GuB	0.40	0.60	0.75	21.0	....	10.00	....	....	....	....	
AKX Special F-GuB	0.40	0.60	0.75	26.0	....	14.00	....	....	....	....	
AKX-GuB	0.60	0.60	0.75	25.0	....	....	....	....	....	....	
AKX 20GuB	0.60	0.60	1.70	20.0	....	....	....	....	....	....	
AKX Extra-GuB	2.20	0.50	0.65	28.0	....	....	....	....	....	....	
AKX 28-GuB	1.20	0.40	1.25	27.0	....	3.50	....	....	....	....	
AKX 30-GuB	1.20	0.40	1.25	30.0	....	....	....	....	....	....	
AKX 30 M-GuB	1.20	0.40	1.25	30.0	....	....	1.75	....	....	....	
Extra F-GuB	1.70	0.40	0.40	18.0	1.25	1.40	....	....	....	....	
Extra C3-GuB	1.90	0.40	0.40	18.0	1.25	1.40	....	....	2.75	....	
ZR-GuB	2.10	0.40	0.40	21.0	1.75	1.00	....	0.40	....	....	

Poldi Brand	C	Mn	Si	P	S	Cr	W	Ni	Mo	V	Cu
UG2-GuB	0.20	0.80	0.40	0.06	0.04	....	....	....	....	....	....
UG3-GuB	0.30	0.80	0.40	0.06	0.08	....	....	....	....	....	....
UG4-GuB	0.40	0.80	0.40	0.06	0.08	....	....	....	....	....	....
UG5-GuB	0.52	0.80	0.40	0.06	0.08	....	....	....	....	....	....
UG4 Extra-GuB	0.40	0.80	1.60	0.06	0.08	....	....	....	....	....	....
UG5 Extra-GuB	0.52	0.80	1.60	0.06	0.08	....	....	....	....	....	....
LG2V-GuB	0.20	0.80	0.40	0.06	0.04 0.08	....	....	....	....	....	....
LG2M-GuB	0.20	0.80	0.40	0.06	0.08	....	....	....	0.40	....	....
LG4-GuB	0.32	1.70	0.40	0.06	0.08	0.30	....	....	....	....	....
LG4V-GuB	0.28	1.70	0.40	0.06	0.08	0.60	....	....	0.20	....	....
LG4M-GuB	0.28	1.70	0.40	0.06	0.08	0.60	....	....	0.25	....	....
CM3-GuB	0.30	0.65	0.40	0.06	0.04	1.00	....	....	0.20	....	....
CM3 Extra-GuB	0.30	0.65	0.40	0.06	0.08	1.00	....	....	0.50	....	....
BO4-GuB	0.33	0.70	0.35	0.06	0.04 0.08	0.70	....	1.50	....	....	....
BOZ-GuB	0.40	0.70	0.35	0.06	0.08	1.00	....	2.00	0.20	....	....
CNL-GuB	0.20	0.70	0.35	0.06	0.08	0.80	....	4.80	....	....	....
HS-GuB	1.35	13.00	0.40	0.10	0.04	....	....	....	....	....	....
HS Special-GuB	1.35	13.00	0.40	0.10	0.04	....	....	1.25	....	....	....
AKV-GuB	0.20	0.60	1.15	0.04	0.04	19.00	....	9.00	0.20	....	....
AKVH-GuB	0.32	0.60	1.15	0.04	0.04	22.00	....	9.00	0.20	....	....
AKV Extra-GuB	0.20	0.60	1.15	0.04	0.04	19.00	....	9.00	1.75	....	....
AKV Extra H-GuB	0.32	0.60	1.15	0.04	0.04	22.00	....	9.00	1.75	....	....
AKRV-GuB	0.22	0.50	0.50	0.04	0.04	13.00	2.00	13.00	....	1.00	....
AKS-GuB	0.38	0.50	0.42	0.04	0.04	4.50	....	21.80	....	....	....
AKS2-GuB	0.20	0.50	1.25	0.04	0.04	4.75	2.00	25.00	3.50	....	4.00
AKC-GuB	0.30	0.60	1.15	0.04	0.04	24.00	....	20.50	....	....	....
Antoxyd-GuB	0.35	0.60	1.15	0.04	0.04	21.00	....	38.50	....	....	....
Antoxyd 2-GuB	0.20	0.60	1.15	0.04	0.04	21.00	....	38.50	5.00	....	3.00

KRUPP-ESSEN

Carbon Tool Steels

Brand	C	Si	Mn	P	S	Cr	Ni	Mo	V	Ti
A17G	0.80 0.90	0.25 0.40	0.45 0.60	0.025	0.020	...	...	...	...	...
BFV	0.65 0.70	0.15 0.25	0.50 0.60	0.025	0.025	...	...	...	...	...
WW	0.04	0.01	0.14	0.015	0.025	0.05	0.15	...	...	...

Alloy Tool Steels

Brand	C	Si	Mn	P	S	Cr	Ni	Mo	V	Ti
BMH	0.42 0.48	1.50 1.70	0.50 0.70	0.050	0.050	...	...	...	...	...
WB97M	0.42 0.48	1.00 1.30	0.50 0.70	0.045	0.045	...	...	...	...	...
B126P	0.62 0.68	1.50 1.70	0.50 0.70	0.025	0.025	...	...	...	...	...
WB136M	0.62 0.68	1.50 1.70	0.50 0.70	0.045	0.045	...	...	...	...	...
BC1244	0.57 0.63	0.90 1.10	0.90 1.00	0.040 0.070	0.040	...	...	...	...	...
WBC1255	0.60 0.70	1.00 1.30	0.90 1.20	0.040 0.070	0.040	...	...	...	...	... W
BDF30	0.30 0.36	0.80 1.00	0.25 0.35	0.025	0.020	0.90 1.10	...	...	0.15 0.20	1.7 2.0
BDF50	0.40 0.46	0.80 1.00	0.25 0.35	0.025	0.020	0.90 1.10	...	...	...	1.7 2.0
BDF Spez.	0.54 0.60	0.80 1.00	0.25 0.35	0.025	0.020	...	...	...	...	1.7 2.0
WBF1552	0.67 0.73	1.20 1.40	0.45 0.60	0.035 0.060	0.035	0.40 0.55	...	...	...	...
BF2555	1.20 1.30	1.05 1.20	0.60 0.80	0.030 0.050	0.030	1.10 1.30	...	...	...	...
BFG	0.90 0.95	1.05 1.25	0.60 0.80	0.030 0.050	0.030	1.10 1.30	...	...	...	...
BFM755 WA650	0.32 0.38	1.40 1.60	0.30 0.40	0.035 0.060	0.030	1.20 1.50	...	...	0.10 0.20	...
WA5M	0.17 0.22	0.30 0.60	0.20 0.40	0.025	0.020	12.50 13.50	...	...	...	...

(Continued on Page 126)

KRUPP-ESSEN

Alloy Tool Steel—(Continued)

Brand	C	Si	Mn	P	S	Cr	Ni	Mo	V	Ti
BFM Spez.	0.45	1.40	0.30	0.035	0.030	1.20	...	...	0.10	...
	0.50	1.60	0.40	0.060		1.50			0.20	
WC128	0.65	0.15	1.70	0.040	0.040	...	...	...	...	...
	0.70	0.30	1.90	0.070						
SC2448	1.20	0.30	11.00	0.080	0.040	...	...	...	...	...
	1.30		12.00							
EF1514	0.70	0.20	0.50	0.025	0.020	1.00	0.50	...	...	...
	0.80	0.40	0.70			1.20				
EFS Spez. S	0.45	0.20	0.50	0.035	0.030	1.20	1.10	...	...	...
	0.50	0.40	0.80	0.060		1.50	1.40			
EFWP	0.50	0.15	0.30	0.025	0.020	0.80	3.00	...	...	...
	0.55	0.30	0.60			1.20	3.50			
WF33	0.12	0.40	0.40	0.035	0.035	0.60	...	...	...	...
	0.18		0.60			0.80				
F168	0.82	0.20	0.20	0.030	0.030	1.70	...	...	...	...
	0.87	0.40	0.35	0.050		1.90				
F168	0.82	0.20	0.20	0.025	0.020	1.70	...	...	...	...
	0.87	0.40	0.35			1.90				
F182/DF35	0.85	0.30	0.50	0.030	0.030	0.35	...	...	...	...
	0.90	0.50	0.70	0.050		0.45				
F193	0.90	0.20	0.20	0.030	0.030	0.70	...	...	...	...
	1.00	0.35	0.35	0.050		0.90				
F193	0.90	0.20	0.20	0.025	0.020	0.70	...	...	...	...
	1.00	0.35	0.35			0.90				
WF202	1.05	0.25	0.25	0.030	0.030	0.30	...	...	...	...
	1.15	0.40	0.45	0.050		0.50				
WF204	1.00	0.25	0.25	0.030	0.030	0.80	...	...	...	...
	1.10	0.40	0.45	0.050		1.00				
WF206	0.95	0.25	0.40	0.030	0.030	1.25	...	...	...	...
	1.05	0.40	0.60	0.050		1.50				
F206G	0.95	0.25	0.40	0.025	0.020	1.25	...	...	...	...
	1.05	0.40	0.60			1.50				
F261	1.26	0.15	0.15	0.030	0.030	0.20	...	...	...	...
	1.32	0.30	0.30	0.050		0.30				
F261P	1.26	0.15	0.15	0.025	0.025	0.20	...	...	...	...
	1.32	0.30	0.30			0.30				
F283	1.35	0.25	0.25	0.030	0.030	0.60	...	...	...	...
	1.45	0.35	0.40	0.050		0.80				
F306	1.40	0.15	0.30	0.030	0.030	1.30	...	...	...	...
	1.50	0.30	0.60	0.050		1.50				
F306G	1.40	0.15	0.30	0.025	0.020	1.30	...	...	...	...
	1.50	0.30	0.60			1.50				
F3014 LCS	1.40	1.40	0.30	0.025	0.020	3.40	...	...	...	...
	1.50	1.60	0.50			3.60				
F4048	2.00	0.20	0.20	0.025	0.020	11.00	...	...	...	...
	2.20	0.40	0.40			12.00				
WFC27	0.14	0.40	1.00	0.035	0.035	0.80	...	...	...	...
	0.19		1.30			1.10				
WFC29	0.17	0.40	1.10	0.035	0.035	1.00	...	...	...	...
	0.22		1.40			1.30				
WFC31	0.20	0.40	1.30	0.035	0.035	1.20	...	...	...	...
	0.25		1.60			1.50				Al
WFF24	0.15	1.00	0.20	0.025	0.020	23.00	...	...	...	1.5
		1.30	0.40			25.00				2.0
WFM48	0.28	0.40	0.50	0.030	0.030	2.20	...	...	0.15	...
	0.33		0.70			2.50			0.20	
WN48	0.28	0.40	0.50	0.025	0.020	2.20	...	...	0.15	...
	0.33		0.70			2.50			0.20	
FM881	0.34	0.40	0.40	0.035	0.030	1.60	...	...	0.10	...
	0.39		0.60			1.90			0.15	
WFM961	0.43	0.40	0.50	0.030	0.030	1.30	...	...	0.15	...
	0.48		0.70			1.50			0.20	
WFM1041	0.47	0.40	0.80	0.030	0.030	1.00	...	...	0.10	...
	0.55		1.00			1.20			0.18	
WFM1141	0.55	0.40	0.90	0.030	0.030	1.00	...	...	0.10	...
	0.62		1.10			1.20			0.18	
FM1251	0.60	0.70	0.70	0.030	0.030	1.10	...	...	0.10	...
	0.68	1.00	1.00	0.050		1.30			0.18	
FM2432	1.15	0.20	0.20	0.030	0.030	0.60	...	...	0.10	...
	1.25	0.35	0.40	0.050		0.80			0.15	
WFP12	0.30	0.40	0.50	0.025	0.020	1.30	...	...	...	1.00
	0.35		0.70			1.50				1.20
HGS	0.55	0.20	0.50	0.030	0.030	0.68	1.50	0.15	...	...
	0.60	0.40	0.70			0.80	1.80	0.20		
HGS Extra	0.50	0.20	0.50	0.030	0.030	0.68	...	0.40	...	...
REZ Extra	0.55	0.40	0.70			0.80		0.50		
HGS Spez.	0.34	0.20	0.50	0.030	0.030	0.68	...	0.15	...	...
	0.39	0.40	0.70			0.80		0.20		
HM4G	0.90	0.20	0.25	0.025	0.025	0.35	...	...	...	...
	1.00	0.40	0.40			0.50				
M202	0.90	0.20	0.35	0.025	0.020	...	...	...	0.25	...
	1.00	0.30	0.45						0.30	W
NFKC	1.35	0.15	0.25	0.025	0.020	0.40	...	...	0.20	3.00
	1.45	0.30	0.35			0.50			0.30	3.50
PFM	0.95	0.15	0.15	0.030	0.030	0.20	...	...	0.10	...
	1.05	0.30	0.30	0.050		0.30			0.15	
Amino 3	0.38—	0.30	0.20	0.025	0.020	12.50	0.60	..	...	..
	0.43	0.60	0.40			13.50				

(Continued on Page 128)

capable of holding about 20 tons. A tool and high speed steels were packed and sealed in pipes without packing compound, the openings in the end of the pipes were merely "mudded". Pipes were quite large, being approximately 350 mm in diameter and were made of low carbon steel.

Nearly all of the annealing furnaces were of the car type, and were gas fired. The pipes were supported in the furnace on cast iron cradles which lifted pipes about 6 in. from furnace bottom. Only a few pipes were charged in each furnace, the number usually being from 3 to 6. General practice seemed to be to heat the steel to the desired annealing temperature, hold for about 8 hr, and then furnace cool for about 24 hr.

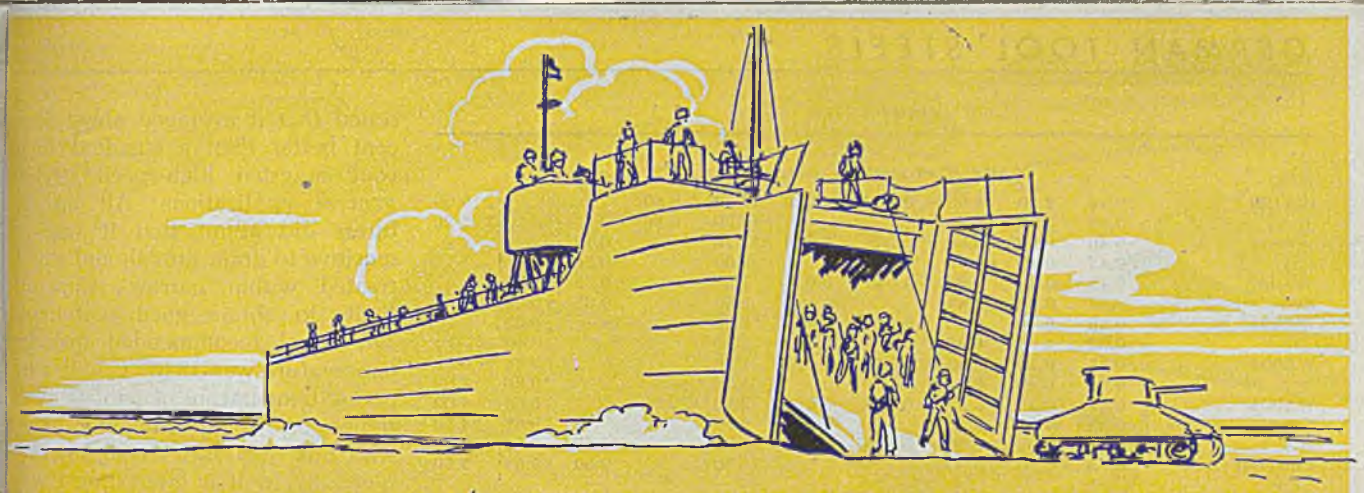
Materials Manufactured

All of the five companies mentioned manufactured materials of a similar nature, these materials consisting of high speed alloy and carbon tool steels, special steels such as magnet steels and valve steels, heat and corrosion resisting steels and structural alloy steels of the SAE type, as shown in the tables. Both Krupp and Edelstahl, as well as Poldi, produced sintered carbides.

A study of the compositions manufactured in 1939 as compared to those being manufactured in 1945 reveals some changes as a result of lack of alloying metals. A direct comparison exists in the list of tool steels as made by Rochling, one list showing the compositions manufactured in 1939, and the other list showing the compositions being manufactured in the fall and winter of 1944.

The study of the compositions reveals that there was a decided preference in 1939 for high speed steels containing about 13 per cent tungsten, about 4 per cent chromium, and vanadium content from 1½ per cent as high as 5 per cent. Carbon likewise was increased proportionally with the vanadium content, in one instance as high as 1.50, with a cobalt content 4.75. Many of the high speed steels contained cobalt from as low as about 2 per cent to as high as 15 per cent. As a result of the lack of alloying metals, a high speed steel was developed containing from 0.90 to 1.00 per cent carbon, about 4 per cent chromium, and a tungsten molybdenum and vanadium content each within limits from 2 to 3 per cent.

All of the men interviewed who manufactured this steel were very enthusiastic regarding its performance. One engineer, a Dr. Houdremont



An L.S.M. beaches at Leyte . . .

A Young Thing reaches for a compact . . .

A G.I. opens his K-rations . . .

Dad is shaving . . .

Steels—special steels for special uses . . . "A.W." Steels—made to meet the exacting requirements of specific use. Steels built for toughness, abrasion resistance, ductility, welding qualities. "A.W." Steels—in any open hearth analysis: carbon, copper or alloy—*under one control from mine to consumer.* Our Metallurgists are at your service.

Ingots, billets, blooms, slabs, plates, sheets. "Swede" Pig Iron: Foundry, Malleable, Basic, Bessemer.

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KRUPP-ESSEN

Alloy Tool Steels (Continued)

WA100	0.43	2.30	1.00	0.025	0.020	17.50	8.50			0.90
	0.48	2.80	1.40			18.50	9.50			1.20
WA342	0.40	0.20	0.80	0.035	0.035	1.70		0.15		
	0.45	0.40	1.00			2.00		0.20		
WA402	0.45	0.20	0.65	0.035	0.035	1.30		0.55	0.25	
Extra Spez.P	0.50	0.40	0.85			1.50		0.65	0.30	
WA594	0.26	0.80	0.20	0.030	0.030	2.20			0.30	
	0.32	1.00	0.40	0.050		2.50			0.40	W
WA904	0.25	0.20	0.30	0.025	0.020	1.00			0.15	3.50
	0.30	0.40	0.50			1.20			0.20	4.00
WA904	0.30	0.15	0.20	0.025	0.020	2.20			0.60	4.00
Extra	0.35	0.35	0.40			2.50			0.65	4.50
WA	0.40	0.50	0.30	0.025	0.020	1.20		0.40	0.75	0.40
Universal	0.45	0.70	0.50			1.50		0.50	0.85	0.50

Electrodes for Hard Surfacing

Brand	C	Si	Mn	P	S	Cr	Ni	Mo	V	Ti	
Zeus EA Zeus GA	1.05	0.30	13.50	0.080	0.040						
Mangan	1.25		14.50								
Zeus EA leg.	0.12	0.30	0.20	0.025	0.020	12.50	0.20				
V13F		0.60	0.40			13.50					
Zeus EA leg.	0.10	0.30	0.20	0.025	0.020	17.00	0.20			7xC	
V17F	0.10	0.60	0.40	0.025	0.020	18.00	0.20				
Zeus EA Zeus GA	0.17	0.30	0.90	0.030	0.030					0.10	
150	0.23	0.40	1.10							0.30	
Zeus EA Zeus GA	0.24	0.30	1.50	0.030	0.030					0.10	
250	0.29	0.40	1.70							0.30	
Zeus GA leg.	1.50	0.80	0.10	0.025	0.020	19.50					
F20S	1.70	1.00	0.30			20.50					
Zeus EA leg.	2.40	0.80	0.10	0.025	0.020	19.50					
F20SH	2.60	1.00	0.30			20.50					
Zeus GA leg.	1.50	0.80	0.50	0.025	0.020	27.50					
F28S	1.70	1.00	0.60			28.50					
Zeus EA leg.	2.00	0.80	0.50	0.025	0.020	27.50					
F28SH	2.20	1.00	0.60			28.50					
Diawald	4.20	1.80	5.00			30.00					
	4.40		6.00								
Zeus EA Zeus	0.43	0.30	2.00	0.030	0.030	0.90				0.10	
GA 350	0.48	0.40	2.20			1.20				0.30	
Zeus EA Zeus	0.85	0.30	2.00	0.030	0.030	1.30				0.10	
GA 500	0.90	0.40	2.20	0.030	0.030	1.30				0.30	
GA Percit Extra	1.20	2.00	0.20	0.025	0.020	26.00				57.00	3.80
	1.40	3.00	0.60			28.00				63.00	4.80
Zeus EA Zeus GA	1.40	1.30	0.20	0.025	0.020	25.00				30.00	4.00
Percit Special	1.60	1.60	0.60			30.00				35.00	4.50
Zeus EA leg.	1.35	0.15	0.25	0.025	0.020	0.40			0.20		3.00
NFKC	1.45	0.30	0.35			0.50			0.30	Ti	3.50
Zeus EA Zeus GA leg. KFM	0.92	0.30	0.30	0.025	0.020	3.50		2.20	2.70	0.10	1.20
	0.98					4.00		2.50	3.00	0.15	1.50
Zeus EA Zeus GA leg. DFMV 5	1.30	0.30	0.30	0.025	0.020	4.00			4.20		10.00
	1.40					4.50			4.50		11.00

Carbon Steels for Electrodes

Brand	C	Si	Mn	P	S	Cr	Ni	Mo	V	Ti
Zeus	0.12	Sp.	0.30	0.040	0.035					0.05
EV37T			0.50							
Zeus GV37T	0.12	0.05	0.30	0.040	0.035					0.05
			0.50							
Zeus EV42										
Zeus EV Universal	0.16	0.05	0.50	0.040	0.035					0.05
			0.70							
Zeus EV Atlantik										
Zeus GV42	0.15	0.08	0.60	0.030	0.030					
	0.25	0.15	0.80							
Zeus EV Max.	0.10	0.05	0.50	0.030	0.030					0.05
Zeus EV Total	0.14		0.70							

Alloy Steels for Electrodes

Brand	C	Si	Mn	P	S	Cr	Ni	Mo	V	Ti	
Zeus EV52											
Zeus GV52											
Zeus EV70											
Zeus EV Optimum A/B	0.10	0.03	1.40	0.030	0.030						
	0.15	0.10	1.60								
ElliraschweiBdr. I											
Zeus EV60	0.11	0.18	3.10	0.030	0.030						
weiBdr. II	0.16	0.28	3.40								N2
Zeus EV leg.		0.30	17.00			14.50					0.28
CF 100 Spez.	0.08	0.60	18.00	0.025	0.020	15.50					0.33
Zeus EV leg.	0.12	0.30	17.50	0.025	0.020	11.50			0.60		0.18
Cromadur		0.60	18.50			12.50			0.70		0.23
Zeus EV leg.	0.12	2.40	0.20	0.025	0.020	5.70				0.50	
FFT.6		2.70	0.40			6.20				0.70	

(Continued on Page 130)

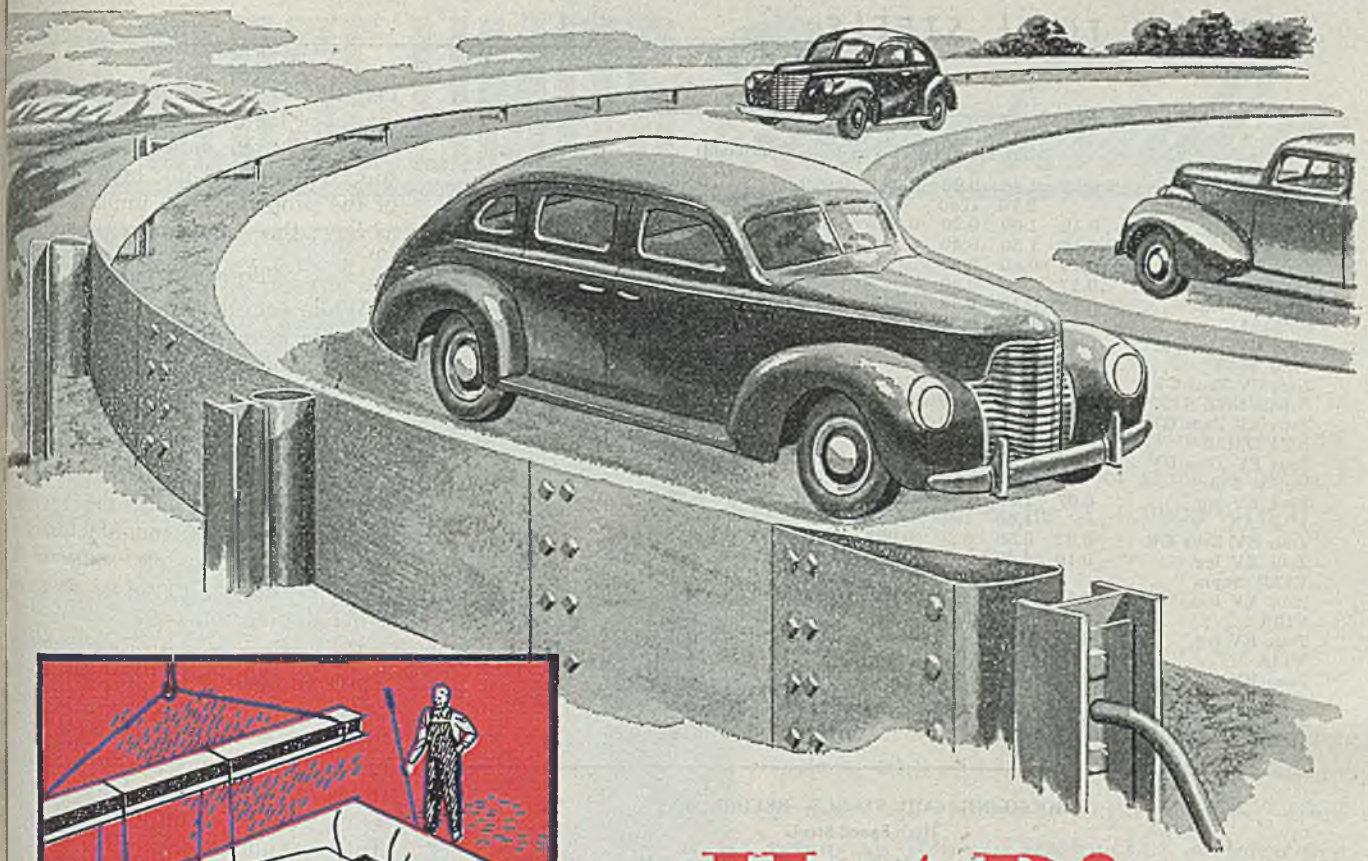
stated that it averaged about 20 p cent better than a standard 18 p cent tungsten high-speed steel f general applications. All manufa turers did admit that it was ve sensitive to grain growth and must treated within narrow temperatu limits to obtain good performan The usual recommended quenchi temperature was 1240° C with a te pering temperature of 545° C, doul tempering being standard practi with this steel as with all other hi speed steels. It is interesting to no however, that Krupp manufactur this steel with a titanium content from 0.05 to 0.10 per cent. In qu tioning other manufacturers of t steel as to whether they used a other alloying elements or deoxidize other than those already stated, th invariably said no, and it appear that only Krupp used titanium. D Houdremont stated definitely that titanium were not used, the steel w more susceptible to grain growth.

"The Holy Trinity"

In discussing the performance this special high speed steel, whi Dr. Houdremont termed the "Ho Trinity," with a number of toolmake they invariably stated they consider it definitely inferior to the standa types. Hans Kiehm, director of Fran Mossman, who manufactured tw drills, was quite emphatic in h statements regarding the inferiority this steel. Molybdenum high spe steels did not seem to find much fav among either the German manufa turers or users, even though sever of the companies had obtained licens to manufacture high speed steel the Momax type. Little or no moly denum was produced in Germany by its satellites, which may explain small use.

Tool steels for hot work appear follow rather consistently the Amer can practice although a much wid range of compositions was made f this purpose than that generally ma in America. Tungsten was definite favored as an alloying element f most hot work die steels, and the was a hot work die containing abo 4.5 per cent tungsten and 1½ p cent chromium made in several ca bon ranges from as low as 0.24 to high as about 0.45 per cent.

Tool steels for cold work likewis follow the pattern of American pra tice, but it was noted there was considerable lack of die steels f cold work of the air hardening va riety in which molybdenum becam principal contributing element to ob



Hot-Dip Galvanized Guard Rail *Lasts Longest*

Hot-Dip Galvanizing by the Hanlon-Gregory method provides the utmost in rust prevention for any exposed iron or steel installations.

Hot-Dip Galvanizing will give *your* product or installations greater uninterrupted service. The Hanlon-Gregory method will save you expensive replacement and maintenance costs.

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

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

In the heart of the STEEL INDUSTRY

HANLON-GREGORY GALVANIZING COMPANY

Pittsburgh, Pennsylvania

KRUPP-ESSEN

Alloy Steels for Electrodes—(Continued)

Zeus EV leg.	0.15	2.40	0.20	0.025	0.020	12.50					
FF13		2.70	0.40			13.50					Al
Zeus EV leg.	0.10	1.00	0.20	0.025	0.020	28.00					0.90
FF 30	0.15	1.50	0.40			30.00					1.10
Zeus EV leg.	0.10	0.40	0.25	0.030	0.030	1.20			0.25		
FM 363	0.17		0.40			1.40			0.35		
Zeus EV leg.	0.12	0.15	0.30	0.025	0.020	3.40			0.10		
FM2121		0.30	0.50			3.60					
Zeus EV leg.	0.18	0.30	0.40	0.035	0.035	1.30	0.30	0.35	0.35		
FKM 4653	0.23	0.50	0.60			1.50		0.40	0.45		
Zeus EV Zeus GV	0.10	1.20	0.40	0.025	0.020	20.00	9.00			0.10	
leg. NCT 5	0.15	1.50	0.60			22.00	10.00				
Zeus EV Zeus GV	0.15	0.90	2.00	0.025	0.020	23.00	19.00			0.10	
NCT 3/113		1.20	2.30			25.00	20.00				
Zeus EV Zeus GV	0.07	0.30	0.20	0.025	0.020	17.50	8.50				
leg. V 2 A		0.60	0.40			18.50	9.50				Ta/Nb
Zeus EV leg.	0.07	1.30	1.20	0.025	0.020	18.50	8.50				1.80
V 2 AX		1.60	1.40			19.50					2.00
Zeus EV Zeus GV	0.07	0.30	0.20	0.025	0.020	17.00	9.50	1.90		0.10	
Zeus EV leg.	0.10	2.20	0.20	0.025	0.020	17.50	9.00	1.90			
V4AB Supra		2.50	0.40			18.50	10.00	2.20			
Zeus EV leg.	0.18	1.10	5.50	0.025	0.020	19.00	7.50				
V10A	0.28	1.40	6.50			20.00	8.50				
Zeus EV leg.	0.07	0.30	0.20	0.025	0.020	16.50	12.50	4.50		0.10	
V14A		0.60	0.40			17.50	13.50	5.00			Cu
Zeus EV leg.	0.07	0.30	0.20	0.025	0.020	17.00	9.50	1.90		7xC	2.80
V46A Extra		0.60	0.40			18.00	10.50	2.20			3.10
Zeus EV leg.	0.55	0.20	0.50	0.030	0.030	0.60	1.50	0.15			
HGS	0.60	0.40	0.70			0.80	1.80	0.20			

ROCHLINGSTAHL STEELS—BEFORE WAR

High Speed Steels

Brand	C	Mn	Si	Cr	Ni	W	Mo	V	Co
Gigant 66	1.40	0.20	0.20	4.0		12.0	0.40	4.20	4.2
	1.50	0.30	0.30	4.5		13.0	0.70	5.00	5.0
Gigant Uno	0.72	0.20	0.30	4.5		13.0	0.70	1.50	5.0
	0.80	0.30	0.30	4.5		13.0	0.70	1.80	5.0
Gigant 33	0.85	0.30	0.30	4.5		13.0	0.70	2.00	2.3
	0.95	0.30	0.30	4.5		13.0	0.70	2.30	2.6
Gigant N	0.72	0.30	0.30	4.5		13.0	0.70	1.50	2.3
	0.80	0.30	0.30	4.5		13.0	0.70	1.70	2.6
Gigant	1.05	0.30	0.30	4.5		11.0	0.40	2.30	
	1.15	0.30	0.30	4.5		12.0	0.70	2.60	
Kosmos	0.82	0.30	0.30	4.5		11.5	0.60	2.35	
	0.90	0.30	0.30	4.5		12.5	0.80	2.65	
RSV	0.78	0.30	0.30	4.5		12.5	0.80	1.80	
	0.85	0.30	0.30	4.5		12.5	0.80	2.00	
RSZ Special	0.75	0.30	0.30	4.5		10.5	0.60	1.30	
	0.83	0.30	0.30	4.5		11.5	0.80	1.50	
RSZ	0.72	0.30	0.30	4.5		11.5	0.40	0.80	
	0.80	0.30	0.30	4.5		11.5	0.60	1.00	

Tool Steels For Hot Work

Brand	C	Mn	Si	Cr	Ni	W	Mo	V	Co	Cu
RWS	0.33	0.20	0.25	3.25		2.6		0.25		
	0.36	0.30	0.35	3.45		3.0		0.35		
WNC	0.35	0.20	0.30	1.30	3.20	5.0				
	0.40	0.30	0.40	1.50	3.60	5.5				
RCW 2	0.24	0.20	0.20	2.20		9.0				
	0.30	0.30	0.30	2.80		10.0				
Pulsus	0.35	0.20	0.50	4.70	1.40		0.45	0.10		
	0.42	0.30	0.75	5.00	1.60		0.65	0.20		
SGM 2	0.31	0.30	0.20	2.20		7.5		0.50	2.5	
	0.35	0.30	0.30	2.80		8.5		0.50	2.5	
SGM 4	0.24	0.30	0.30	1.30		5.0	0.50		4.5	1.2
	0.30	0.30	0.30	1.60		5.5	0.70		5.0	1.5
RWS 2	0.24	0.30	0.40	1.10		4.0				
	0.28	0.30	0.50	1.20		4.5				
RWS 4	0.32	0.40	0.80	1.30		4.0	0.40			
	0.38	0.50	1.00	1.60		4.5	0.60			
CeOT	0.38	0.80	0.30	1.60			0.70	0.15		
	0.45	1.00	0.50	1.80			0.90	0.25		
NGS	0.25	0.80	0.30	1.50			0.80	0.40		
	0.33	1.00	0.50	1.80			1.00	0.60		
RCNW	0.33	0.30	0.20	1.30	4.00	0.90				
	0.38	0.45	0.30	1.50	4.50	1.15				
MFR	0.42	0.80	0.20	0.80			0.25			
	0.50	1.10	0.40	1.10			0.40			
PG 3	0.27	0.30	0.20	2.90			2.50	0.40		
Stentor	0.53	0.50	0.15	0.60	1.30		0.20			
	0.60	0.65	0.25	0.75	1.70		0.30			
RGS 4	0.53	0.50	0.25	0.65	1.75		0.80			
	0.60	0.60	0.35	0.80	2.00		0.80			

(Continued on Page 132)

tain the air hardening qualities. As matter of fact, it is significant that t entire German industry of tool a special steels did not take advanta of the properties Mo imparts to st as have the American manufacture

Purpose of Tables

While considerable comment co be made in reference to the compo tions manufactured for tools and sp cial applications, a study of the tab will reveal the information mu better than will brief comment. T tables have been chosen to give b the broad view of all the tool a special steels as manufactured several makers, while some of other tables are more condensed avoid duplication.

First group of tables are Poldi represent the steels that were ma factured in 1942. Included are h speed steels, many types of tool ste for both hot and cold work, mag steels, heat and corrosion resist steels, as well as the complete list structural alloy steels which in Am ca are often classed as the SAE ty Since the Poldi compositions are most complete, they are the tal most deserving of study.

The tables of the Rochling st works contain the tool steels made fore the war and during the y 1944; therefore offering a basis comparison as to how the comp tions were affected by shortages.

Compositions from the Edelsta steel works are complete, while th of Krupp reflect the many comp tions made, including soft as as alloy steels. The Bohler steel gr includes tool and special steels o and included with the Bohler lists the steels as made in 1939, and made in 1944.

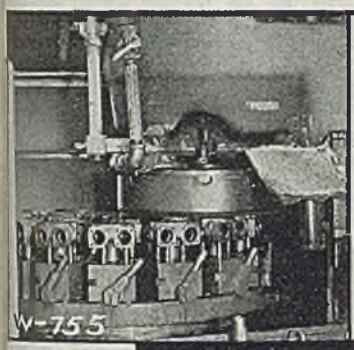
ROCHLINGSTAHL

Carbon Steels—Before War

Brand	C	Mn
RT 6	0.60	0.22
RT 7	0.69	0.35
RT 7	0.70	0.35
RT 7	0.79	0.35
RT 8	0.80	0.35
RT 8	0.89	0.35
RT 9	0.90	0.35
RT 9	0.99	0.35
RT 10	1.00	0.35
RT 10	1.09	0.35
RT 11	1.10	0.35
RT 11	1.19	0.35
RT 12	1.20	0.35
RT 12	1.34	0.35
RT 14	1.35	0.35
RT 14	1.44	0.35
RV 1	0.70	0.22
RV 1	0.77	0.30
RB 7	0.77	0.30
RB 12	1.11	0.30
RB 12	1.20	0.30

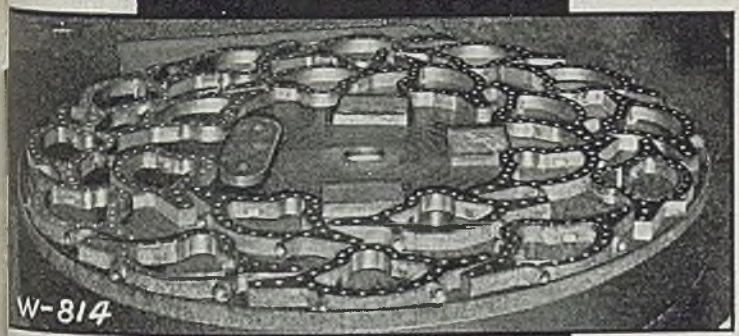
Note: RV 1 contains alternative additions 0.05-0.10 vanadium.

FOR CLOSE LIMITS—*Blanchardize*



The Blanchard No. 18 Surface Grinder is used to rough and finish-grind these oil burner parts, and .012″ of stock is ground off one side to limits of +.0003″ −.0001″. (48 per hour)

Eighteen of these cast iron ball bearing spacers, with eighteen smaller spacers inside of them are ground to limits of .0002″ after removing .025″ of stock. (144 surfaces per hour)



This is an excellent example of accurate surface grinding of pump body parts on a No. 18 Blanchard Surface Grinder. The material is high strength forged steel and .004″ of stock is removed from each side to limits of ±.0003″. (80 surfaces per hour)

These heat-treated steel trunnion bearings are ground on a No. 16-A2 Blanchard Surface Grinder. They are ground to limits of ±.0005″ after removing .005″ to .015″ of stock. (2315 per hour)

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

ROCHLINGSTAHL STEELS—BEFORE WAR

Tool Steels for Hot Work (Continued)

RWM	0.50	0.45	0.40	....	....	....	....	....	.	.
	0.58	0.55	0.50	....	....	....	....	....	.	.
WWS	0.55	0.90	1.00	....	....	....	....	....	.	.
	0.65	1.00	1.30	....	....	....	....	....	.	.
PWD	0.23	0.20	0.20	0.35	4.00	....	1.15	....	.	.
	0.28	0.30	0.30	0.50	4.50	....	1.25	....	.	.
PWDN	0.25	0.30	0.30	0.60	4.50	3.80	0.65	....	.	.
	0.32	0.30	0.30	0.80	4.50	4.30	0.85	....	.	.

Tool Steels For Cold Work

Brand	C	Mn	Si	Cr	Ni	W	Mo	V	Co
RCC	1.80	0.20	0.30	12.0	....	....	....	....	..
	2.10	0.30	0.40	13.0	....	....	....	....	..
RUS	0.85	1.70	0.20	0.15	....	....	....	0.10	..
	0.95	1.90	0.30	0.25	....	....	....	0.20	..
RUS 2	1.00	0.30	1.20	0.90	....	....	....	....	....
	1.10	0.40	1.40	1.10	....	....	....	....	....
RUS 4	0.95	0.40	0.20	1.40	....	0.90	....	....	..
	1.10	0.60	0.30	1.60	....	1.10	....	....	..
T 76	1.45	0.20	0.20	0.60	....	7.00	0.30	0.30	..
	1.55	0.30	0.30	0.80	....	7.80	....	0.50	..
RTW 3 Special	1.30	0.20	0.20	0.60	....	4.60	....	....	..
	1.40	0.30	0.30	0.80	....	5.00	....	....	..
RTW 1	1.15	0.20	0.15	0.10	....	1.10	....	....	....
	1.25	0.30	0.25	0.20	....	1.30	....	....	....
RTW 2	0.33	0.30	0.90	1.00	....	2.60	....	....	..
	0.40	0.40	1.10	1.20	....	3.00	....	....	..
Robust M	0.40	0.40	1.10	1.20	....	2.25	....	....	..
	0.46	0.40	1.10	1.20	....	2.50	....	....	..
RTWK	0.60	0.20	0.20	1.00	....	2.20	....	0.10	..
	0.65	0.40	0.30	1.50	....	2.50	....	0.20	..
ZK	1.50	0.20	0.20	1.80	....	....	....	....	..
	1.60	0.30	0.30	2.00	....	....	....	....	..
RTC 20	0.88	0.25	0.30	2.00	....	....	....	....	..
	0.95	0.35	0.30	2.00	....	....	....	....	....
RTK 10	1.00	0.35	0.30	1.00	....	....	....	....	..
	1.10	0.35	0.30	1.25	....	....	....	....	..
RTC 14	0.93	0.25	0.30	0.30	....	....	....	....	..
	1.10	0.40	0.30	1.60	....	....	....	....	..
RT 14 Cr	1.35	0.20	0.15	0.40	....	....	....	....	..
	1.45	0.30	0.25	0.60	....	....	....	....	..
RT 11 Cr	1.00	0.30	0.25	0.20	....	....	....	....	..
	1.10	0.30	0.25	0.40	....	....	....	....	..
RT 7 Cr	0.70	0.20	0.25	0.45	....	....	....	....	..
	0.79	0.30	0.25	0.55	....	....	....	....	..
Kubax	1.20	0.35	0.15	0.10	....	....	....	0.15	..
	1.30	0.45	0.25	0.20	....	....	....	0.25	..
RKMV	0.95	0.40	0.15	....	....	....	....	Spuren	..
	1.00	0.50	0.25	....	....	....	....	Spuren	..
SKSV	0.65	0.23	max.	....	....	0.50	....	0.10	..
	0.73	0.33	0.15	....	....	0.60	....	0.15	..
RTC 14 Mo	1.10	0.30	0.15	1.15	....	....	0.20	....	..
	1.20	0.40	0.30	1.30	....	....	0.30	....	..
D Special	0.96	0.35	0.30	1.90	....	....	....	....	..
	1.00	0.45	0.40	2.10	....	....	....	....	..
RAB w	0.42	0.40	0.20	1.30	3.40	....	....	....	....
	0.50	0.50	0.30	1.50	3.65	....	....	....	..
RAB 1	0.35	0.40	0.20	1.30	4.20	....	....	....	..
	0.38	0.50	0.30	1.50	4.60	....	....	....	..
Ordix	0.60	0.35	1.20	....	....	....	....	....	..
	0.70	0.50	1.50	....	....	....	....	....	..

ROCHLINGSTAHL STEELS DURING WAR (1944)

High Speed Steels

Brand	C	Mn	Si	Cr	Ni	W	Mo	V	Co
Gigant 11	0.92	0.20	0.20	3.50	....	1.20	2.20	2.20	..
	0.98	0.35	0.35	4.00	....	1.50	2.50	2.50	..
Gigant 22	0.78	0.20	0.20	3.50	....	7.30	....	1.80	..
	0.85	0.35	0.35	4.00	....	8.00	....	2.00	..
Gigant 44	1.30	0.20	0.20	4.00	....	9.00	....	3.50	..
	1.40	0.35	0.35	4.50	....	10.00	....	4.00	..
Gigant 5	0.87	0.20	0.20	3.50	....	9.00	....	1.90	2.50
	0.95	0.35	0.35	4.00	....	10.00	....	2.20	3.00

Tool Steels for Hot Work

Brand	C	Mn	Si	Cr	Mi	W	Mo	V	Co
WWS	0.50	0.80	0.80	....	....	....	....	....	..
	0.57	1.00	1.00	....	....	....	....	....	..
Robust 35	0.32	0.30	1.20	1.20	....	....	....	0.05	..
	0.40	0.50	1.50	1.50	....	....	....	1.10	..
Faktum	0.26	0.40	0.15	2.20	....	....	....	0.13	..
	0.34	0.60	0.25	2.50	....	....	....	0.18	..

(Continued on Page 134)

Germany's Magnesium Production

Report to WPB indicates fo mer foe attained 95-ton da production

MAGNESIUM capacity of G many is about 190,000 lb of me per day. Of this total, I. G. F benindustrie in Bitterfeld, Stassfu and Aken produces 154,000 lb, cording to Ralph M. Hunter of D Chemical Co., technical investiga for the War Production Board. Sta furt and Aken each are about 30 mi from Bitterfeld and although ma facturing facilities at these cities greater than those at Bitterfeld, th are directed from the main office the latter city. Processes are said be identical.

I. G. Farbenindustrie

Works at Bitterfeld are very exte sive, with four separate enclosures e ploying a total of 35,000 employ Plants are called South Bitterfe North Bitterfeld, Wolfen Farb fabrik, and Wolfen Filmfabrik. T first two specialize in inorganic pr ucts, while the Wolfen operations organic. Light metal manufacture carried out at Stassfurt and Ak (near Dessau), and light metal ca ing at Leipzig is under the directi of Bitterfeld.

Magnesium has been produced w ferrosilicon and magnesium oxide an experimental plant. Thus far has not been promising. A carb reduction (Hansgirg) unit also b been tried with negative results.

Power for operations in this ar was made from "Braumkohle" min from nearby deposits by open-p methods. One mine near the pl is about 1½ miles square. Coal burned on falling grates after rou crushing. Stack gases contain abo one per cent sulphur dioxide. Bitte feld generates 160,000 kw and is co nected with other stations, such Leuna. The Stassfurt and Aken o erations receive power from this sy tem. A nearby power plant on t system had 30,000 kw capacity d stroyed by bombs, but, from gener information received, it is believe that the I.G.F. power system (es mated at 250,000 kw), which is tied

MODERN

as a Streamliner

. . . IN LIGHTWEIGHT, WEAR-RESISTING STRENGTH

RECOGNIZED THE WORLD OVER AS THE FINEST SHOVEL MADE

BLADES OF
SUPER-TOUGH, LONGER-WEARING

Mo-lyb-den-um
ALLOY STEEL

Moly shovels, spades and scoops are made in all types, sizes and weights required for diversified industrial use.

Moly
REG. U.S. PAT. OFF.

WOOD SHOVEL AND TOOL CO. PIQUA OHIO

A NATIONAL ORGANIZATION *SPECIALIZING EXCLUSIVELY* IN SHOVELS, SPADES AND SCOOPS

ROCHLINGSTAHL STEELS DURING WAR

Tool Steels for Hot Work (Continued)

RAN	0.40	0.50	0.20	1.20	1.10	.	.	.	.
	0.50	0.80	0.40	1.50	1.40				
RWA	0.25	0.20	0.15	2.20	.	4.00	.	0.50	.
	0.35	0.40	0.25	2.50		4.50		0.60	
MFR	0.35	1.10	0.15	1.70	.	.	0.05	0.10	.
	0.45	1.50	0.25	2.00			0.10	0.15	
Stentor	0.50	0.50	0.15	0.60	1.50	.	0.10	0.10	.
	0.60	0.80	0.25	0.80	1.80		0.15	0.18	
PWD 13	0.22	0.20	0.30	0.60	1.20	.	0.20	0.15	.
	0.30	0.40	0.50	0.90	1.50		0.40	0.20	
NGSA	0.40	0.30	0.50	1.20	.	0.40	0.40	0.75	.
	0.50	0.50	0.70	1.50		0.50	0.50	0.85	
RGS 4	0.50	0.50	0.15	1.00	1.50	.	0.30	0.15	.
	0.60	0.80	0.25	1.20	1.80		0.40	0.20	
PWD 6	0.24	0.20	0.30	0.60	2.20	.	0.50	0.25	.
	0.32	0.40	0.50	0.90	2.50		0.70	0.32	
CeOT	0.40	0.65	0.15	1.30	.	.	0.55	0.25	.
	0.50	0.85	0.25	1.50			0.70	0.32	

Tool Steels for Cold Work

Brand	C	Mn	Si	Cr	Ni	W	Mo	V	Co
R LB	0.11	0.25	0.20	.	.	.	.	.	.
	0.18	0.40	0.30						
RB 7	0.68	0.20	0.10	.	.	.	.	.	.
	0.75	0.35	0.20						
RT 7	0.70	0.22	0.08	.	.	.	.	.	.
	0.80	0.32	0.15						
RR 7	0.70	0.60	0.25	.	.	.	.	.	.
	0.80	0.80	0.40						
BS 2	0.75	0.50	0.25	.	.	.	.	.	.
	0.83	0.70	0.40						
RT 11	0.05	0.15	0.15	.	.	.	.	.	.
	1.15	0.25	0.25						
S	0.25	0.20	0.10	.	.	.	.	.	.
	1.35	0.35	0.20						
Ordix	0.65	0.60	1.50	.	.	.	.	.	.
	0.75	0.80	1.80						
RFFw	0.42	0.80	0.80	.	.	.	.	.	.
	0.50	1.00	1.00						
RUS	0.85	1.80	0.15	.	.	.	.	0.08	.
	0.95	2.00	0.25					0.15	
ES	1.30	0.20	0.25	0.50	.	.	.	.	.
	1.50	0.35	0.40	0.80					
RTS	1.10	0.20	0.15	0.50	.	.	.	0.07	.
	1.25	0.40	0.25	0.80				0.12	
RTC 14	0.95	0.60	0.40	0.75	.	.	.	.	.
	1.05	0.80	0.60	0.95					
RSH	1.00	0.25	0.15	0.80	.	.	.	.	.
	1.10	0.40	0.25	1.00					
Ordix Special	0.55	0.80	0.15	0.90	.	.	.	0.07	.
	0.62	1.10	0.25	1.20				0.12	
D Special	1.20	0.60	1.05	1.10	.	.	.	.	.
	1.30	0.80	0.25	1.30					
Robust 40	0.40	0.40	1.20	1.20	.	.	.	0.05	.
	0.50	0.60	1.50	1.50				1.10	
ZK	1.40	0.30	1.15	1.30	.	.	.	0.08	.
	1.50	0.60	0.25	1.50				0.15	
RTC 20	0.80	0.25	0.10	1.60	.	.	.	.	.
	0.90	0.40	0.30	1.90					
RCC	2.00	0.20	0.20	11.00	.	.	.	.	.
	2.25	0.40	0.40	12.00					
RCCw	1.55	0.40	0.40	12.00	.	.	.	0.07	.
	1.75							0.12	
RABw	0.45	0.30	0.15	0.90	3.0	.	.	.	.
	0.55	0.60	0.30	1.20	3.5				

BOHLER STEELS

High Speed Steels

(Available 1940)

Brand	C	W	V	Mo	Cr	Co
CC Special	0.75	18.0	1.6	0.80	4.00	19.0
CC	0.80	18.0	1.6	1.00	4.20	9.0
Super Rapid, Extra 500	0.85	18.5	2.0	0.50	4.00	5.0
Super Rapid, Extra 214	0.70	19.0	1.7	.	4.30	2.4
Super Rapid, Extra HV	0.90	14.5	2.0	1.15	4.50	.
Super Rapid, Extra	0.65	18.5	1.3	.	4.00	.
Super Rapid	0.65	15.5	0.6	.	3.75	.

Alloy Tool Steels

Brand	C	Si	Cr	W	V	Mn
KP	1.30	0.20	....	4.75	.	0.30
KL	0.50	0.85	1.60	1.90	0.10	0.45
MY Extra	0.40	0.90	1.00	1.85	.	0.35
MY A	0.40	1.50	1.35	..	0.10	0.30

(Continued on Page 136)

with other systems, can produce
obtain almost enough current to
erate the chemical plants at capac

Coal analyzes 53 per cent wate
per cent ash, and 3000 calories
kilogram. It is stated that 1.7 k
grams are required per kw hr, w
1.5 for the newer stations. Analy
of this figure indicates a low ther
efficiency. However, as the eva
rator and other plants operate on
atmosphere steam, it may be assu
that high condenser vacuums are
used. The coal, in seams of 5
thickness covered with 100 ft of o
burden, is very soft and is mined b
continuous bucket chain conve
which loads into cars.

No serious damage due to bo
ing has been done to any of

TABLE I

Capacities in Metric Tons

Location	Per
South Bitterfeld	
Stassfurt	1
Aken	

equipment for the production of m
nesium in Bitterfeld, Stassfurt,
Aken. Capacities of these plants
listed in Table I.

Processes: Raw materials for
operation are carnallite from Stassf
and high magnesium content d
mite (stated to be 40 per cent M
from Scharzfeld in the Harz mo
tains. The dolomite is calcined
the quarry and shipped to Teutsch
tal near Halle, where it is slaked
26 per cent $MgCl_2$ brine, an end pr
uct of the potassium chlorine op
tions from carnallite in the Stass
area. The precipitated Mg (O
is filtered on an Oliver filter, was
with water and cake dropped with
to 60 per cent water. This cak
dried in a shelf drier at 500° C w
rabble arms on a vertical shaft
move the material across the shel
Producer gas is the fuel used. It t
is calcined at 900° C with Braunko
producer gas. The dried MgO the
mixed thoroughly with crystal Mg
$6H_2O$ obtained by evaporation of
$MgCl_2$ liquors from the carnallite
erations. The product (a mixture w
analysis $MgO.MgCl_2$ plus 30 per c
water of crystallization) is called "o
chloride" and does not absorb m
water. It is shipped from Teutsch
tal to Bitterfeld. Stassfurt and A
in special triple-hopper cars hold
32 metric tons per car. (Average
tance 50 km). At these plants t
mixed with Braunkohle, which

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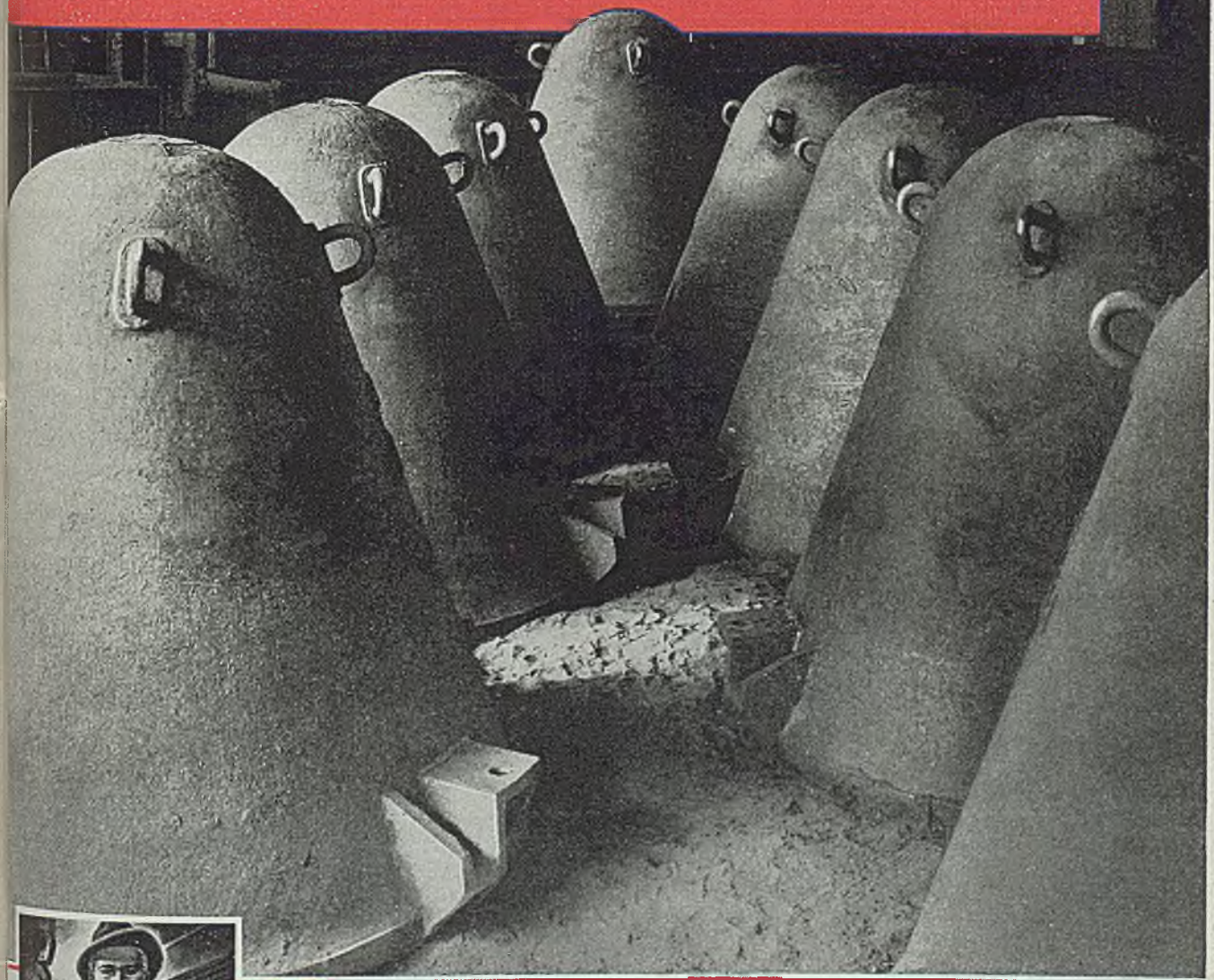
From lip to tilting lugs, these 300-cubic foot "mill-design" Slag Pots have the uniform grain structure and sound strength needed for long life in tough service. Whether the customer's design or our own, all PSF castings are the product of advanced foundry methods, laboratory techniques, and finishing equipment. Let us enlist these modern steel casting facilities on your side.



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BOHLER STEELS

Alloy Tool Steels—(Continued)

Amutit	1.00	0.25	1.10	1.50	...	0.90
MST	0.80	0.25	...	....	0.10	1.90
MG Extra	1.00	0.20	0.55	....	....	1.10
TWW	1.25	0.25	0.85	1.65	...	0.30
T W	1.15	0.25	...	0.90	...	0.30
SW	1.00	0.20	...	0.90	....	0.30
TWV	1.20	0.20	..	1.20	...	0.25
Special K	2.00	0.70	12.00	....	...	0.30
Special KN	2.00	0.35	12.00	....	...	0.30
K Extra	0.80	0.25	1.50	...	...	0.30
K 100 S	1.10	0.30	1.20	....	..	0.35
K 100/I	1.20	0.25	0.80	....	..	0.40
Extra Hart	1.40	...	0.50	....	1.10	0.30

Special Tool Steels

Brand	C	Si	Mn	Cr	W	V
RM Special, Sehr Hart	1.5	0.25	0.25	0.65	7.50	0.40
Special, Sehr Hart	1.4	0.25	0.25	0.65	4.75	0.25
Special, Sehr Hart	1.3	0.25	0.25	0.65	4.75	0.25

Tool Steels For Hot Work

Brand	C	Si	Mn	Cr	W	V	Co	Mo	Ni
WPZ	0.30	0.30	0.30	2.25	9.0	0.35	2.25	....	....
WKZ	0.30	0.30	0.40	2.25	8.5	0.40	...	....	....
WPD	0.25	0.30	0.35	1.85	0.9	....	...	2.85	2.5
US Special	0.40	0 30	0.30	1.55	...	0.30	..	0.60	..
NW	0.40	0.30	0.50	1.25	...	....	..	....	4.4
GNM	0 50	0.30	0.50	0.70	...	...	...	0.30	1.5
GSI	0.50	0.30	0.90	0.70	....	....	....	....	....
WB	0.50	0.50	0.90	....	....	....	....	....	....

Tool Steels For Cold Work

Brand	C	Si	Mn	Cr	W	V	Mo	Ni
NBS	0.50	0.25	0.25	1.00	....	....	....	3.20
NBSN	0.50	0.25	0.25	0.70	....	....	0.30	1.50
TWV	1.20	0.20	...	....	1.2	0.10	....	....
WON	0.80	0.30	0.35	....	....	0.35	....	....

High Speed Steels

(Available 1944)

Brand	C	Si	Mn	W	Cr	Mo	V	Co
Super Rapid. Extra 214 A	0.7	0.3	0.3	9.50	3.7	..	2.80	2.8
Extra Rapid 300 A	1.2	0.3	0.3	10.50	4.3	....	3.8	..
Super Rapid, Extra HVA	0.9	0.3	0.3	9.50	3.8	....	2.50	..
Super Rapid, Extra A	0.65	0.3	0.3	8.50	3.8	..	1.80	..
MO Rapid Extra 3 A	1.00	0.3	0.3	1.35	3.8	2.35	2.35	..

Tool Steels

Brand	C	Si	Mn	W	Cr	Mo	V	Co	Ni
Special sehr Hart A	1.40	0.25	0.25	3.25	0.65	..	0.25	..	..
SSC	1.10	0.20	0.30	....	0.70	...	0.10	....	..
FM Extra	1.50	0.20	0.40	....	1.40	...	0.10	....	..
SC Extra	1.25	1.15	0.30	....	1.20	...	...	....	..
CNW	0.45	0.25	0.30	....	1.35	..	....	..	1.65
MSI	0.60	0.95	0.95	....	....	..	....	..	..
GMNE	0.55	0.30	0.30	....	0.70	0.5	....	..	1.70
WKV	0.45	0.60	0.25	0.50	1.35	0.5	0.90	..	..
WKZ 50	0.30	0.60	0.25	4.35	2.35	..	0.65	..	..
WM	0.30	0.30	0.30	3.85	1.05	...	0.20	..	..
WM 2	0.35	0.90	0.30	1.85	0.05	...	0.20	..	..
GMCA	0.40	0.25	1.35	....	1.85	0.2	....	..	..
US 25	0.30	0.30	0.30	....	2.35	..	0.25	..	..
MYD	0.35	1.50	0.30	....	1.35	...	0.10	..	..
SCV	0.60	0.30	1.00	....	1.20	...	0.10	..	..
CSI	0.70	1.30	0.30	....	0.50	..	....	..	..
WKW 6	0.40	0.20	0.30	....	13.50	...	....	..	..
WKW 2	0.20	0.30	0.30	....	13.00	...	....	..	..
ESK	0.15	0.25	0.30	....	0.80	...	....	..	..
KR Special	2.10	0.35	0.30	0.7	12.00	...	....	..	..
KPV	1.45	0.20	0.30	....	.....	...	1.20	..	..

EDELSTAHLWERKE

High Speed Steel

Cobalt-Tungsten-Vanadium	C	Cr	Mo	V	W	Co
Cobalt II	0.80	4.25	0.65	2.23	12.5	5.00
Cobalt III	0.80	4.25	0.65	2.25	12.5	2.75
Cobalt III N X	0.80	4.25	0.65	2.00	10.0	2.50

ground to 25 per cent through 2 mesh. At Bitterfeld the mix is o chloride —88 per cent, plus coal give 6 per cent carbon, and peat yield 6 per cent carbon.

At Stassfurt 12 per cent carbon obtained from Braunkohle; only peat is added. Operations at A regarding peat are not clear, bu probably is not used. Elimination peat in the new plants is due to of larger and better chlorinators by the production of a more por briquette obtained by using the wa vapors driven off during drying to crease porosity.

Employ Extrusion Briquettors

Oxychloride, coal, and peat mixed in dry mixers, a little Mg liquor added to aid in briquetting, the moist mixture is extruded throu a sausage-type briquettor (sc against an orifice) to a 1½-in. cy der of low strength which breaks to 2-in. to 4-in. lengths as it is truded. These are dried at 400° to harden and then calcined at cok temperature to decompose the and peat. The product is estima to contain 10 per cent water. chlorinators at Bitterfeld are e rated at 10 tons of anhydrous Mg per day. They are vertical steel inders, acid-brick-lined, and are 2 high, about 9 ft ID, and 13 ft The briquettes are fed in at the Chlorine from the cells (90 per concentration), to which is ad makeup chlorine from liquid, is in duced just above the bottom. temperature is maintained by car resistors operating 3-phase at 2 amp and 22 v (about 0.6 kva per of magnesium). Each chlorin serves about 12 cells. Molten m nesium chloride flows out of the rinators and is transferred into 3 ft crucibles. electrically driven, tilting mechanism, and fed to cells once per 8-hr shift.

Chlorine losses occurring in operation result from stock loss gas not absorbed in the briquettes, conversion of CaO impurities to Ca which is present in the feed up t per cent, and the conversion of a la portion of the 10 per cent of w to HCl due to the water-chlorine action at the elevated temperat The $CaCl_2$ and the HCl loss is e mated at 0.2 lb of chlorine per pou of metal for the $CaCl_2$, and 1.5 of chlorine per pound for the HCl.

Liquid chlorine is supplied to process at the rate of from 0.5 to lb of chlorine per pound of metal. T chlorine balance, therefore, appe

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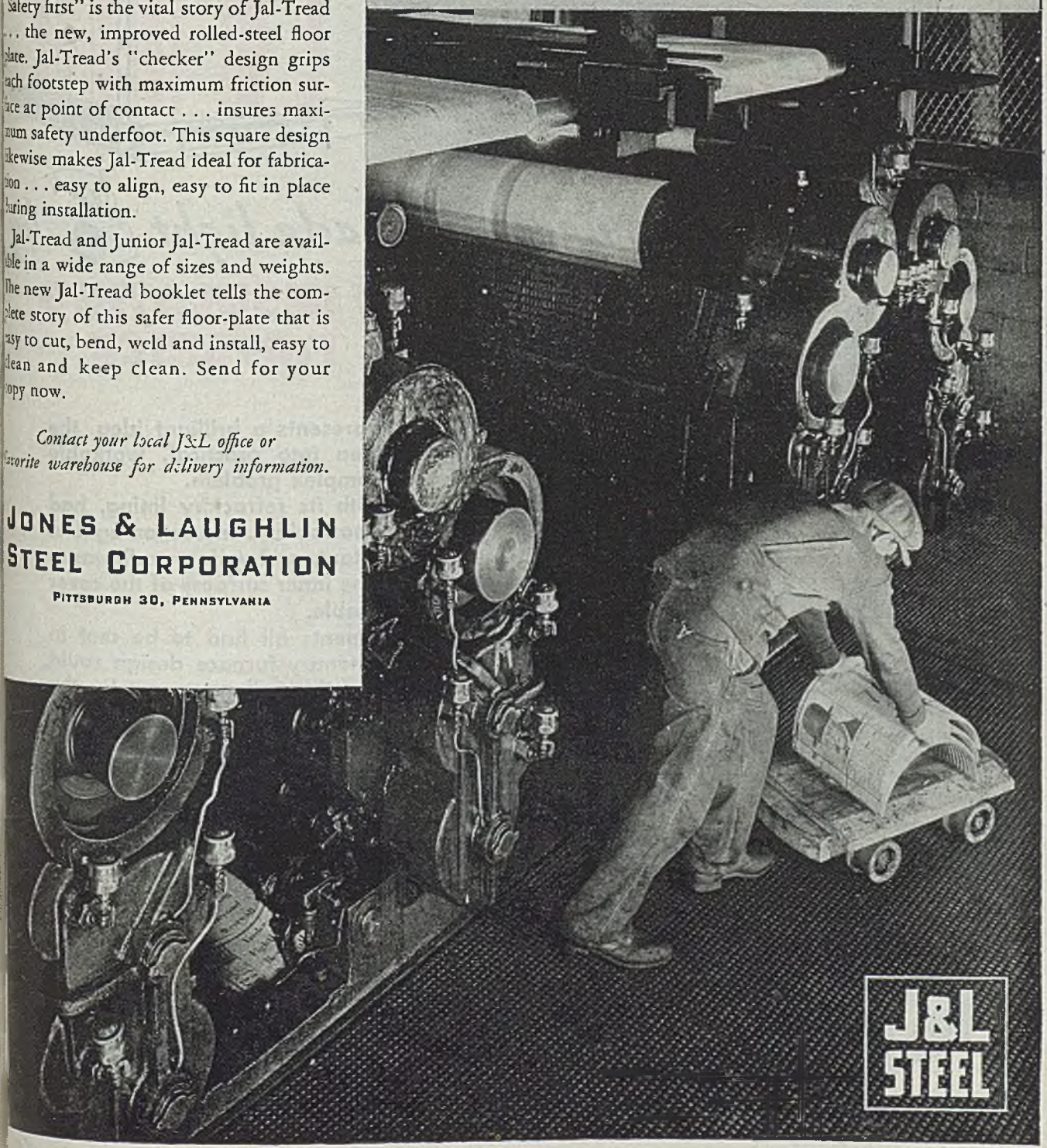
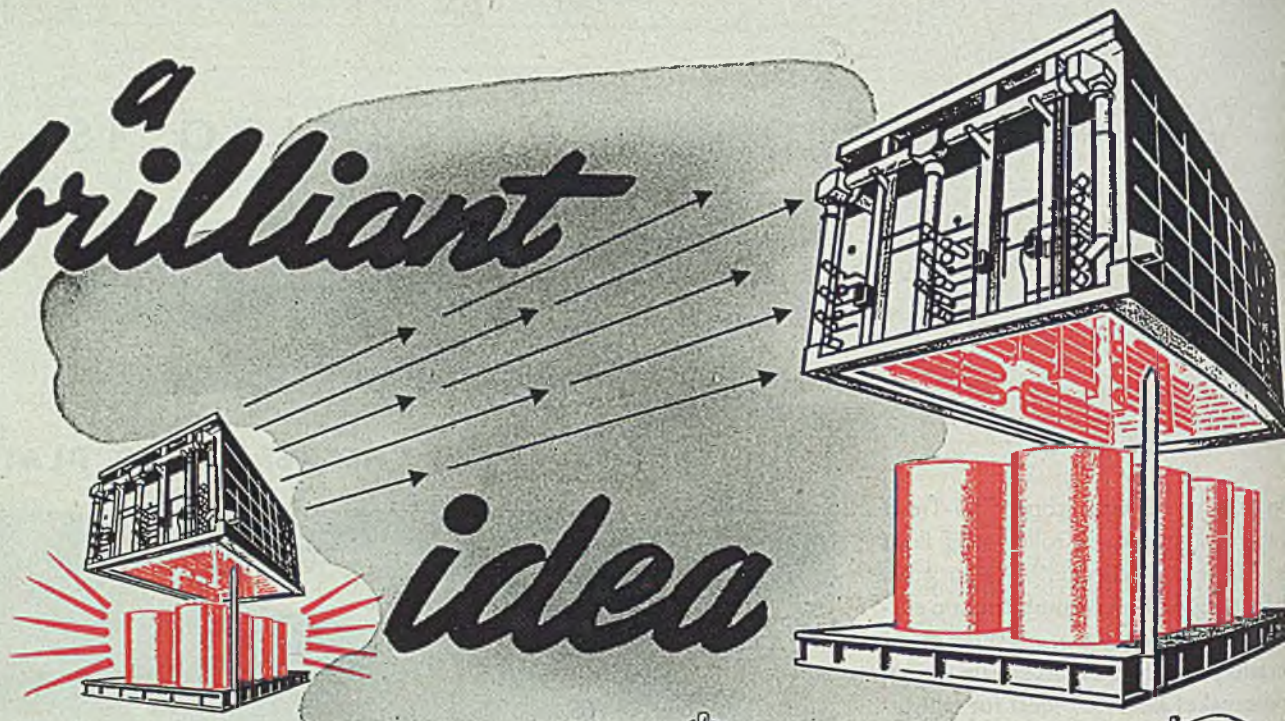


a brilliant idea



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2. Inner covers are kept filled with controlled atmosphere.
3. Large cover, with radiant-tube heating elements, can be removed after work is heated and soaked.
4. Atmospheric control continues after hot cover is removed and used to heat another charge on another base.

While this furnace represents a brilliant idea, the translation of the idea into practical, workable equipment posed a complex problem.

The radiant cover, with its refractory lining, had to be light enough for portability. Insulation against heat losses was important, and uniform reflectance of heat inward from the inner surfaces of the cover lining was highly desirable.

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BUY WAR BONDS BUY MORE THAN BEFORE

R-20

to be 1.48 lb of chlorine per pound of metal in the $MgCl_26H_2O$ added at Teutschental and 0.5 to 1.0 new chlorine, making a total addition of 1.98 to 2.48 and a known loss from HCl and $CaCl_2$ of 1.7. The difference, then, is probably the amount which is lost out of the chlorinators.

Magnesium Cells

The magnesium cells at the Bitterfeld plant are about 88 in. ID by 48 in. wide by 48 in. deep. Facing the 88-in. dimension, the cell is compartmented as follows: 9-in. cathode space, 2-in. partition, 10-in. anode space, 2-in. partition, 13-in. cathode space, 2-in. partition, 10-in. anode, 2-in. partition, 13-in. cathode, 2-in. partition, 10-in. anode, 2-in. partition, 9-in. cathode. Partitions are made of high silica, acid-proof brick in two pieces about 24-in. long and 17 in. deep; they extend a few inches under the bath and above the cell top to serve as sides of the chlorine dome. The front of the chlorine dome is completed with brick. Anodes are graphite pieces about 4½ x 9 x 55 in. and are assembled close together at the top on bus bars to make an electrode 4½ x 54 x 55 in. Anode life is from 12 to 16 months, and failure is due to breaking just above the chlorine dome cover and below the bus bar connection. During the life of the anodes, very little wear is experienced, and the broken electrodes would still serve, were it not for the break. This is believed to be due to crystallization of salts in the pores of the electrodes, with subsequent strains due to vaporization. The anodes are sealed into the dome with asbestos and cement, and it is not necessary to renew the seal. The electrodes never are moved during operation, except for breakage, which can be predicted by appearance. As stated, chlorine gas from this operation is said to be of 90 per cent concentration.

Cathodes are steel castings of eccentric shape designed to present a face about 18 x 50 in. to the anode and tapered up to maintain constant current density through the steel. Bars coming through the top are 3 to 4 in. thick. The spacing is about 7 in., anode-to-cathode face.

Cells are composed of high silica, acid-proof brick built into walls about 18 in. thick and encased in steel shells with solid bottoms. Diaphragm brick is the same composition as the lining (about 70 per cent SiO_2-30 per cent Al_2O_3). It has a maximum life of about 16 months. The cell pot lin-

EDELSTAHLWERKE

High-Speed Steel—(Continued)

Tungsten-Vanadium	C	Cr	Mo	V	W	Co
SA 200	0.85	4.00	(0.3)	2.50	10–11	..
SA 500	1.35	4.25	(0.3)	4.30	10–11	..
SA 900	1.50	4.25	0.65	4.25	12.50	5.00
000 Special 31	0.80	4.00	(0.3)	2.60	10.00	..

Low Tungsten	C	Cr	Mo	V	W	Co
Rapid Special BN X	0.80	4.0	(0.3)	1.60	8.0	10.0
Mo 325 X	0.9/10	4.0	2.5	2.5–3.0	2.2	2.5
Mo 1225 X	0.9/10	4.0	2.5	2.5–3.0	1.0	1.5

Steels for Battering Tools

Brand	C	Si	Mn	Cr	V	W
Durax Special	0.25	0.5	0.50	1.10	0.10	3.75
Durax W 2	0.45	0.9	0.35	1.20	. . ca	2.00
Durax W 3	0.35	0.9	0.35	1.20	. . ca	2.00
Durax H	0.55	0.5	0.35	1.25	0.40ca	2.00
CaV 1	0.60	0.9	0.90	1.35	0.15	..
CaV 2	0.50	1.5	0.75	1.20	0.15	..
CaV 3	0.35	1.5	0.70	1.10	0.15	1.5–7
E 612	0.40	1.0	0.40	5.25	0.15	3.75
E 975	0.45	0.3	0.75	2.50	0.20	....

Stainless and Acid Resisting Steel

Brand	C	Si	Mn	Cr	Ni	
Remanit 1510	0.15	0.60	0.4	14.0	..	
Remanit 1520	0.20	0.33	0.5	13.5	0.5	
Remanit 1540	0.40	0.30	0.4	13.5	..	
	C	Si	Mn	Cr	Mo	
Remanit 1610	0.10	0.60	0.4	18.0	..	
Remanit 1610 S	0.10	0.50	0.4	18.0	.	+ Ti
Remanit 1620	0.25	0.30	0.4	16.5	1.5	
Remanit 1710 A	0.12	0.30	0.6	16.5	0.2	+ S
Remanit 1710 S	0.10	0.50	0.4	18.0	1.8	+Cb +Ta 0.7
	C	Si	Mn	Cr	V	
Remanit 1690	1.00	0.30	0.4	17.5	..	
Remanit 1690 V	0.85	0.30	0.4	18.0	0.5	

Brand	C	Si	Mn	Cr	Ni	Mo	
Remanit 1880	0.10	0.5	0.4	18.0	8.5	..	
Remanit 1880 S	0.10	0.5	0.4	18.0	8.5	..	Cb +Ta
Remanit 1880 SS	0.10	0.5	0.4	18.0	9.5	2.0	
Remanit 1880 T	0.10	0.6	0.4	18.0	9.5	..	N2-0.1
Remanit 1990 S	0.10	1.7	0.4	18.0	8.5	..	
Remanit 1990 SS	0.10	2.4	0.4	18.0	9.5	2.0	

Welding Rod Steel	C	Si	Mn	Cr	Ni	Mo	Cb
Thermit A (17)	0.10	1.20	0.40	19.5	9.0	2.0	1.5
Thermanit C	0.10	2.20	1.25	23.0	16.5	.	.
Thermanit D	0.15	1.75	1.25	22.5	9.5	.	.
Thermanit G	0.05	0.50	0.40	18.0	9.0	2.0	.
Thermanit J	0.05	0.50	0.40	18.5	8.0	.	.
Thermanit K	0.15	0.55	0.60	13.5	..	.	.
Thermanit L	0.20	0.50	0.50	23.0	3.0	.	.
Thermanit X	0.10	0.50	5.00 6.00	18.0	7.0	.	.

Drop Forging Die Steels

Brand	C	Si	Mn	Cr	Ni	Mo
AMS	0.55	0.30	0.5–0.8	0.60	1.50	0.15–0.2
AMS Extra	0.55	0.30	0.8	0.75	1.5–1.8	0.40–0.6
CMS	0.45	0.35	1.3	1.8–2.0	W	0.20–0.3
CNS T H	0.25–0.3	0.30	0.4	1.0–1.3	4.5	0.30–0.5
		0.30	0.6			0.30–0.5

Steels For Use With Heat and Hydrogen
Medium High Temp. Steels

Brand	C	Si	Mn	Cr	V	Mo
CV 30	0.30	0.3	0.2	1.00	.	0.20
CV 60	0.30	0.3	0.4	1.35	..	0.55
CV 70	0.15	0.3	0.4	1.00	0.25	0.30
CV 110	0.30	0.3	0.4	1.40	.	1.10
CV 120	0.30	0.3	0.4	1.40	0.40	0.55

Medium High Temp. Steels

Brand	C	Si	Mn	Cr	Mo	V	W
HC 5	0.10	0.35	0.4	2.5–2.75	.	.	.
HC 8	0.25	0.35	0.4	2.5–2.75	.	.	.
HC 9	0.20	0.35	0.4	3.0–3.25	0.25	0.5	.
MC III V	0.20	0.30	0.4	2.5–2.75	0.40	0.8	0.4

EDELSTAHLWERKE

Steels For High Temperatures

Heat-Resisting	C	Si	Mn	Cr	Ni	
Thermax 8 F	0.10	2.75	1.00	3.25		+ Ti
Thermax 9 F	0.10	2.75	1.00	6.75		+ Ti
Thermax 10 F	0.10	2.75	1.00	13.50		+ Ti
Thermax 11 FN	0.20	0.50	0.65	25.00	2.5-3.0	
Thermax 12 F	0.15	1.75	1.00	25.00	0.5	

Heat-Resisting	C	Si	Mn	Cr	Ni
Thermax 10 A	0.10	2.35	1.25	19.0	10.0
Thermax 11 A	0.15	2.30	1.25	23.5	19.5

Low Grade Welding Rod	C	Si	Mn	Cr	Ni	
Thermax 9 AM	0.10	3.50	14.00	9.0		+ N2
Thermax 10 AM	0.10	3.50	18.50	9.5	1.75	+ N2

Valve Steel	C	Si	Mn	Ni	Cr	V	W
Silchrom II	0.40	4.00	0.30	....	3.0	....	....
Silchrom	0.40	3.50	0.50	....	9.5	....	....
Gs	1.60	0.40	0.35	....	12.0	....	....
GSE	0.45	1.50	0.70	13.0	15.0	....	1.25
GSM	0.40	2.25	15.50	....	12.5	....	....
V 444 D	0.40	2.45	1.00	10.0	18.5	1.50	....

Magnet Steel	C	Si	Mn	Cr	Mo	Co	W
Magnet C	1.00	0.25	0.25	3.3	....	....	....
Magnet CM	0.95	0.25	1.10	5.0	....	....	....
Cobalt 125	1.00	0.30	1.10	8.5	1.25	6.25	....
Cobalt 160	1.00	0.30	0.30	8.5	1.50	10.50	....
Cobalt 200	1.00	0.25	0.25	8.5	1.50	15.50	....
Cobalt 300	0.90	0.25	0.25	4.5	0.30	30.00	4.50

ing lasts about 5 years. A diaphragm repair requires that the cell be shut down, which includes dipping out the bath. Cells are spaced with about 3 ft between cells in rows about 12 ft apart. Aisles in front of the cells are used for operations, and the back aisles are used for the bus bar which consists of 6 bars of 0.45 x 7-in. copper. Elaborate switches are used in this aisle to short cells out of service.

The Bitterfeld cells are rated at 23,000 amp and 7 v per cell, although there is evidence of operating at 18,000 amp. Ampere efficiency is about 88 per cent.

Power required is between 8.0 and 8.5 dc kw-hr per lb of metal. Further analysis of power requirements was given as 25 ac kw per kilogram, including briquetting and process power, giving an overall of 11.2 ac kw per lb. Graphite consumption is 0.025 lb per pound of magnesium. Assuming the cathode face at 18 x 50 in., the current density is 4.3 amp per square inch.

The cell bath was not sampled, as all cells were frozen and true samples were impossible. Analysis of the cell bath is given in Table II.

The cell feed in the form of molten $MgCl_2$ analyzes 86 to 90 per cent $MgCl_2$, 5 to 6 per cent $CaCl_2$, and the balance NaCl and KCl. There are no sulphates present, as they are eliminated in the chlorinator. Sludge is dipped once a week and analyzes 30 per cent MgO, 10 per cent metallic magnesium, and the remaining 60 per cent being bath. A study of the impurity balance indicates a build-up of $CaCl_2$ in the bath, and it is said that the bath was dipped whenever $CaCl_2$ exceeded 50 per cent. NaCl was added to restore the desired composition. Usually 0.11 lb of bath is dipped per pound of metal produced, but recently was compelled to go as high as 0.28 lb of bath dipped per pound of metal because of high Ca content of feed. It was never necessary to clean the cathodes.

Cells are started by pouring in a few hundred pounds of molten carnallite. The graphite electrodes are used with a special transformer for alternating current heating which is used until the cell is full of normal bath which is added slowly. There is no indication of iron pickup during the starting of the cell.

TABLE II

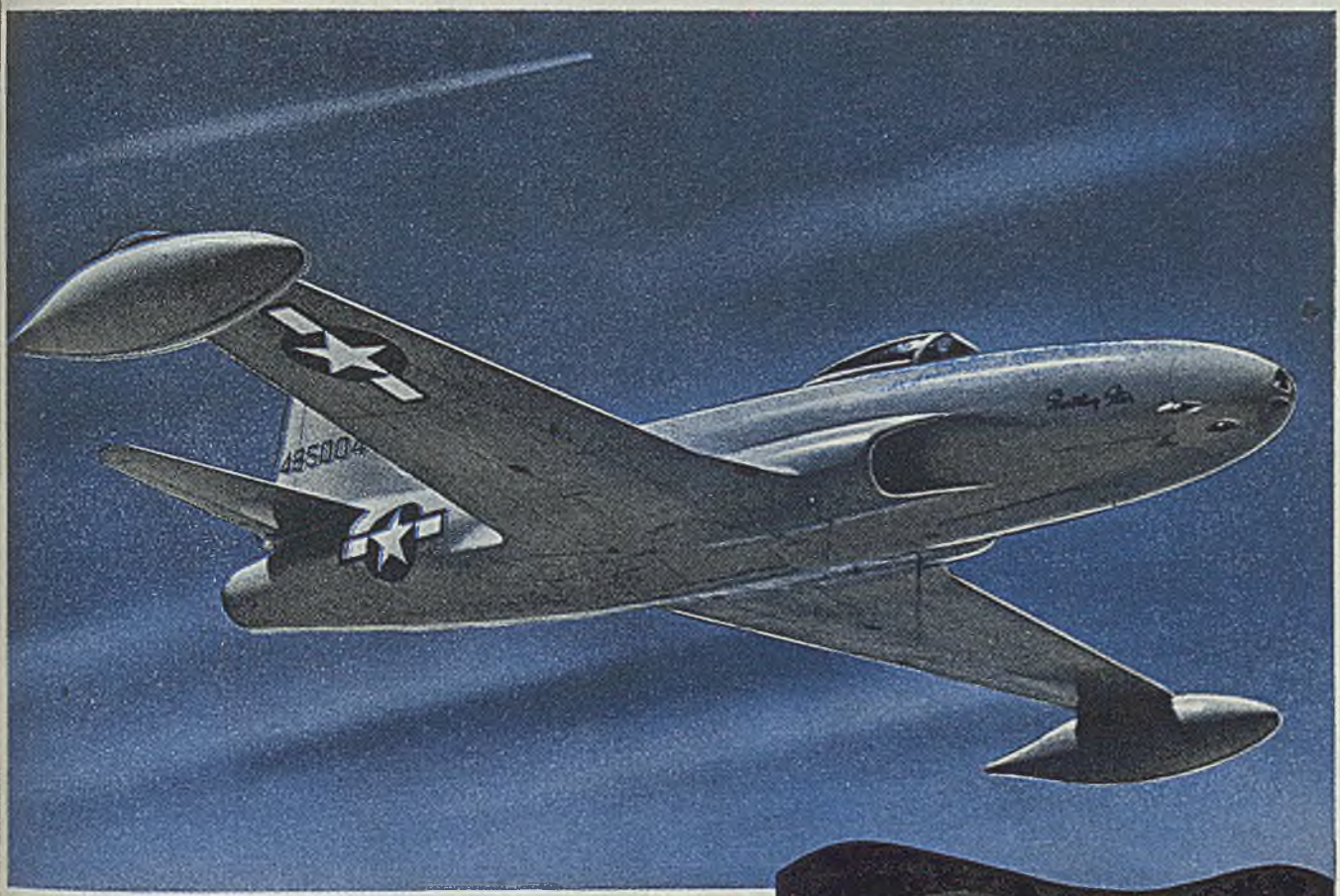
Analysis of Cell Bath

$CaCl_2$	45-50%
$MgCl_2$	10-25%
NaCl	30% (Average 15%)
KCl	10%
CaF_2	0.5-1.0%

One chlorine gas outlet is provided for each dome—three per cell. They are about 2 in. ID, and are composed of a section of ceramic pipe delivering into a cast iron line. The line suction is 1 in. of water, and the cell suction about 0.1-in. Before compression, the chlorine is dry filtered through thimbles (bag house) of asbestos cloth for removal of the c and is then compressed to about in. of water pressure with a Ja Blower (similar to the American nersville-Roots) and returned to chlorinators. The four cathode ch bers are ceramic covered, with provided in the front for metal sludge removal, and are vented the back through lines similar those for chlorine, to remove H These gases are scrubbed and thro away. Power for the operation rectified with motor generator set 93 per cent conversion. Units quite old.

Labor for Operation: Figures en (cells only) are 20.5 man ho per ton of magnesium, for maintena of cells 16.8 man hours per ton magnesium, making a total in the room of 37.3 man hours per ton metal.

Metal dipping from cells is d once a day and could be done o two-day schedule. Metal collected the four cathode compartments (double—two single) is collected automatic skimming. Apparatus this purpose is a pot holding 800 k grams which is fitted for vacuum eration. The casing is about 5 ft diameter and 5 ft high and conta a nichrome resistance heater rated 60 kw. It is mounted on an elec truck. The whole assembly wei about 7 tons. A large handwh operates four corner screws wh raise and lower the pot to conform bath levels. Suction lines at 300 m absolute pressure are provid throughout the plant. A pipe, skimmer for the cell, is connected the top of the vacuum pot; it is abo 1½ in. ID and reasonably well in lated. It is put lower than necessa in the cell for preheating. Wh ready, a valve is opened, and the ski mer placed at the surface, the me being sucked in. There is a certa amount of flexibility in the pipe, b as the cell level falls, the pot is lo ered by the screws. The pot is mov from compartment to compartme until one cell is cleared. A man rak metal toward the skimmer to aid t skimming. When cells are clear, t valve is closed, and the pot goes another cell, or, if full, to a separa ing pot. A full pot usually contai 1300 lb of metal and 400 lb of ce bath. At the separating pot, whic is in a corner of the cell buildin the skimming pot is put under pre sure and metal and bath discharge through a dip pipe in it. The sepa ating pot is similar to the first in siz (about 40 x 54 in.), and is heated wit

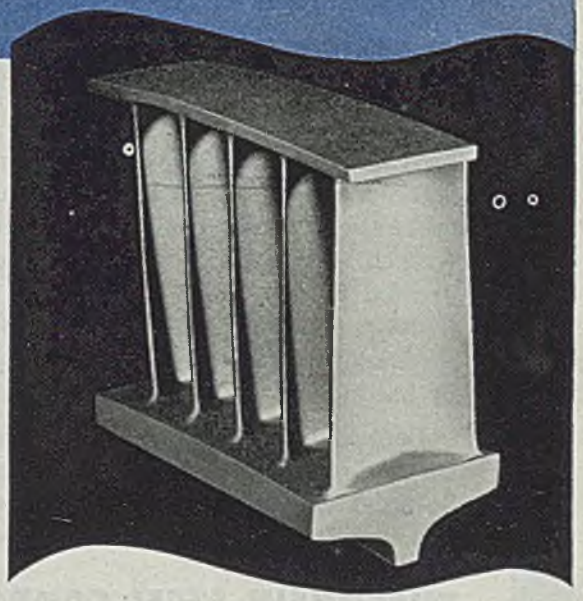


Blades for Breathing

Quantity Production Jet Turbine Blades Solved by Microcast Process

Flying higher and faster than ever before possible, jet propelled aircraft such as the Lockheed Shooting Star P-80 "breathe" vast quantities of air—supplied by turbine-driven compressors.

In designing blades for these turbines it was necessary to use high melting point, extremely hard alloys such as *Vitallium, capable of withstanding the tremendous force and heat of jet blasts. High melting point alloys being difficult and expensive to machine were a problem in quantity production. The answer—MICROCAST, the process of precision casting high melting point non-machineable alloys which has proven so successful in producing specialty blades by the millions for gasoline aircraft turbo-superchargers.



The MICROCAST Process is foremost in the precision casting of specialty blades for power development units. Engineers are finding that MICROCAST, by permitting the economical quantity production of high melting point alloy castings, has opened the way to many design improvements particularly where extreme resistance to wear and stress is required.

*VITALLIUM
A non-machineable alloy

The precision process originated by Austenal Laboratories, Inc., for the production of castings of intricate design where accurate dimensions and surface smoothness are absolutely essential. Small castings produced by Microcast Process require little or no machining. Consider Microcast in your product plans.

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WISCONSIN SULFITE-TREATED STEEL

an electric heater. It is mounted so as to tip over at 180°. First it is discharged through a pipe cast in it, which extends to the bottom. The excess bath runs out, and a small amount of metal is discharged; the pot is tilted the other way and discharged into an alloy pot which transports the metal to the alloy plant. The skimming operation is said to dip one cell in less than 5 min (70 cells in 5 hr), and five men can handle this operation at that speed.

The cell settings are supported on a set of I-beams running lengthwise which are carried by columns. A number of smaller beams act as purlins. Bricks are used for insulation. The floor is supported by noncontinuous steel beams resting on the walls or brick piers. Reinforced concrete slabs span the beams, and the slabs are covered with brick. Bitterfeld has never stored metal outdoors, preferring to use a building provided with a little heat to avoid condensation.

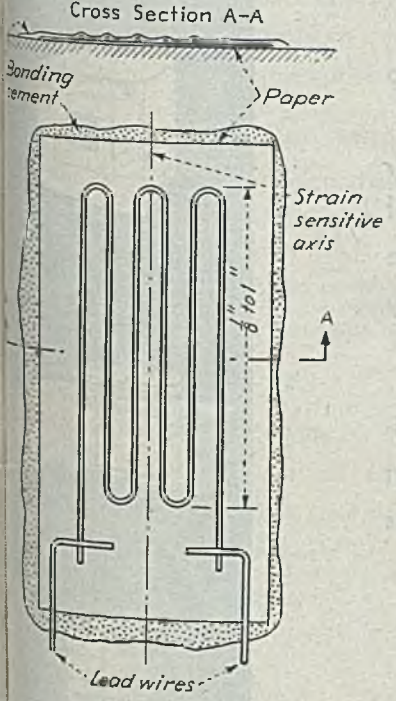
The Stassfurt cells are the same as those at Bitterfeld with the following exceptions. One line of cells is operated at 32,000 amp and 6.8 to 7 v per cell. These cells contain four anode assemblies and five cathodes (two single—three double). The units are the same, but the cathode to anode spacing is given at 4 in., compared to the smaller cells at 7 in. This cell was developed in 1938. Its power requirement is slightly better, being 7.8 dc kw-hr for each pound of metal.

At Stassfurt dc power is supplied by rectifiers of multi-anode type, rated at 6000 amp, each containing 18 anodes. The efficiency was 94 per cent. A sludge treatment is used to recover the 10 per cent metal in sludge. A pot setting is used with alternating current used on several electrodes. Sludge is agitated in the cell bath. It is claimed that 8 to 10 metric tons of metal are recovered per month.

Composition of the cell bath at Stassfurt was given as 30 to 40 per cent $CaCl_2$, 20 to 25 per cent KCl, 20 per cent NaCl, 15 per cent $MgCl_2$, with about 100 lb of NaF added per cell per month.

Wintershall at Heringen

The remaining 36,000 lb of magnesium per day is said to be produced by Wintershall. Location was sufficiently remote so as to be unavailable for investigation. However, the following information was obtained from assessment reports. Eighty cells operate at about 10,000 amp and 6 to 7 v per cell. Power for this electrolytic operation is about 12 kw hr per pound. One hundred thirty-two cells operate at 18,000 amp at 6 v, with a power requirement of 10.6 kw hr per pound. The average for the overall operation, including the foundry, is 13 kw hr per pound. The raw material is carnallite from potash operations, and the carnallite feed is prepared by air drying in a shelf drier or in tray furnaces with feeding shovels similar to those used for the roasting of zinc. The feed sent to the cells contains 3 per cent water, 1½ per cent MgO, a low percentage of impurities, and the balance carnallite. In this type of operation it is necessary to remove bath from the cell to equalize the KCl fed in with the feed. The material removed is discarded for fertilizer purposes and is stated to be from 2 to 5 per cent $MgCl_2$, 20 per cent NaCl, a small amount of fluoride, and the balance KCl. It is, therefore, evident that NaCl is fed along with the carnallite to maintain the bath composition. The 18,000-amp pots were stated to be about 8 ft in diameter and 4 ft deep, and to use about 16 graphite anodes of 12 to 14-in. diameter. Cathodes are spaced between these anodes, and the electrode assembly is arranged in a circle. Metal is collected in the center.



Stresses and Strains Determined by Bonded Resistance-Wire

STRAIN GAGE

ONE of the useful and interesting tools of modern design engineering is a bonded resistance-wire strain gage used for determining stresses in aircraft, both in the factory and on test-flights, on bridges, dams, ships, railway cars, high towers, such as broadcasting antenna, and high-tension electrical lines. It also is used for testing heavy guns for the strains which are developed during firing. High pressure vessels and tanks, which might cause severe damage if overloaded, are said to be kept under control by this gage, which is made by Baldwin Southwark Division of Baldwin Locomotive Works.

Operation depends on the fact any wire which is conducting an electric current will change in resistance if it is strained, inasmuch as internal stresses distort and interrupt energy levels at which electron transfer takes place. It is therefore, necessary to select this wire with great care in order to get the highest possible degree of correlation between the various gages used in a single test. This means that size and resistance must be controlled within very narrow limits and that the temperature coefficient characteristics of the wire be known to a high degree of precision in order that these gages may give the design engineer a true picture of what is happening in the structure he has designed. Accompanying plan and cross-section view shows construction of a typical strain gage.

Advance brand wire, supplied to Baldwin by Driver-Harris Co., Harrison, N. J., has been found very satisfactory for this application. Usually only 0.001-inch in diameter, one-third the size of a human hair, this alloy has a comparatively high ratio of resistance change to load and at the same time, a small rate of change in resistance with temperature. This makes it possible to use the strain gage with a comparatively simple setup where resistance is measured by a good Wheatstone bridge.

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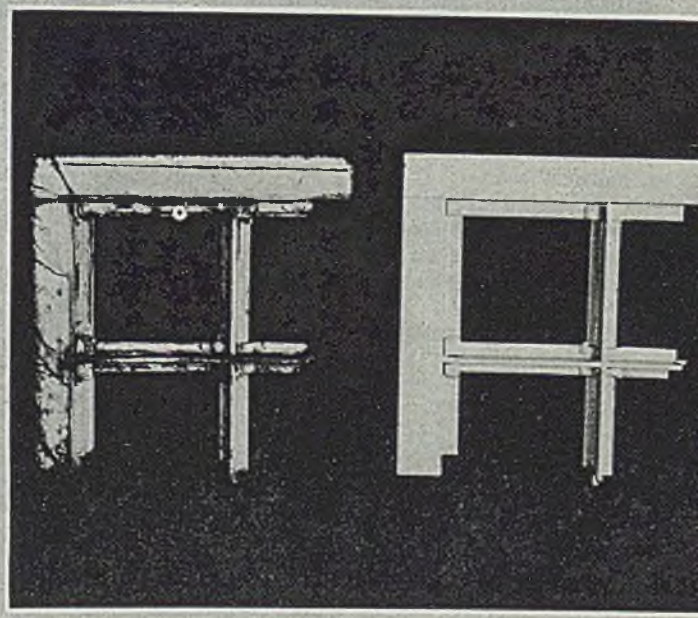


STEEL SASH IS MORE BEAUTIFUL AND DURABLE WHEN IRCO-IZED—The above illustration is an untouched photograph showing the comparative effects of salt spray upon steel sash. Both pieces of metal have been subjected to the same salt spray test. Both pieces of metal have been painted with the same material. The illustration proves beyond question that when metal is IRCO-IZED your finish will last 3 to 5 times longer.

IRCO PRODUCTS
QUER RUST
THE
WORLD OVER

INTERNATIONAL RUSTPROOF CORPORATION

Stress Distribution

(*Concluded from Page* 116)

tension axially the strain is determined simply with one gage. In the case of a complex stress distribution several gages are used at a point and from the orientation of the gages and mathematical formulae the amount and kind of principle stress or strain and its orientation may be determined. Shear at the same point may also be determined.

The electrical changes induced are small but electrical measuring devices of sufficient sensitiveness and accuracy are available for measurement.

The gage is attached to the piece to be loaded at a spot which has been thoroughly cleaned. It does not appear that it is necessary that the spot be extremely smooth if adherence is good.

The gage is held in position by a lacquer and must be kept dry. Temperature must be held constant or compensated for.

The gages themselves are inexpensive but the recording apparatus is relatively expensive.

Since strain is recorded, the modulus of elasticity is used in transforming this strain to stress and therefore, stress may be determined only within the range for which this constant applies. Strains beyond this point may be determined however. These strain indicators may be used in dynamic work where there is alternation of stress if an oscillograph is used in connection with the recording apparatus.

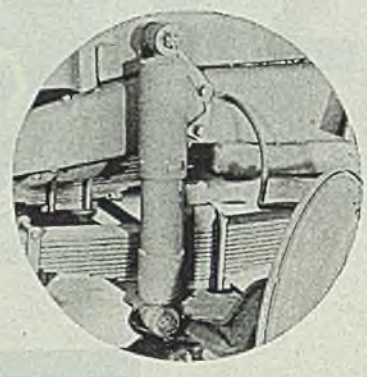
Apparatus is available for the solution of the mathematical equations involved. There is an electronic type, a machine based upon a plurality of rotary transformers and a mechanical integrating machine. No machine is necessary but the electrically operated computers such as the electronic and transformer type give an immediate answer while a test is run.

There are many concrete examples of the application of this type of strain gage to structures for the determination of strains and stresses. They have been used on railroad rail to determine the strains at various points in a rail, to determine strains in rails at curves, applied to tie plates and to bridge members. When the floor system of one of Pittsburgh's bridges was replaced in aluminum, the change release in strain in bridge members was determined as a check on mathematical computation. They have also been used to determine stresses in penstocks, a drag line boom, at the fillets of a pump impeller, fatigue stresses in studs in aluminum forgings, on tools to determine tool pressures and on forging hammers to determine effect of foundation cushions.

One of the most important uses of such strain gages has been in connection with the determination of stresses in complex structures.

An interesting use of the resistance wire strain gage is in connection with a new type of accelerometer. This accelerometer is a simple type of cantilever beam which is attached to the object for which it is desired to find the acceleration or deceleration. As determined by the circumstances, the cantilever may be loaded at the end or not. A wire strain gage is attached to the cantilever and records the extent of compression or tension in the cantilever under conditions of shock. Any sudden acceleration or reverse results in vibration of the cantilever and the record of strain gage readings shows the magnitude and duration of the disturbance.

Such an accelerometer has been attached to a Charpy impact machine to record the magnitude and length of time of the resistant force at breaking. This may perhaps give more accurate evaluation of impact tests than has been possible previously.



SMOOTH TRUCKING: An enlarged version of shock absorbers made for automobiles and heavier vehicles, this unit has a 2-in. bore pressure cylinder. Length extended is 23⅛ in., compressed 15¾ in. Largest exterior diameter at top shaft is 5¾ in. Developed by Monroe Auto Equipment Co., Monroe, Mich., this airplane type, or direct acting, unit has a lockout valve which affords secondary compression in addition to rebound and compression resistance, making it triple-acting.

Such indications of residual stress have been shown as to cause the manufacturer of castings to pause and wonder if stress relieving should not be resorted to in the case of every casting subject to severe loadings. However, it is also apparent that on occasion initial stress, if of the proper kind, may result in advantageous service. Therefore, it is wise to consider the matter fully as to what residual stresses there may be, to consider the service equally and then to form an opinion as to desirable action.

Residual Stress

In the field of residual stress determinations the sectioning or dissecting method has been of most use, although this has been combined with wire strain gage methods to some extent.

Particular attention has been given to the use of residual stresses to strengthen a part. By so treating the material as to place the outer portion in compression before loading it is possible that the stress in the extreme fibers will be t resultant of a residual stress in compre sion and a tensile stress from loadin Thus a materially greater load may applied before failure.

Residual stresses may be introduced several ways. Shot blasting, heat tre ing by quench and draw, nitriding a carburizing are treatments which res in residual stresses. The differing metho result in stresses differing in value a in the position of the residual tensile a compressive forces. It is possible to treat a bar as to have compression in exterior layer, tension in a layer imme ately beneath and compression again the core. It is possible to have compr sion in the exterior layer to a very hi value and moderate tension in the rest the section. The kind and approxim location of the residual stresses may postulated by consideration of the fluence of heat in causing expansion manner in which cooling contracts.

It may be said that there are two ty of treatment which are used to prod residual stress. A type of treatment sulting in change in structure might designated as micro and one not result in structure change as macro.

The value of compressive and ten residual stresses has been investiga by sectioning means and surprisingly h values, particularly in compression, h been ascertained to exist.

By such investigations it has been termined in some cases that initial fail has started at a layer beneath the s face where residual tension existed ra than at the surface where residual c pression existed.

Much work has been done by means in determining the distribution stress at oil holes in steel cranksh and one of the cures of failure (wh generally starts at such a point) is to duce a residual compressive stress the surface of the hole.

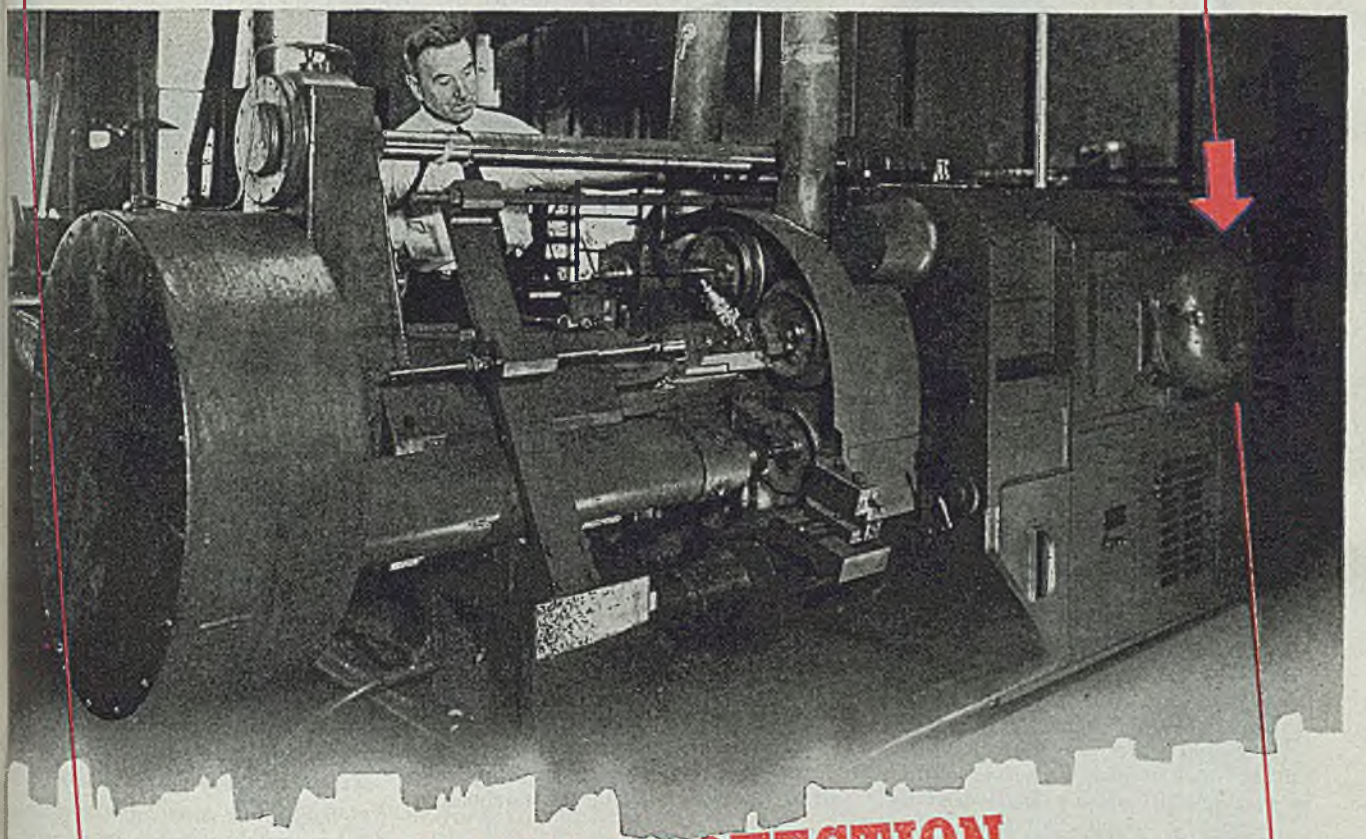
Steel pieces have shown very defi increase in fatigue strengths due to blasting or other treatment resulting residual compressive stress in a sur layer.

This whole field has just been scratc lightly but the opportunity for studie stress distribution as related to cas design is so vast that no progres foundryman or design engineer can af to neglect it or ignore the vast amo of knowledge and methods of deter ing stress distribution that are now av able to him. As an example of the c mercial value of such work, we m cite the case of a crankshaft redesig worked out by a Meehanite foundr

As redesigned in a Meehanite cast total weight was 2291 lb and the amo of metal that had to be machined off 272 lb. In the previous design, the ro crankshaft weighed 8855 lb, requiring removal of 6696 lb of metal. Machi time for the new design was 52 against 340 previously.

Economies of this sort accompa by surer knowledge of safe and s factory service performance are proo progress which has been and will b essential to the profitable operation

15 horsepower Century Totally Enclosed Fan Cooled Motor driving a multiple spindle automatic lathe. This motor is protected against dust, chips, and coolant mist.



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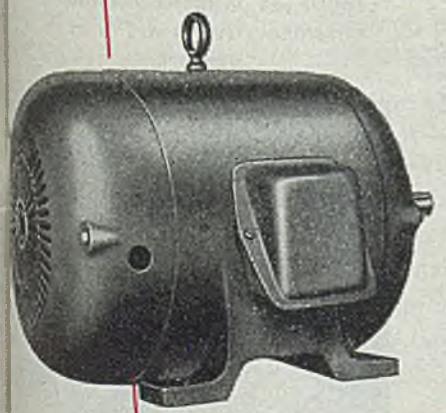
The thorough protection of the vital parts of Century Totally Enclosed Fan Cooled Motors guards against such destructive forces as abnormal amounts of metallic and abrasive dusts, metal cuttings, coolant fog or mist, oil-laden factory dust, chips, etc.

The inner sealed frame of these motors prevents destructive, dust-laden atmosphere from getting into the motor.

Another feature that contributes to longer motor life is the effective cooling of Century TEFC Motors. A large, enclosed fan forces a controlled blast of cooling air through the large air passages, over the active magnetic material and around the bearing housings.

For protection that will keep your machines operating in destructive atmospheres, specify Century Totally Enclosed Fan Cooled Motors. TEFC Motors are only one of the wide range of sizes and types of Century Motors from 1/8 to 600 horsepower.



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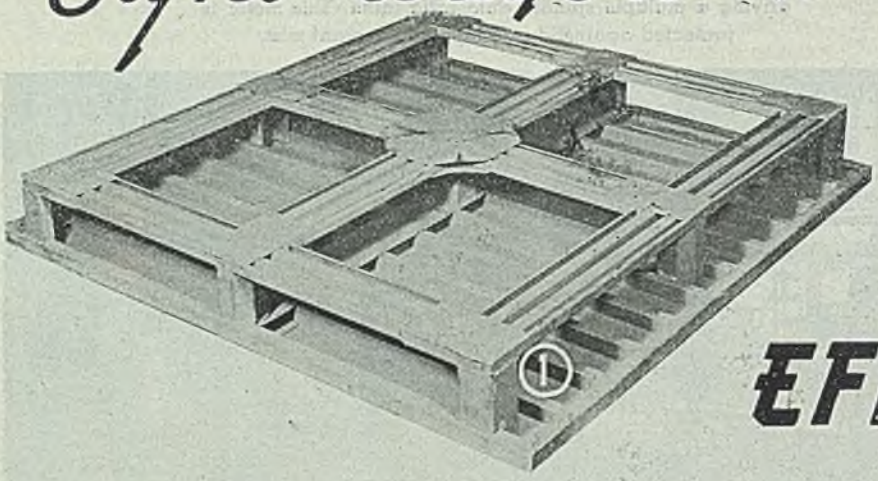


New 8-way pallet used by U. S. Navy's Bureau of Ordnance provides important increases in versatility and flexibility in handling and stowage, at same time reducing aisle space requirements and strengthening unit loads

ACCESSIBLE from any side or corner, the new laboratory-tested piece of handling equipment known as the 8-way pallet is a highly significant variation on the fork-truck-pallet theme. Many of the most universal problems of materials handling are eliminated because of the wide application of its four primary advantages: Versatility in handling, flexibility of stowage arrangements (with rectangular pallets), reduction of aisle space required, and strengthening of unit loads.

An 8-way pallet set down from one direction may be picked up from another, so that removal of unit loads need not be a reversal of the placement process. For general handling this means easy maneuverability in confined spaces such as are commonly found at the end of production lines, in crowded aisles, or on narrow loading platforms. The feature is especially valuable in warehouses with a rapid turnover where the posit of the aisles fluctuates and where sto are likely to be buried unless they accessible from more than one side.

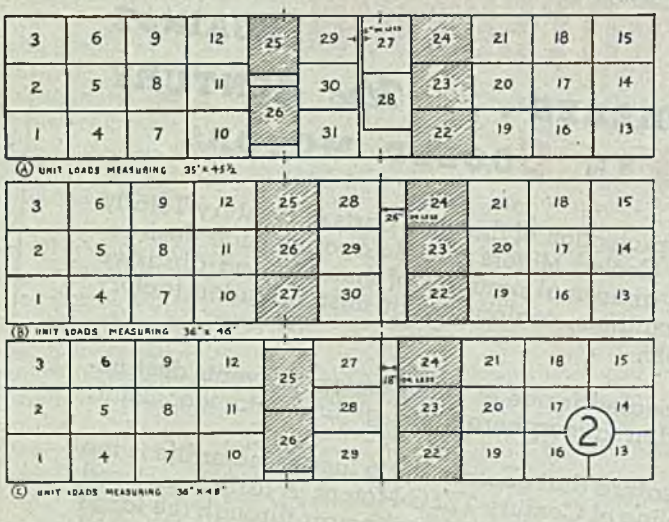


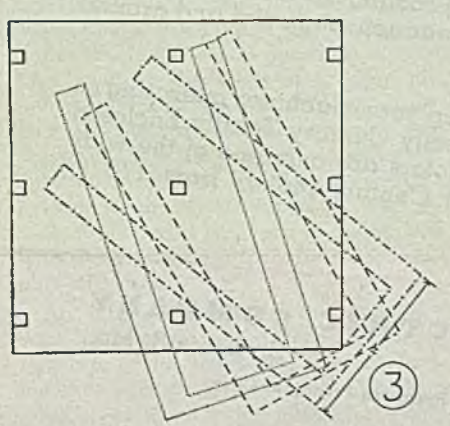
Fig. 1 — One of several new reinforced steel designs of the 8-way pallet, shown here bottom up to show construction

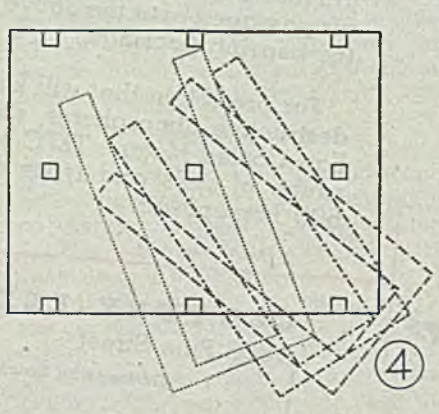
Fig. 2 — Three methods of stowing a freight car with 35 x 45½-in. pallets made possible by the new 8-way pallet. Shaded units should be loaded by transporter

Fig. 3 — Entry angles possible on standard 4-ft square 8-way pallet when upright supports are no more than 2 in. square or 3 in. diameter. Corner and center supports could be larger without hindering accessibility, but not the other four supports

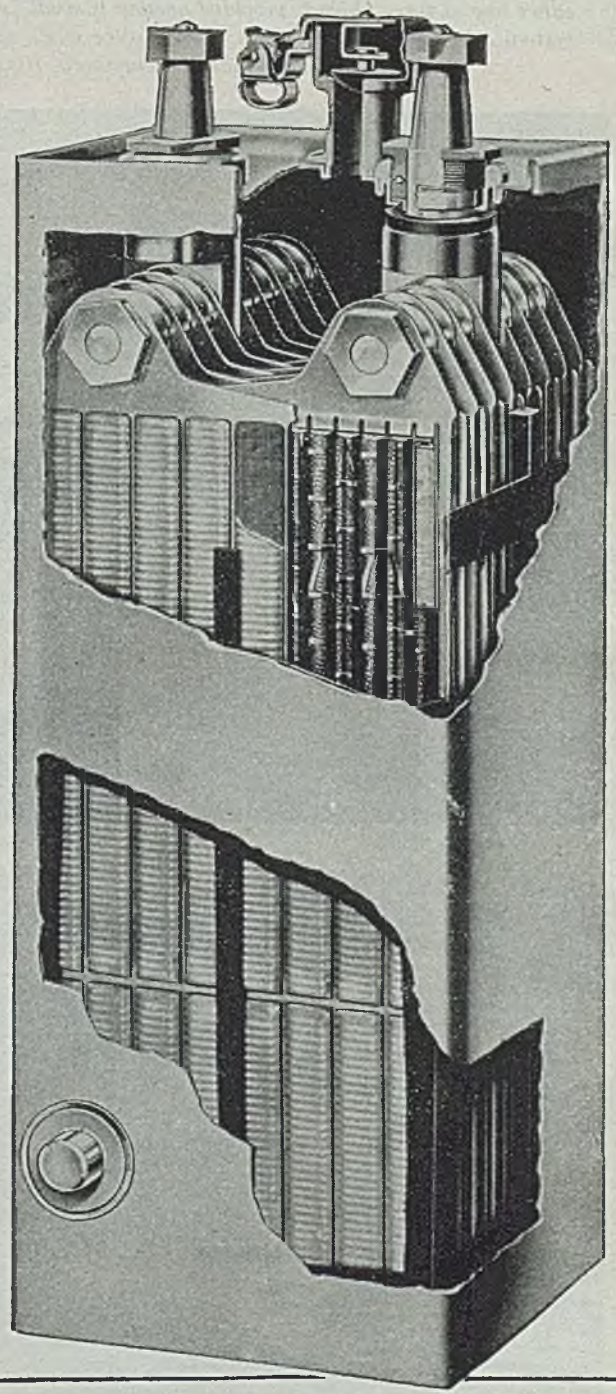
Fig. 4 — Somewhat more limited entry angles on standard 35 x 45½-in. pallet caused by supports being closer. Setting supports in from edge on larger pallet has same effect

Fig. 5—Diagonally stowed 8-way pallets can be approached from two directions even in a 7 ft aisle as shown here





MOST RUGGED OF ALL



Here is a cut-a-way view of a single cell of a typical Edison Alkaline Battery for operating electric trucks in industrial material-handling services. Note the ruggedness and precision of its construction. The container, cover, pole pieces and other structural parts are made of STEEL. Even the active materials are permanently locked in perforated STEEL tubes and pockets. These in turn are securely assembled into STEEL grids to form the positive and negative plates. The STEEL cover is welded onto the container. This cell construction is entirely different from that employed in other types of storage batteries . . . and every difference is an advantage to users of alkaline batteries in industrial trucks.

Because of their STEEL construction, they are by far the most rugged and durable of all batteries. When it comes to standing up under the shocks, vibration and hard usage in material-handling services, they have no equal. Alkaline batteries in trucks have fallen off loading platforms and docks, turned over, and even dropped down elevator shafts with little or no damage . . . and still delivered their full service life. The fact they can withstand such accidents, indicates the extra dependability that can be expected from them under more normal conditions. Their durable mechanical construction is also one of the principal reasons why alkaline batteries stay on the job and out of the repair shop, give longer life, and help cut material handling costs. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.*

Edison
ALKALINE BATTERIES

is also useful in lighter loading and ship-loading because it eliminates the perplexing question of which way to face the stringers in each section of the hold.

Carloading is facilitated by the 8-way feature. Flat cars (and open highway trailers) can be loaded or unloaded from any direction by equipment on either ground level or platform level, an advantage which becomes important if the cars (or trailers) are used in a congested area.

When box cars are being loaded with such items as ammunition in tanks, which often require that all the units face the same way, it is handy to be able to set pallets fore and aft into the door area without need for dunnage on the de Also, when a fork truck on ground le is feeding loads to a hand lift truck in t car, the hand truck can run them direc into position without having to t around.

The 8-way entry enables rectangu pallets to be used in a variety of stowa patterns that would be impossible if the pallets had to be facing the sa way. This feature can be a real spa saver in warehouses having structu disadvantages such as columns, alcov and the like. For example, if columns 15 ft apart center to center, it is i practical to stow more than three sta dard Navy 35 x 45½-in. pallets of t two-way design between them, and nea 4 ft of space is wasted. However, th 8-way pallets can be placed wide way and one the narrow way.

In irregularly shaped warehouses w alcoves or bays, similar combinations frequently be used to accommodate greater number of loads than could stowed with 2-way pallets. Also, it may convenient to pick up such pallets fr

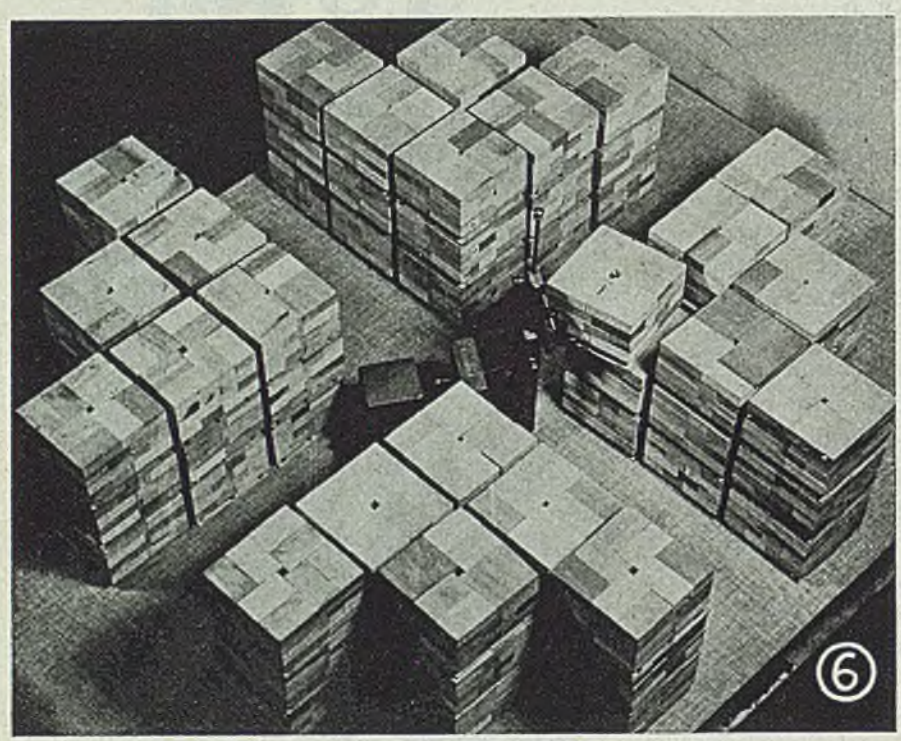
(*Please turn to Page* 172)

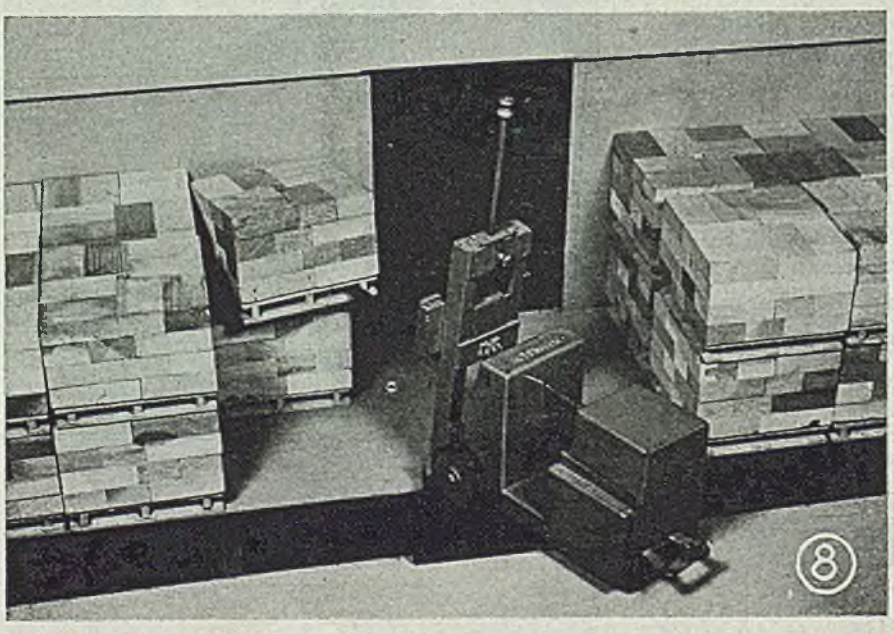
Fig. 6—A 4000-lb capacity fork truck can enter an 8-way pallet at intersection of two 7-ft aisles as shown here. With corner stow removed, ones on either side are easier yet

Fig. 7—Cars can be unloaded on narrow platforms by using a transporter to feed a fork truck

Fig. 8—The 8-way feature greatly facilitates placing last pallets in a freight car as it enables the truck to get forks under corner and swing pallet around

Fig. 9—BuOrd's 8-way 35 x 45½-in. pallet can be loaded into a freight car either two or three abreast, provided overlap is small. A wide range of loading patterns is possible. Photos Figs. 5-9 inclusive made with small models at the Navy's Materials Handling Laboratory, Hingham, Mass.



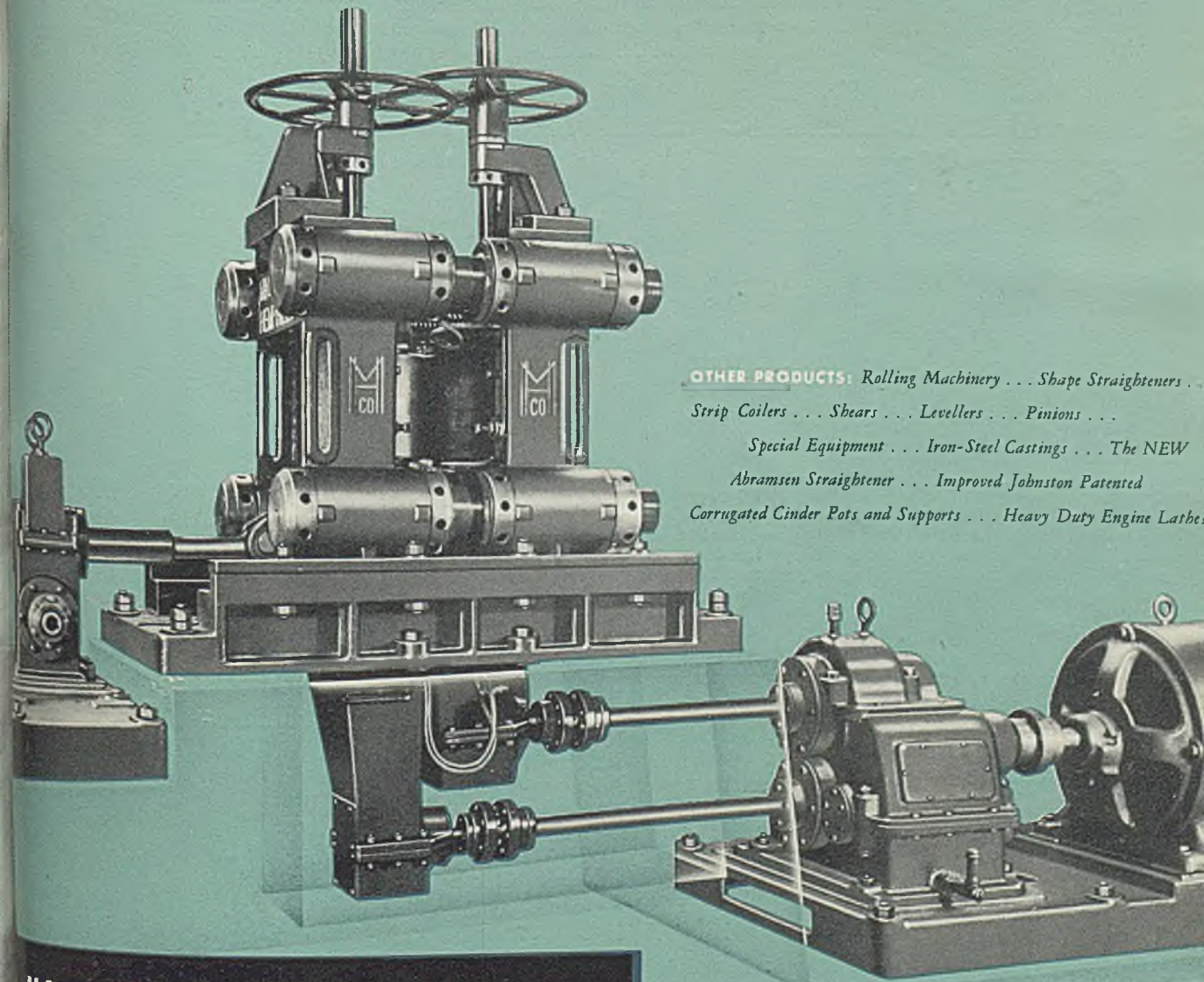


Here is a vertical precision mill of exceptional accuracy. It handles rounds from 3/8" to 1½" diameter and can be set up to edge shapes and flats. The extremely simple and rigid design of this mill and its easily accessible adjustments and locking devices have helped make it an outstanding success.

Equipment of this kind typifies Mack-Hemp's *advanced industrial thinking* backed up by their perfectly coordinated, balanced and specialized facilities in metallurgy, engineering and manufacturing.

Mack-Hemp is heavy industry's proved and logical approach to increased production, reduced operating costs, higher quality products.

Rolls hot rounds within cold round tolerances



OTHER PRODUCTS: *Rolling Machinery . . . Shape Straighteners . . . Strip Coilers . . . Shears . . . Levellers . . . Pinions . . . Special Equipment . . . Iron-Steel Castings . . . The NEW Abramsen Straightener . . . Improved Johnston Patented Corrugated Cinder Pots and Supports . . . Heavy Duty Engine Lathes*

MACKINTOSH-HEMPHILL COMPANY

PITTSBURGH AND MIDLAND, PA.

DC

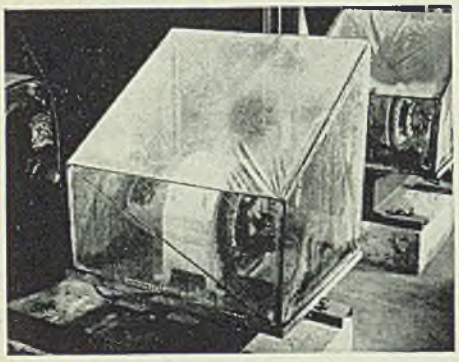
DOW CORNING

SILICONES

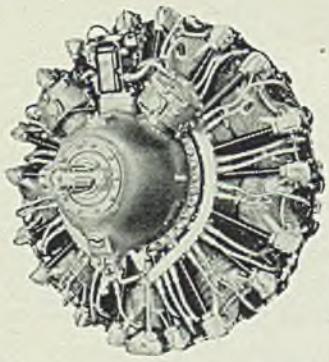
Exclude → Water

. . . even after aging at elevated temperatures

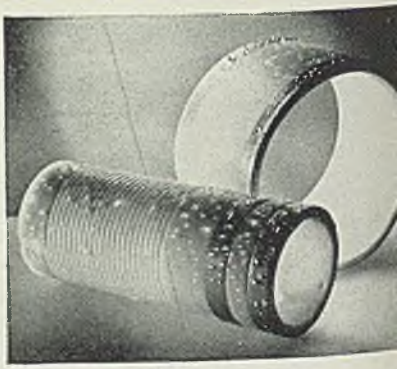
Water repellency is one of the basic properties of Dow Corning Silicone products. Exceptional stability over a wide temperature range is another. These two properties recommend Dow Corning Silicones for the solution of many hitherto insolvable industrial problems involving the exclusion of moisture at elevated temperatures.



DC VARNISHES and RESINS have made possible Silicone Insulation, a new class of electrical insulation which excludes moisture from equipment operating in wet or hot locations despite normal operating temperatures of 175° C.



DC COMPOUNDS are heat stable materials easily applied to form a waterproof dielectric seal for disconnect junctions in ignition systems, radio and radar equipment. Non-melting, low freezing properties keep compound where it belongs.



DC FLUIDS, colorless, odorless, in liquids, form a durable water repel film over glass and ceramic surface enable insulator bodies to retain th originally high surface resistivity e after immersion in salt water.

DC Silicone Varnishes, Fluids, Greases, Compounds and Rubber (Silastic*) are in commercial production and in general distribution. Inquiries are invited concerning your particular problems involving moisture exclusion, high temperature insulation and special lubrication.

*TRADE MARK, DOW CORNING CORPORATION

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

New York Office: Empire State Building

Dow Corning

FIRST IN SILICONES

STEE

Modern HEAT TREATING Practice

By ARNOLD P. SEASHOLTZ
Metallurgical Engineer
E. F. Houghton & Co.
Philadelphia

Fourth article on heat treating and quenching defines the purpose of carburizing steel and relates explicitly how a hard surface can be produced upon a tough, ductile core. Preceding articles of series reviewed principles of the subject, construction and use of S-curves, hardenability tests and quenching

CARBURIZING is one of the oldest ...allurgical processes on record. Case ...dened knives, chisels and other tools ...e been found in Egyptian tombs of ...0 to 200 B. C. The early 17th cen...y was the beginning of the cementa... process of steelmaking. Purpose of ... cementation process was to increase ... carbon content of wrought iron ... about 0.05 per cent carbon to near ...per cent carbon. Often during the ...urizing the carbon reacted with ... oxide of iron to form carbon mono... and when the reaction took place ...eath the surface of the metal, blisters ...e produced. For this reason the steel ... sometimes called blister steel. Later ... surface of armor plate was carburized. Today the process has been developed to the extent that it is of commercial importance and has a long record of successful applications in industry.

The object of carburizing or case hardening is to produce a hard surface upon a tough, ductile core. The case can be varied to any depth by controlling time and temperature of the carburizing cycle. Selecting the proper heat treatment after carburizing, the part can be provided with a case of high fatigue and wear resistance and a wide range of core properties. It is employed where high hardness, high strength or wear resistance are required of the surface and it is essential for the core to be tough to resist shock or soft to permit machining. Gears, camshafts, bearing races, ball bearings are a few parts that are case hardened.

Fig. 17 — Fine grained steel as shown by McQuaid-Ehn test. Nital etch. X100

Fig. 18—Coarse-grained steel micrograph at X100 from same test

Carburizing of case hardening is done by three methods: (1) Solid or pack carburizing, (2) gas carburizing, and (3) liquid salt bath carburizing.

Pack carburizing is dependent on the action of CO and CO_2 mixture with the steel; in gas carburizing the agent may be any of a number of hydrocarbons with which CO is present. In liquid salt bath carburizing, the carbon is obtained from the reaction of the composition of activated salts.

Carburizing steels should have the ability to absorb carbon uniformly at the usual carburizing temperatures, and to harden satisfactorily in a suitable quenching medium. The presence of iron oxide and nonmetallic inclusions, such as found in bessemer screw stock, rimmed or semikilled steels, greatly affect the ability of the steel to meet these requirements. Carburizing quality is controlled in the manufacturing of the steel. Since low carbon steels are made "killed", "semikilled", "rimmed" or "capped", it is important to specify to the source of the material when steel is to be used for carburizing. Good quality carburizing steel must be throughly killed and have a normal grain structure.

In 1922 McQuaid and Ehn found that

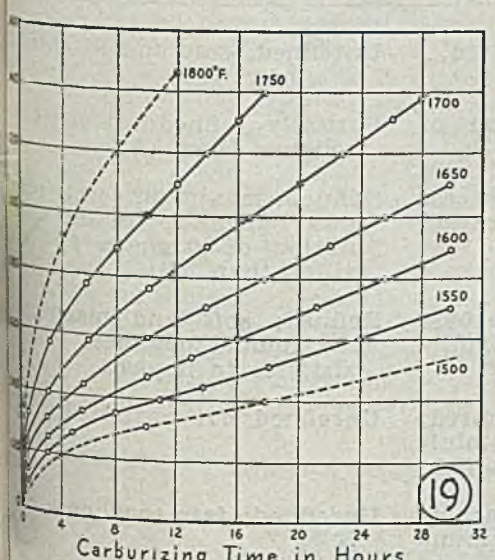


Fig. 19 — Effect of temperature on case depth SAE 3115 steel carburized in natural gas. Curves for solid carburizers would be approximately the same for equal lengths of time at heat

TABLE IV
LIQUID CARBURIZING PENETRATIONS

Minutes	Degrees Fahr. 1500	1550	1600	1675
30	0.006-0.008	0.007-0.009	0.009-0.011	0.010-0.012
60	0.008-0.010	0.010-0.013	0.013-0.015	0.016-0.018
90	0.010-0.013	0.014-0.017	0.017-0.020	0.020-0.023
120				0.025-0.027
180				0.031-0.034
240				0.040-0.042

carburizing steels which developed soft spots in the carburized case when heat treated had a different carbide formation in the grain boundary than steel that hardened satisfactorily. The satisfactory structure was termed "normal", the unsatisfactory "abnormal." (See STEEL, September 10, p. 114, McQuaid-Ehn Test). The hyper-eutectoid case of a normal steel, when slow cooled from a carburizing temperature, has a fine lamellar pearlitic grain enveloped by a thin network of hyper-eutectoid cementite. (See Figs. 17 and 18). Abnormal steel is identified when the pearlitic grain is surrounded by free ferrite with irregular networks of islands of hyper-eutectoid cementite.

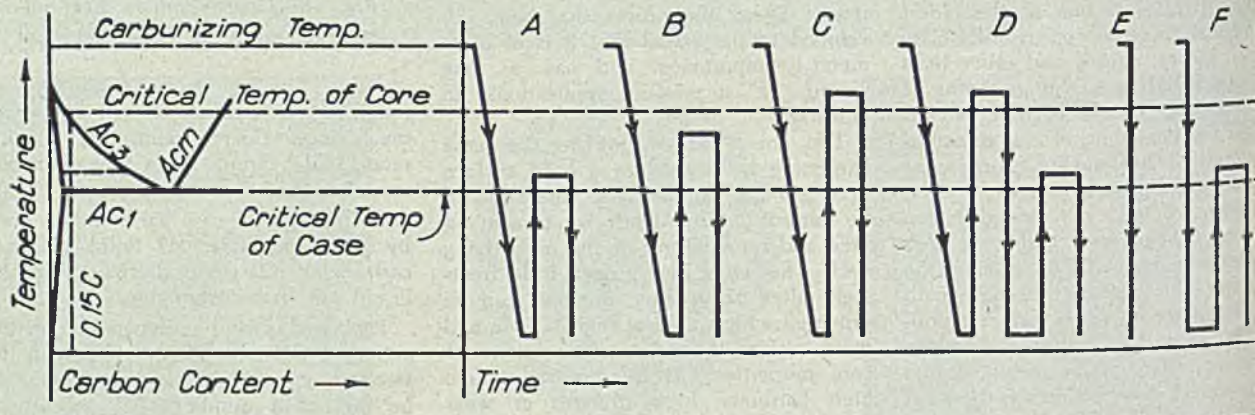
There is some difference in the readiness with which carbon is absorbed in the carburizing grades of both standard and alternate grades. NE 8020, 8620, and 9420 are above the average for alloy steel, yet show no tendency to build up high carbon concentrations at the very surface, as do SAE 4120, 5120 and 6120. Manganese, chromium, nickel and molybdenum in various combinations are added to the steel to increase the strength and hardness of the core and help produce very hard, wear-resistant cases. Manganese steels were once considered to be coarse grained and brittle, but by controlled ladle additions they can be made fine grained, which largely overcomes this brittleness.

Pack Carburizing

Commercial carburizing materials used in pack carburizing vary in composition, resulting in a different rate of carbon penetration and character of case. Base of the carburizing compo may be charcoal, coke, or a mixture the two combined with some form energizers. Carburizing Compou energized with either sodium carbo or barium carbonate have greater r of penetration over plain charcoal coke. Barium, calcium and sodium various forms are used for the en izers.

In G. K. Manning's summary (19 before ASM of "Carburizing Charac istics of 0.20 Per Cent Carbon A and Plain Carbon Steels", he sta "Alloying elements, when present in amounts generally found in the ca rizing grade steels, had no pronoun effect on case depth. The presence chromium led to extreme carbon build at the surface, when carburized in s compounds. Nickel tended to mo the effect of chromium to some ex One of the five carburizers investig appeared to overcome completely tendency of chromium toward a carbon surface. Cooling rate had appreciable effect on the surface ca content of the carburized case. longer the time, the higher was surface carbon and the deeper case, providing the low carbon

Fig. 20—Diagrammatic representation of various hardening treatments for carburized steels and summary of case and core properties



Treatment	Case	Core
A (Best adapted to fine grained steels.)	Refined; excess carbide not dissolved.	Unrefined; soft and machina
B (Best adapted to fine grained steels.)	Slightly coarsened; some solution of excess carbide.	Partially refined; stronger tougher than (A).
C (Best adapted to fine grained steels.)	Somewhat coarsened; solution of excess carbide favored; austenite retention promoted in highly alloy steels	Refined; maximum core stren and hardness. Better com nation of strength and d tility than (B).
D (Best treatment for coarse grained steels.)	Refined; solution of excess carbide favored; austenite retention minimized.	Refined; soft and machina maximum toughness and sistance to impact.
E (Adapted to fine grained steels only.)	Unrefined with excess carbide dissolved; austenite retained; distortion minimized; file proof when carbon is high.	Unrefined but hardened.
F (Adapted to fine grained steels only.)	Refined; solution of excess carbide favored; austenite retention minimized.	Unrefined; fair toughness.

Scrap Heap into "Treasure Trove"

How RADIOGRAPHY reclaimed $35,000 worth of castings from an $840 scrap pile

Almost as dramatic as a Yukon "gold strike," here's a case history of radiography speeding production . . . rescuing $35,000 worth of castings from the scrap pile . . .

Costly, complicated to cast, these 40-pound housings demanded—and received—the most precise casting technics. But in spite of all precautions, flaws were unavoidable . . . deliveries fell behind requirements.

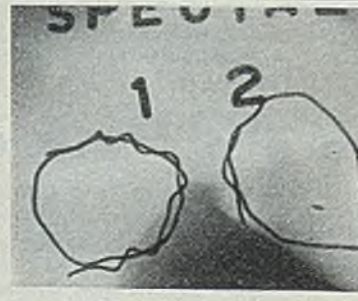
The suggested remedy was repair welds. But how could they be proved sound?

How? The foundry used radiography to locate the internal irregularities . . . then made the welded repairs and x-rayed them. Study of the new radiographs showed the repaired castings to be acceptable. The 350 castings which were thus salvaged each month brought deliveries up to schedule—with a monthly saving of thousands of dollars.

This case history—repeated in many industries—shows how radiography serves as a design and improvement tool . . . as well as an inspector. Tremendously increasing industrial output, under rigid inspection standards, radiography has more than "won its wings." Tomorrow, it will be an even greater *must*. Why not investigate its possibilities for you, now? See your local x-ray equipment dealer.

Investigation discloses irregularity. A flaw typical of those which slowed the foundry's deliveries on these complex housings.

Welding repairs the condition . . . BUT: Is the weld sound, is penetration satisfactory and metal well fused? Will the casting meet inspection requirements?



Radiography approves the repair: "Yes," says this radiograph—welding has made the rejected casting sound, sturdy, acceptable—and ready to use.

EASTMAN KODAK COMPANY, *X-ray Division,* Rochester 4, N. Y.

RADIOGRAPHY

ANALYZES . . . INSTRUCTS . . . CORRECTS . . . IMPROVES

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FOR THE FIRST TIME—

Authoritative information about Crush Form Grinding Precision Contours on a Completely Engineered Machine

Results of ten years of full-time study and development are graphically illustrated in this first pictorial booklet on crush form grinding precision contours with surface grinders. Savings in time and labor and improvement of finished work made possible by completely engineered machines warrant a thorough investigation of this machine process.

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CRUSH FORM CONTOUR GRINDING DEVELOPMENT LABORATORY

The Thompson Grinder Co. Inc., Dept. 11, Springfield, Ohio

Gentlemen: Please send me your new 16 page pictorial book describing Crush Form Contour Grinding on Surface Grinders.

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0003 to 0.001-in. deep after 10 hours at 1700° F was disregarded. For a constant time, the higher the temperature, the higher was the surface carbon and the deeper the case, again providing that the low carbon skin was disregarded."

During the past 10 years, rapid development has been made in gas carburizing in both continuous and batch type furnaces. This process is dependent for its carburizing medium upon the introduction into the furnace chamber of hydrocarbon gases, such as natural gas, butane, propane and often city gases. Liquid hydrocarbon oils volatilized by the temperature of the furnace chamber are also used.

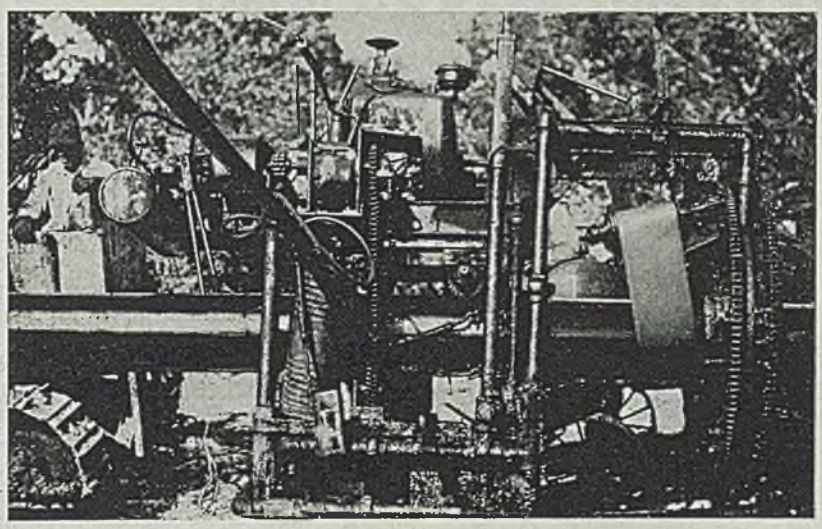
Steels carburized in solid compounds are equally adapted to gas carburizing. The total case depth, surface carbon content, and the carbon concentration gradient from surface to core are all functions of temperature, time and the characteristics of the carburizing mixtures used.

Liquid Salt Bath Carburizing

Carburizing salts are a mixture of activated salts, composed of neutral salts with a cyanide content. On the surface of the bath is a carbon mixture forming a crust which is capable of being dissolved in the liquid bath to keep the bath supersaturated with carbon, with a minimum burning or consumption. This method of liquid bath carburizing is capable of penetrations up to 0.125-in. deep. The case is a true carbon case and differs from the nitride case obtained from cyanide hardening at somewhat lower temperatures. The rate of penetration will vary somewhat for different steels and with the carburizing temperature. Depth of penetration is a function of time and temperature as is shown in Table IV.

Time for carburizing is much reduced when liquid salt carburizer is substituted for the older pack carburizing, especially when several hours may be necessary to bring the pots up to heat, depending upon the type of parts and size of the charge. The parts are brought up to heat much more rapidly and evenly when heated in a molten salt bath. Also, the total heat treating time will be reduced as compared with gas. One of the chief advantages of salt bath heat treatment is the uniformity of heating obtained. Parts treated in salt baths are likely to suffer only a minimum of distortion. This holds true for such parts as transmission and differential gears, stem pinions, spline shafts, etc.

Work which has been carburized in a liquid bath may be quenched in water, brine or oil according to the results desired. Work which has been quenched in either water or brine will emerge free from salt or requiring only a hot water rinse. For cleaning after an oil quench, an alkaline cleaner is used. The parts retain much of the original finish except that there is a wavy pattern of slight mottling to indicate they have been heat treated.



PIPE WRAP: To prevent corrosion of pipe on a Texas oil line, thin porous mats of bonded glass fibers in roll form are being applied as a carrier for the asphalt-bitumen coating. Coating is applied first, then Fiberglas mat, a product of Owens-Corning Fiberglas Corp., Toledo, O., is wrapped on pipe by machine shown at rate of more than 4000 ft of 10-in. pipe per day. Individual glass fibers have average diameter of 0.0005-in., while mats are produced in thickness from 0.010 to 0.050-in. and widths of 22 and 36 in. Rolls are 150 and 300 ft in length

Carburizing steels are furnished fine or coarse grain. Coarse grain steels generally are used for their easier machining and deeper hardening qualities. Fine grain steels do not coarsen at the carburizing temperatures, so when quenched direct from the carburizing temperature, the result is a tougher product. Generally a coarse grain steel requires a double treatment for the added toughness. Temperatures vary from 1550 to 1675° F and can be controlled within the limits of error of the pyrometer equipment. Gear teeth, representing relatively thin sections, might be expected to heat more rapidly than the mass of metal at the root. A uniform heating by conduction of the salt at all points results in a minimum of distortion.

Increased carbon of the case lowers the critical range of the steel. The carburized case therefore will require a relatively low temperature for hardening, while a higher one will be required for the low carbon core. These differences permit a number of variations in heat treating to be used after carburizing to provide a wide range of case and core properties. It is also important to keep in mind in determining the proper heat treatment that grain size is an important factor in obtaining maximum ductility and toughness to resist shock.

To understand the control of grain size, let us follow the changes in a piece of plain carbon, carburizing steel with 0.15 per cent carbon. Before heating, it has the structure produced from heat for rolling or forging. As its temperature rises, its grain size remains the same until it reaches its lower critical or Ac_1 temperature, at which moment it begins to transform to austenite. It will reach minimum grain size at the Ac_3 temperature.

Let us assume it has a grain size 6 to 8. An Ac_3 temperature for a 0.15 carbon steel is about 1575° F. If the steel is now heated to a higher temperature, it is found that coarsening does not begin immediately. There is a temperature range in which the grain size remains constant. Let us assume this steel remains the same grain size from the moment it transforms to austenite at 1575° F till it reaches the temperature of 1600°. When heated to above 1600° F, it begins to coarsen. A portion of the grains begin to coarsen, while the majority of the grains are still at their original 6 to 8 grain size. This mixture of mixed grain size (fine and coarse) is called a duplex structure and definitely is an undesirable grain structure for good physical properties, tending toward distortion in heat treating. Heating still higher to a temperature of 1700° F, the grains become coarser consisting almost entirely of No. 1 or 2 grain size, with a few No. 6 or 8. At still higher temperature, the last of the No. 6 and 8 grains will disappear and the steel will be coarsened entirely.

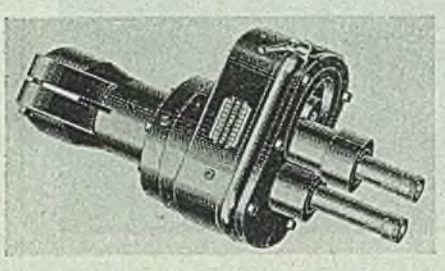
Steel that has coarsening temperature below 1700° F is considered coarse grain steel, while steels that retain an austenitic grain of 5 to 8 grain size at temperatures 1700° F or above, are considered fine grain steel. The McQuaid-Ehn carburizing test shows whether the coarsening temperature of the case is above or below 1700° F. The adopted

(*Please turn to Page* 176)

INDUSTRIAL EQUIPMENT

Adjustable Drillhead

Thriftmaster Products Division of Thomson Industries Inc., 29-05 Review avenue, Long Island City, N. Y., announces a new two spindle offset type drillhead in which one spindle is built integral with the drive shaft and the other is offset and adjustable for variable



centers. This permits drilling on closer centers. The three sizes used most have spindles provided with ¼-in. capacity chucks, No. 1 or No. 2 Morse taper and are available from standard designs. This drillhead is of full ball bearing construction, having all vital parts enclosed running in grease.

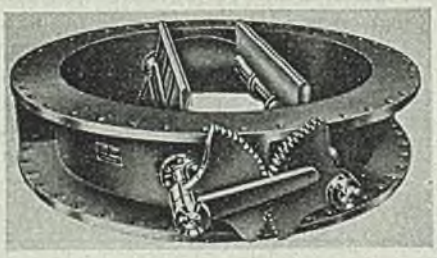
Grinding Machine

Fitchburg Grinding Machine Corp., Fitchburg, Mass., announces a new multiple precision grinding machine for plunge-cut grinding three spottings on 96 in. torsion springs for tanks. It grinds all dimensions at the same time within time of longest single grinding operation and in one handling. If any operation is discontinued, heads can be used elsewhere, either on standard machines or regrouped and remounted on new special bases.

Normal swing over table is 6 in.; maximum swing, 18½ in.; maximum diameter with 3 in. rapid traverse, 6 in.; maximum distance between the centers, 96 in. Range of work speeds is 51 to 306 rpm; work speed drive is a V-belt and chain.

Butterfly Valves

Development of double louver butterfly valves for use in blast furnace gas mains where dirty or abrasive gas is present is announced by S. P. Kinney Engineers, 233 Oliver avenue, Pittsburgh 22. Constructed of 12 per cent manganese, the louvers and filler pieces of these valves effectively resist abrasive materials in gas and prevent, through streamlining the flow, impinging of dust particles on sides of main. Body of the valve is made of either iron or heavy welded steel.

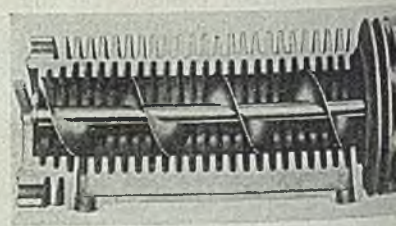


The butterfly valve can be used also to control the flow of gas in mains to washers, boilers or bleeder mains. The double louvers may be ground for very close clearance to give a complete gas shutoff or clearance may be provided as desired.

Equipped with packing glands and bearings, the two square shafts suppor ing the louvers are arranged with gear segment for operating both at t same time. They are operated easi by a hydraulic control cylinder. Louve are secured on these shafts by split ke located at back of louvers out of t abrasive gas flow.

Temperature Exchanger

Bird-White Co. 3119 West Lake stre Chicago 12, announces development of new temperature exchanger based on t principle of heat tranfer for air and g lines and offering as a byproduct, e ternal heating applications and positi purification by centrifugal action. Th unit as an after-cooler, is recommend for installation at the compressor d charge point. Supplied with external a internal cooling fins, it features a multip action helicoid flighting. Velocity of t element (air or gas) under pressure r volves the helicoid flighting at hi speeds forcing air or gas outward again



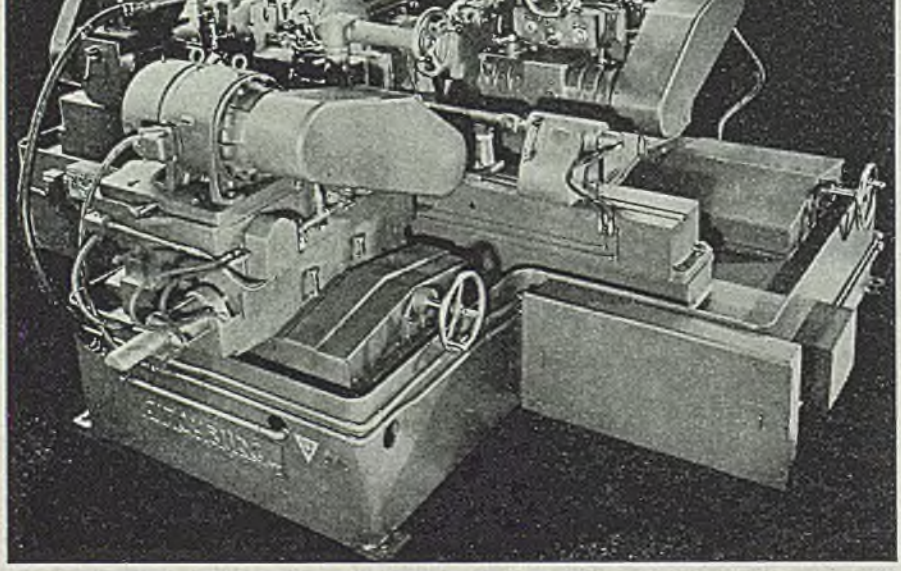
internal cooling fins. These intern cooling fins rapidly absorb heat or Bt generated in compression and dissipa this heat to outside atmosphere throu external cooling fins thereby lowerin element to room temperature in length unit. By this cooling action vaporiz moisture and oil suspended in eleme condenses and is entrained in sum assuring moisture-free, cooled eleme at discharge point.

Another advantage in design perm tandem installation to any requir length. The exchangers are availab for both flanged and screwed-ty assemblies and may also be supplied f either manual or automatic draining the sump.

Dust Collector

Designated as Model 420, a ne self-contained and portable dust collect for grinders, sanders, abrasive disks a cut-offs and polishing lathes is announc by Aget-Detroit Co., 602 First Natio building, Ann Arbor, Mich.

The unit features a cyclone separat motor driven multiple blade fan, lar dust storage bin, and flat, spun gl filter, all contained in an all steel, fir safe unit. Dust and dirt drawn in fro the source first enter cyclone separat



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

where most of the dirt is removed; f
filter, which comprises top of the d
collector, removes balance of dust a
dirt, returning cleaned air to worki
space. Measuring 12 x 22 x 24 in.,
can be placed in a small space behin
grinder or beside it. It is installed
slipping the flexible metal hose onto
inlet sleeves of the dust collector a
connecting hose to dust outlet of grind

Dust storage compartment is the s
of the entire base of the machi

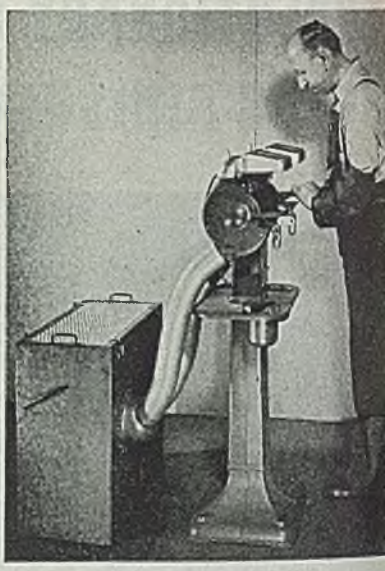


Plate on the front of the unit is
moved to empty the collected du
Power to provide the suction (which
rated at 420 cfm with a 1-in. static sucti
in a 5-in. pipe) is supplied by a multi
blade fan driven by a 1/4-hp continuo
duty 3450 rpm motor, the latter bei
available to suit almost any 60 cy
power supply.

Milling Machines

W. H. Nichols & Sons, Waltha
Mass., announces a new line of doub
spindle milling machines for light p
duction work requiring medium du
cuts in metals and plastics. These m
chines are designed so that two c
can be made simultaneously.

The machine illustrated has two o
posed spindles with No. 40 milling m
chine taper. Adjustments are provid
on this model so that spindles may
lined up or may be set out of li
vertically 2½ in., horizontally 2½ in. a
in or out 1½ in. Another model th
is available has two identical spindl
one directly over the other. A vertic
adjustment is provided so that cent
line of spindles may be positioned fro
4½ in., minimum, to 7½ in., maximu

Both models have a choice of spind
drives. They are regularly supplie
with two motors, one for each spind
so that independent selection of spind
rotation is obtained. An optional dri
uses a single motor which turns bo
spindles in the same direction. U
has heavy alloy spindles mounted
permanently lubricated ball bearing

Better Results

WITH

Follansbee

CLAD METALS

Silver, Copper
Copper Alloys on Carbon
or Alloy Steels

Stainless Steel
on Copper or Steel

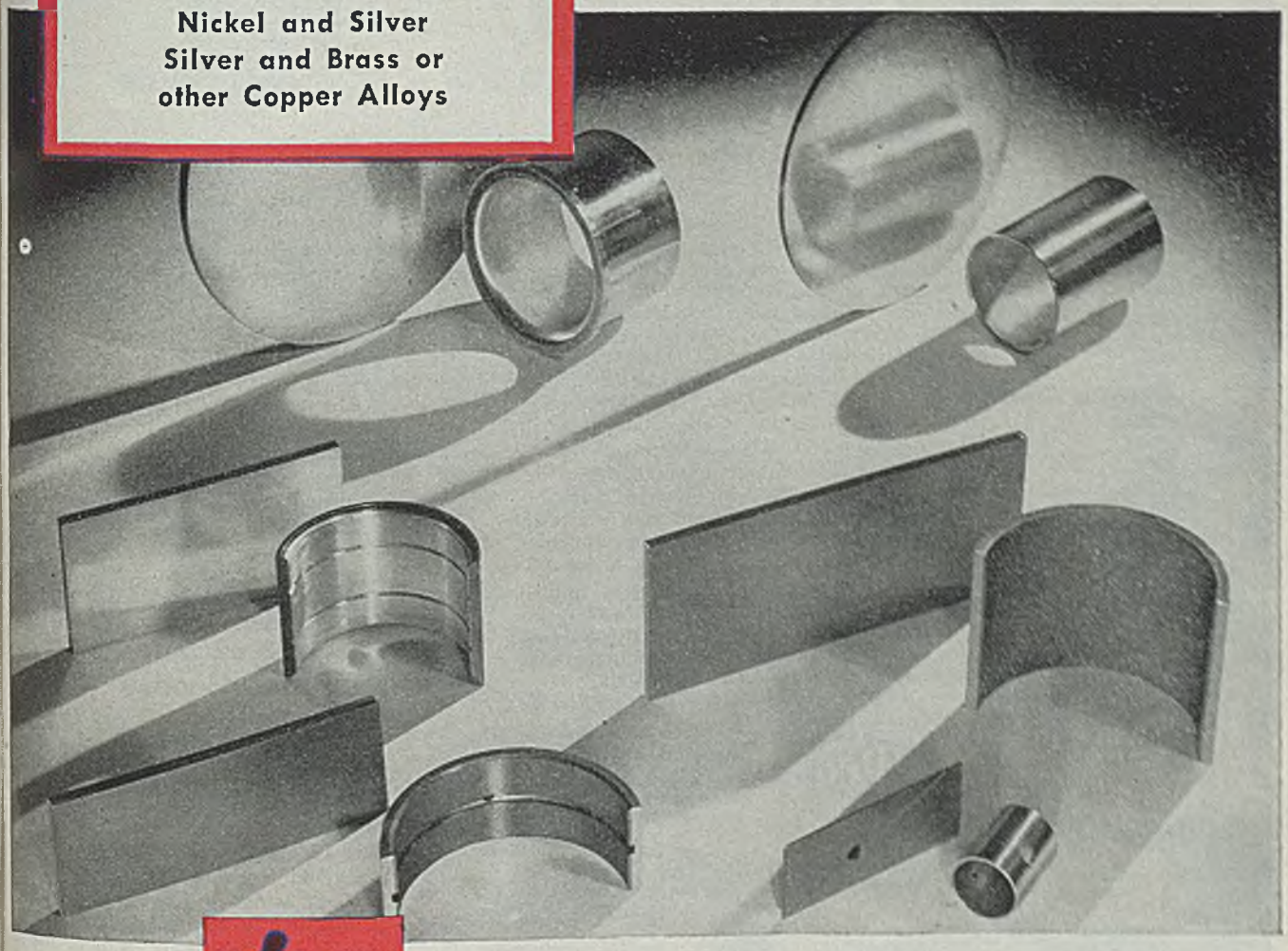
Other Combinations

Nickel and Silver
Silver and Brass or
other Copper Alloys

BEARINGS are but one of numerous products for which Follansbee Clad Metals provide highly desirable characteristics. Leading manufacturers of bearings, for example, are using Follansbee Silver and Copper Clad Steels to increase capacity and fatigue life. These bearings are performing superlatively under the severe conditions imposed by aircraft, automotive and marine engine use.

These and other combinations of Follansbee Clad Metals offer excellent potentials in such widely diverse products as Cooking Utensils, Electrical Contacts, Chemical Mixing Vats, Industrial Heating Vessels and Heat Exchangers.

If you are interested in exploring the possibilities of improving your products through the combination of two or more metals, you are invited to make use of our Clad Metal facilities. Just direct your request to our General Offices.



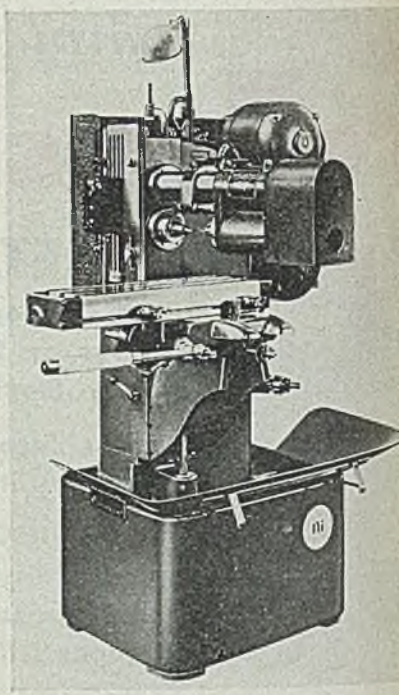
FOLLANSBEE STEEL CORPORATION

GENERAL OFFICES • PITTSBURGH 30, PA.

Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee. *Sales Agents*—Chicago, Indianapolis, Houston, St. Louis, Kansas City, Nashville, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Can. *Plants*—Follansbee, W. Va. & Toronto, O.

ALLOY BLOOMS & BILLETS, SHEETS & STRIP • CLAD METALS COLD ROLLED CARBON SHEETS & STRIP
POLISHED BLUE SHEETS • ELECTRICAL SHEETS & STRIP • SEAMLESS TERNE ROLL ROOFING

spindle nose is hardened and ground. Work table is cast of special wear resistant alloy with top ground to assure accurate location of standard work holders or special fixtures for semiautomatic production. Table is operated by screw



or by rack and pinion, and is fitted with graduated stops. All slides are pressure gun lubricated so that old is flushed out automatically each time gun is used. A quickly removable coolant tank is provided in the base.

Alloy Welding Rod

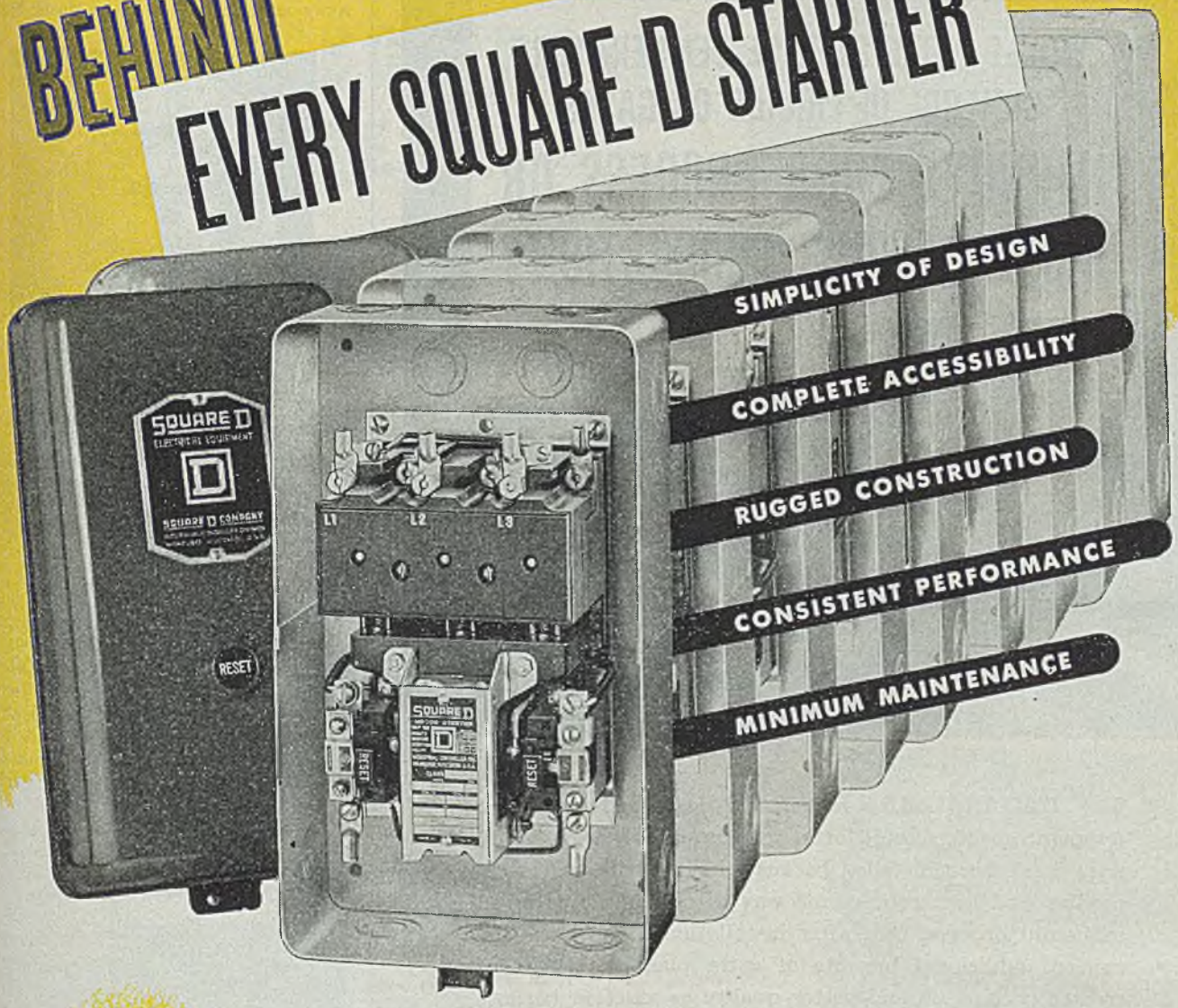
Chromend 9-M, an alloy electrode giving 8 to 10 per cent chromium and per cent molybdenum weld deposit, has been developed to meet the need for electrode that will give strength and corrosion resistance combined with high creep resistance for high temperature corrosion resistance work. It is a product of Arcos Corp., 1515 Locust street, Philadelphia 2.

Respirator Hoods

Designed to give complete head protection on operations involving dust and spray and at the same time allowing normal, unrestricted vision, a new line of respirator hoods is introduced by Industrial Products Co., 2820 North Fourth street, Philadelphia 33. They feature a plastic window of heavy gage (0.04 in.) for impact resistance. It can be replaced when necessary without use of tools. The device may be worn with or without correction glasses.

Type GA-200 is recommended for short period use where dust volume is so great as to make breathing for a length of time impossible without an air filtering device. For long periods operations where concentration of dust is not so heavy, type GB-200 is recom-

BEHIND EVERY SQUARE D STARTER



SIMPLICITY OF DESIGN

COMPLETE ACCESSIBILITY

RUGGED CONSTRUCTION

CONSISTENT PERFORMANCE

MINIMUM MAINTENANCE

MAGNET coils, contacts or overload relays can be changed in no time at all—and without disturbing external connections. Square D is designed for simplicity.

PLENTY of wiring space and easy-to-get-at terminals. Installation and inspection is faster and easier. Square D is designed for accessibility.

YOU can be sure that any starter from Square D's unusually complete line will do its job consistently and with minimum maintenance. Their performance in thousands of plants proves that Square D starters are built to "take it."

Write for Bulletin 8536

Square D Company, Industrial Controller Division,
4041 North Richards St., Milwaukee 12, Wis.

SQUARE D COMPANY

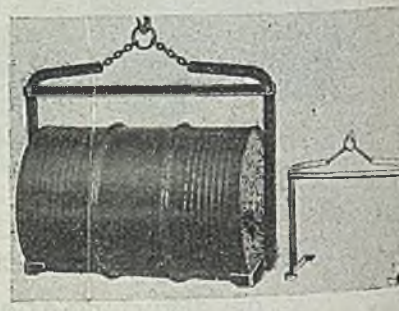
DETROIT • MILWAUKEE • LOS ANGELES

mended. Type GB-55 is the same as GB 200 except that it is fitted with respirator that is more adaptable for paint spray and general nuisance dusts. Sam

as GB-200, GB 1 is fitted with a chemical cartridge type respirator for absorption of fumes given off in spraying lacquers and enamels.

Barrel Cradle

An improved style toggle type barrel cradle is announced by Palmer-Shile Co. 796 South Harrington avenue, Detroit 17. It is able to pick up any shape barrel or drum with straight or bilged sides and with flat or chimed ends. While primarily designed for handling barrels and drums, it can also pick up rolls of paper,



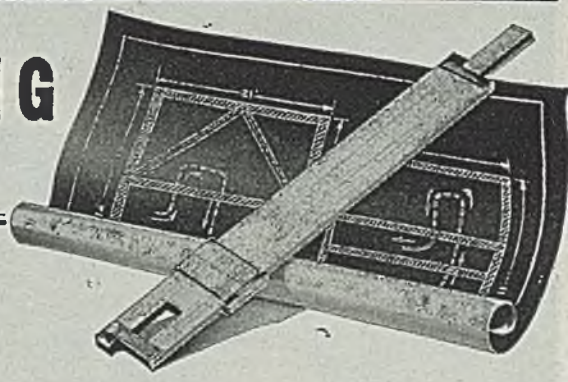
carpeting or other cylindrical packages. The unit has a capacity of 1000 lb and is made of heavy bar stock, welded construction.

The cradle shown here handles units 20 to 25 in. in diameter and 32 to 3[illegible] in. in length. Special sizes can be obtained.

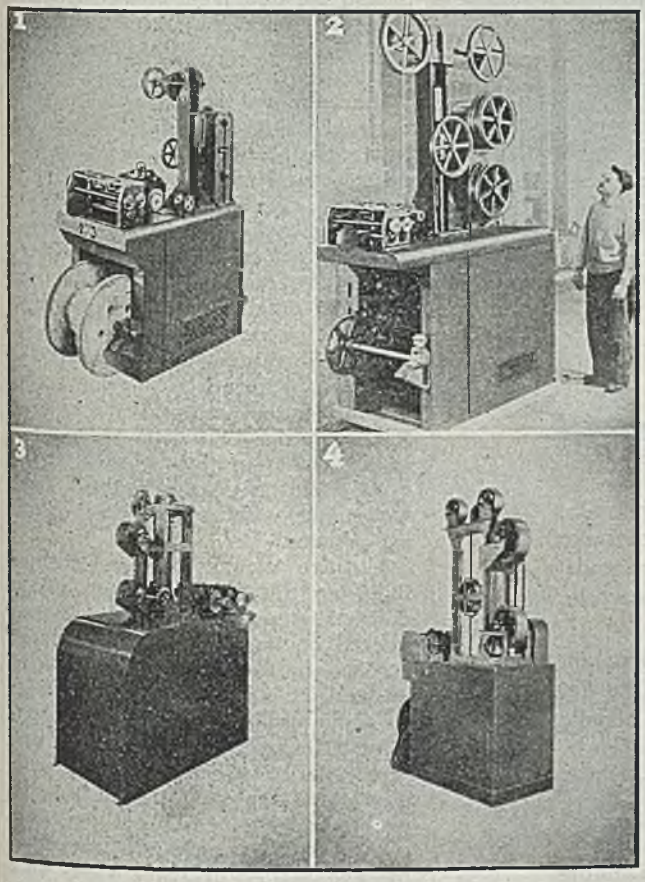
Incandescent Lamps

Incandescent lamps rated from 150 and 1500 w in eight sizes and three types for commercial and industrial lighting are available from Sylvania Electric Products Inc., Salem, Mass. All wattage sizes are available in clear. Inside frosted types are supplied in 300 w and larger sizes. Inside white bowl bulbs, particularly suited for use with standard RLM reflectors for industrial service are supplied in 150, 200 and 300 w sizes. All lamps are supplied for use in 115, 120 or 125 v circuits. Standard packages of 60 for 150 or 200 w; 24 for 300 w; 12 for 500 w and 6 for 750 or 1000 or 1500 w lamps are available.

OVEN ENGINEERING NEWS



IOE Constant-Tension Windups Now Available for Wide Range of Processing Applications



The coating, impregnating and drying of continuous materials, such as insulated wire, cable, tape, yarn, fabrics and cords, is a task which demands top engineering and machine design skill. One of the most important factors in any coating system is the windup machine, providing the motive power to draw materials through coatings, saturants and drying tower. All **IOE** windups, such as those shown left, are built on the same basic design, yet that design is flexible enough to suit a variety of applications.

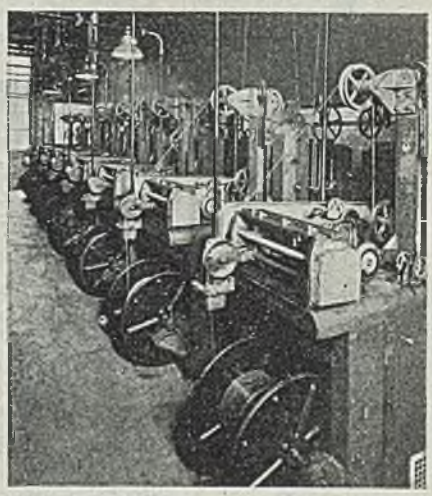
Fig. 1 shows a high-speed, low-tension unit for lacquering, saturating, waxing, respooling and monofilament impregnation. It will handle materials from .010" to .385" diameter at speeds up to 1500 feet per minute.

The large machine in Fig. 2 is a heavy-duty extrusion takeup for large diameter cable running at low speeds and high tensions. It handles flexible materials up to 1.50" diameter at speeds from 25 to 240 feet per minute, with tensions as high as 500 pounds.

The saturating takeup in Fig. 3 is designed for medium speeds and tensions. This machine handles material up to .750" diameter at tensions up to 40 pounds and speeds from 80 to 480 feet per minute.

Flat materials such as tape and textiles are handled by the machine in Fig. 4. This particular model is designed for materials up to 6" wide and .050" thick, though wider rolls are available. Tension is adjustable over a wide range, and the speed change ratio is 10 to 1.

All machines are available with hydraulic, electric or electronic synchronization, and with traversing mechanisms for wide lay range adjustment. Multiple units handling up to 12 ends simultaneously also are supplied by this company, a good example being the eight-end system shown below, in operation at the Lenz Electric Company of Chicago.



FREE BULLETINS

You may obtain, without charge, full data on windup machines and complete coating systems for continuous materials. Just drop us a line.

(This is No. 21 of a series. Reprints of previous advertisements will be sent free upon request)

ENGINEERING VERSATILITY

THE INDUSTRIAL *Oven Engineering* COMPANY

11621 DETROIT AVE., CLEVELAND 2, OHIO

Engineering Representatives in Principal Industrial Areas

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

Carburizing and Nitriding

(*Concluded from Page 118*)

case hardening effect. As in gas carburizing, the active constituents are in relatively small proportions, diluted with a carrier gas which has substantially no effect upon the reacting gases or upon the steel. Carbon dioxide and water vapor are harmful constituents and are excluded from the carrier gas. Frequent checks of the muffle gas dew point are made to insure against any influx of water vapor which will result in discoloration and tarnishing of the parts. Otherwise the parts emerge from the treatment clean and bright, with color resembling a dull-finished aluminum and require no further processing before use. Should the dew point check show presence of water vapor, its effect can be neutralized by feeding additional natural gas to the furnace atmosphere.

Furnace equipment was built by Surface Combustion Corp., Toledo, O., and is flexible in that a dozen or more different sizes and types of parts can be handled. Designed to process about 200,000 pieces per week, the equipment currently is handling some 400,000.

The slow cooling is adopted to minimize and distortion in the hardening of such thin pieces. The furnace has a side gas lock to permit withdrawal of trays for water or oil quench if the slow cooling is not required. Actually the combination carburizing-nitriding treatment at 1425°, followed by a slow cooling cycle, yields a surface hardness higher than normally obtained by usual quenching practice.

If there should be some distortion following the heat treatment, the individual pieces, of a single size, are stacked on an arbor, and while under pressure to straighten them are drawn at 600° F, a low enough temperature to avoid disturbing surface hardness.

With the exception of loading the tray at the start and one hand operation to transfer a tray from the cooling zone to the discharge vestibule, all operations of the furnace cycle are carried out by five master hydraulic valves on a central control panel located to one side of the furnace. A convenient signboard lists the sequence of valve operations which the attendant must follow.

Coating Stick Replaces Damaged Metal Finishes

For use in the cable and wire manufacturing field, Amco coating stick, manufactured by American Solder & Flux Co., Philadelphia 25, replaces the damaged metal coating brought about during the process of butt welding wire. It is necessary only to apply the stick to the heated wire. Brands include: A, a pure tin coating; B, a tin and lead combination; C, a lead coating; and E, a zinc coating. It is claimed that coatings produced by the stick are equivalent to the hot dip process.

How the New Murex Type U Eased Jonesy's Supervisory Duties

Jonesy, our arc welding super, looked at this new job that came in and emitted a stricken groan. Being his secretary, I acted sympathetic.

"Miss Clark," he complained, "I am unhappy. Look at this weird assembly, of which they expect me to do ninety before the week is out. Vertical fillets here, downhand fillets there, and darned if there isn't even some overhead welding—wish we had one rod that would do the whole job. Besides looking after my routine work, I will be all over this place like a blue-bottle fly, keeping the boys straight on which rod to use and where. I *am* unhappy."

"And deservedly so," I said tartly, "for not keeping up with events in the arc welding world. Metal & Thermit has just come out with a new E-6013 rod that makes *any* type of weld in *any* position with *any* current. They call it Type U, meaning Universal. Its arc is penetrating and easily handled. Welds are smooth and unusually sound. Slag is easy to remove. The rod is ideal on complicated jobs where you want high quality without a lot of supervision. (P.S. I'm so glib about it because I've just read the M & T bulletin!) We use several of Metal & Thermit's Murex electrodes already: want to try their new Type U?"

We tried their new Type U, and it did everything I had read it would do. Jonesy was jubilant. Better try it yourself: it saves lots of time and supervisory bother, besides doing a fine all-around job.

METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK 5, N. Y.

ALBANY • CHICAGO • PITTSBURGH • SO. SAN FRANCISCO • TORONTO

MUREX *Electrodes*

Tire Conservation Methods Recommended

Solid rubber tires on drive and trai wheels are practically the only parts o all power industrial trucks vulnerable t wear, according to Elwell-Parker Electri Co., Cleveland. When rubber is plenti ful, the cost of spare tires for replace ment is unimportant. Tire life varie from 3 months to 5 years and depends o floor conditions and on care given tire

Long life is insured by making re pairs before tires have become too bad ly worn. Trucks can be kept in opera tion instead of standing idle. At Warn er and Swasey Co., Cleveland, effectiv methods of repairing power truck tire are used by the electrical maintenance industrial truck department. Conserva tion measures have resulted in longe useful life for tires and better operatin efficiency.

Vibration due to lumpy tires reduce operating efficiency of the material han dling system by inducing operato fatigue or by causing damage to th loads, such as finished precision part Tires out of round wear out faste Travel vibration is harmful to the truck

Smooth Floors Reduce Wear

Tire wear is reduced when floors ar smooth and kept clean of gr.ase. chip and metal parts, and when drivers avoi hitting curbs, holes, machines, wall columns and similar obstructions. Bu it is impracticable to eliminate oil an chips from some floors, nor can hole be repaired the instant they appea Principal causes of tire wear are: O or grease, imbedded chips, and har smashes on obstructions and pitted floor Oil weakens a tire by changing rubbe to a springless, putty-like material. Piec separated from the main body of a tir causes holes. Holes also are caused b chips or shocks. Conditions are aggra vated by heavy loads which increase com pression.

Tires subject to excessive service con ditions seldom are worn smooth. Larg pieces tear out, and the wheel is out o round. When the wheel becomes flat i one spot, the flat spot grows large rather than rounding off. With severa flat spots, a truck running at 5 mile per hour has excessive vibration. handles like an automobile with a ba shimmy, and it is necessary to reduc speed to preserve normal control an avoid fatigue induced by difficult han dling.

A satisfactory method for recondition ing a lumpy tire is to remove high spo by turning in a lathe, making circumfe ence true with wheel center. Remain ing rubber life is prolonged by smoot contours and more uniform distributio of loads. Efficiency of the truck is re stored. Rubber is not wasted as it damaged beyond value.

The entire wheel with tire is chucked or tire is pressed off and replaced wit a spare. Average time to remove wheel, press off the tire, press on spare, wash out bearings, repack wit

Why an OZALID machine

increases in value from year to year

1935—4 types of OZALID prints

• Reasons enough to install an Ozalid machine then. (Thousands did!)

For the first time, it was possible to reproduce an engineering drawing, office form, typed sheet, etc. . . . as any one of *four different types* of prints.

Not *negative* prints—but easy-to-read *positive* prints . . . with *black, blue, red* or *sepia* lines or images on white paper.

And this versatile, new method was *faster, simpler,* more *economical* than any other!

It allowed every Ozalid user to produce the desired type of print *in seconds* . . . in clean, compact equipment installed right in the drafting room or office.

1945—10 types of OZALID prints

• Since 1935, Ozalid has created product after product—which can be processed in the same unique manner in *any* Ozalid machine.

So that today you can make *10* types of prints . . . and use them in innumerable ways. Ways you will consider all the more amazing if you've been seeing, using, and "stretching" only *one* type of print!

1. **Black-line**
2. **Blue-line**
3. **Red-line**
4. **Sepia-line Intermediate**
5. **Transblack Intermediate**
6. **Transparent Cloth**
7. **Transparent Foil**
8. **Opaque Cloth**
9. **Chartfilm**
10. **Dryphoto**

Each one of the ten OZALID types has its advantages. For example, you can use different colors to identify work prints of different departments. You can employ Ozalid Intermediates to save time and labor when changing art and drafting designs or financial reports. And new *Ozalid Dryphoto* when you want to reproduce continuous tone photographic material for sales, advertising, and general display purposes.

Furthermore, you'll find many personalized uses for Ozalid . . . recognizing it as not merely a reproduction process, but as a new graphic art which projects the use of your equipment beyond the drafting room and shop . . . to *all* departments!

Ten types of prints is only the beginning for Ozalid. And the machine you invest in today—besides giving you immediate advantages—will provide even greater versatility tomorrow.

Write for free catalog and OZALID samples to Dept. 15

OZALID

Division of General Aniline and Film Corporation
Johnson City, New York

OZALID IN CANADA—HUGHES-OWENS CO., LTD., MONTREAL

grease, and replace the wheel is hr. The imbedded chips are removed h hand, if it can be done without leavi a large hole. Spiral turnings are liab to tear out too much rubber, or cut "biscuit." Experience indicates that turning tool will flip out chips wi least damage.

Cutting tools should be ground to considerable rake or clearance with fairly sharp edge and rigidly clamp into the tool post. The sharp edge is f into the tire at an upward angle. Ma a cut 1/16-in. deep, or less, using slow feed with the lathe chuck turni between 300 and 500 rpm. Since a v riety of rubber compounds are encou tered and condition of the tires vari tool angle, clearance, feed and spe are best determined by experience. T worn top layer of rubber is more eas cut than subsurface layers, chips givi little difficulty if large ones are remov before turning. Warning that a ch will make trouble is given by the to ticking against it before it catches. Wh a chip is caught on the tool edge, scores the rubber. The lathe must stopped immediately and the chip r moved. It can be done without remo ing the tool from rubber. The lat operator should wear safety goggles.

Tire Life Is One Year

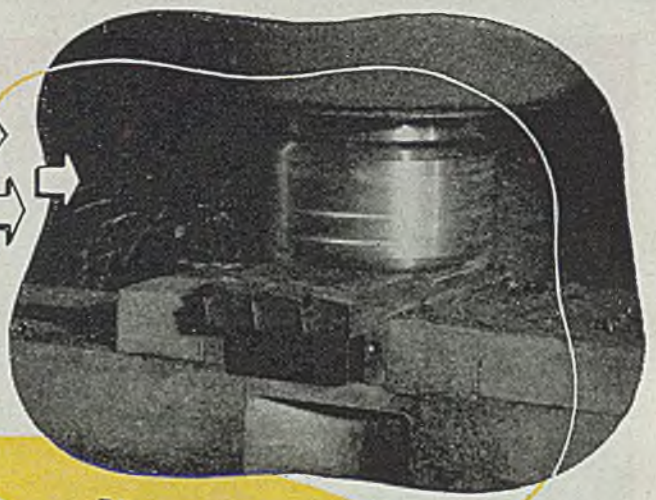
At present, when trucks are used three shifts, 7 days a week, the ti have a normal life of 1 year. Aft turning, they run about four mo months before needing further attentio Following the first treatment there is difference in tire performance. Aft a second cutting, tires feel more soft And, if a third cut is possible, they fe very solid. Reconditioning adds 70 80 per cent to tire life. Care is taken replace tires in pairs having the sam outside diameter to keep the truck in level position. This benefits the dri axle reducing differential wear.

Wheels of smaller diameter, such those used beneath platforms of l trucks, are not so easy to recondition turning because of lower periphe speed. A hub may be turned and chucke or centered in a grinder and rubb ground off, using a very fine 6-in. diam eter wheel turning at hi h speed. Lar quantities of water must be used to wa rubber out of the pores of the grindi wheel. It also is better to remove i bedded chips before grinding small tire

Some trucks have a cluster of fo wheels under the platform. These ha molded-on tires which are difficult to r place. It is necessary to return hubs the tire companies and seldom possib to obtain spares. Steel rims can b installed to relieve wear on rubber whe the truck is loaded. Two steel wheel one right and one left, are provided wi two rubber wheels, one right and on left, steel wheels being turned ¼-i smaller in outside diameter. Rubb tires, being larger, carry the truck whe empty or lightly loaded. If a heavy loa is placed on the platform, rubber tir are compressed and steel wheels take u part of the load.

KENNAMILLING

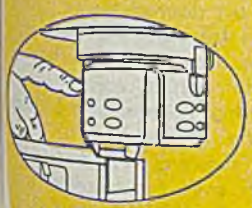
A *Simple* MEANS TO DO HIGH RATE CARBIDE MILLING, ON *ALL* TYPES OF METAL, WITH AVAILABLE EQUIPMENT



THE KENNAMILL FOR *Face-Milling*

1. Table is adjusted so that distance between surface of work and bottom of cutter head is equal to depth of cut, plus 1/8" for clearance.

2. Blade is locked in No. 1 slot, positioned so its nose rests on workpiece. Table is withdrawn, adjusted to desired depth of cut, then a swath is fly-cut in workpiece.

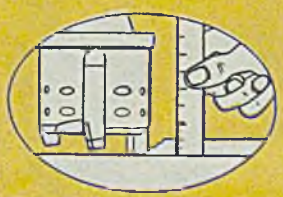


3. Fly-cut swath in workpiece provides a corner into which second, third, and fourth blades are fitted.

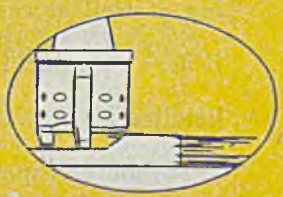
4. With face-mill setting, maximum production is obtained where available power is adequate to permit chip loads of over .005".

THE KENNAMILL FOR *Step-Cutting*

1. Kennametal-tipped blades, made especially for Kennamills, are set in cutter head, to a scale.



2. Work is distributed over four blades by dividing the desired depth of cut into four steps.



3. With step-cut setting, high rates of milling are possible where power is a limiting factor.

VERSATILE Kennamill Step-Cutters extend profitable application of the exceptional metal-cutting ability of tough, hard Kennametal. The cutter head is a permanent toolholder which can be used for high rate carbide milling on steel, cast-iron, and non-ferrous materials simply by interchanging blades having tips of the proper grade of Kennametal.

ADAPTABLE The Kennamill is adaptable for either step-cutting or face-milling, as illustrated. Standard 39M40 blades (steel-cutting) and 39K40 blades (for cutting cast iron and non-ferrous materials) have a cutting edge 3/16" long, which provides for cuts up to ½" deep, with step-cut setting. By grinding a longer cutting edge, these blades are used for cuts up to ½" or more, with the face-mill setting.

ECONOMICAL Initial cost of Kennamill cutter head is low; replacement blades are inexpensive; and major operating economies are effected because: The Kennamill is easy to set-up; Down time is minimized because cutter head does not have to be removed from machine for blade replacement; Blades can be reground on simple carbide tool grinder.

PROFITABLE The Kennamill is one of the most *useful* and *profitable* tools you can install because: *It enables you to do diversified milling jobs, at high production rates, at less cost, with available equipment.*

Catalog 45 gives full particulars on Kennamilling.
A copy is yours for the asking.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL *Inc.*, LATROBE, PA.

Blades are Resharpened to Template on Ordinary Carbide Tool Grinder. Grinding in head unnecessary.

Handling Efficiency

(*Continued from Page 150*)

the narrow side and take them throug spaces too small for regular pallets whe stringers run the short way. In unploa ing, the variety of patterns made possib often permits unit loads to be stowed spots that would otherwise have to lined with loose cargo.

Important too is the new range of ca loading patterns that have develope Eight-way pallets of the 35 x 45½ i size will fit into a freight car either tw abreast the long way or three abreast th short way. The latter condition requires freight car 9 ft 2 in. wide and a pallet loa with an overlap of not more than ½-i As a result, car capacity may be utiliz more completely than was previously po sible with this size of pallet.

If the unit loads have no overlap, many as 93 will fit into a standa 40½-ft freight car so snugly that virtual no bracing will be required. Even wi 1⅜ in. of overlap on each of the 35 i sides, 87 loads can be put into a ca (See diagram Fig. 2.)

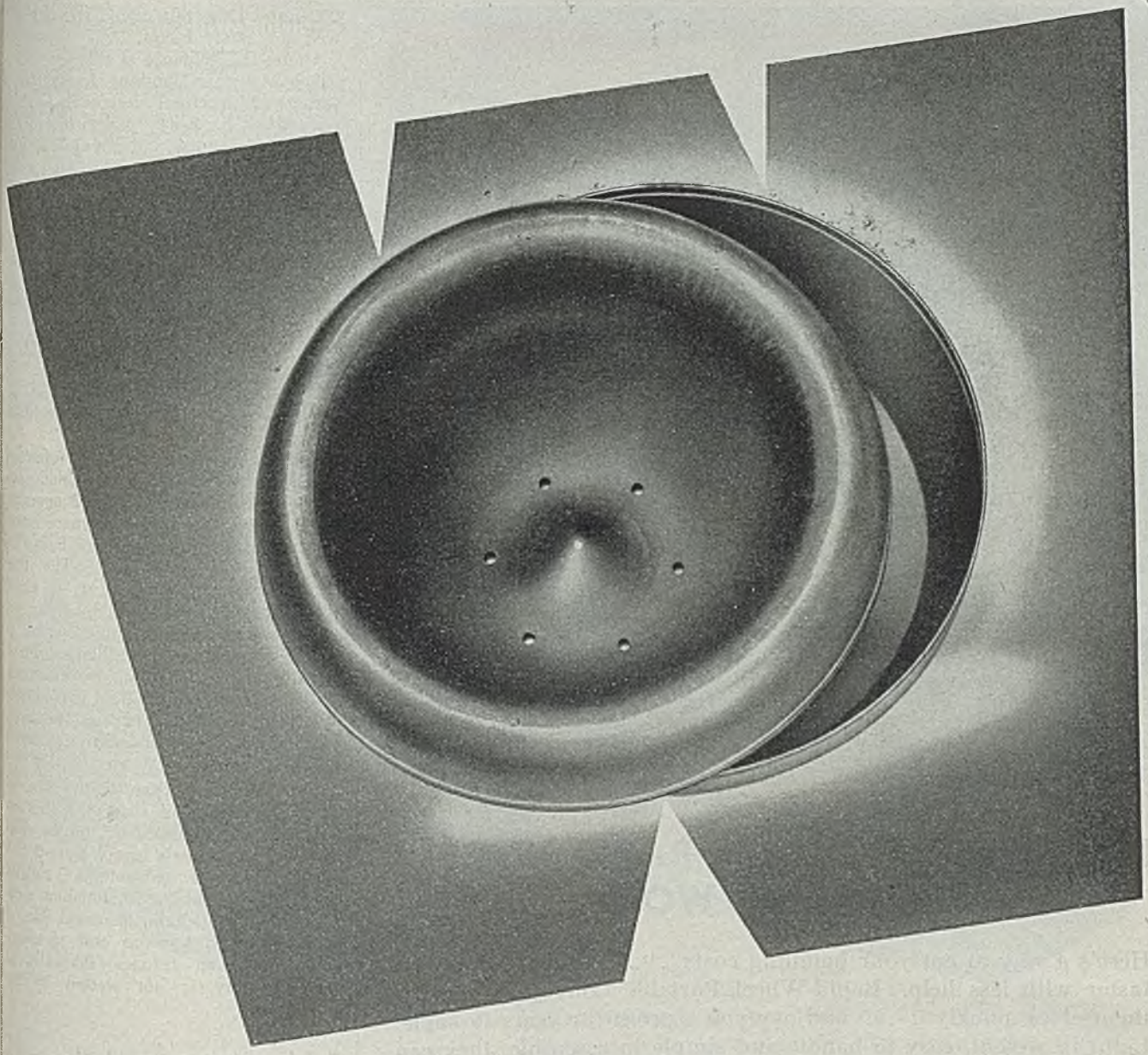
Utilized In Truckloading

By permitting 35 x 45½-in. pallets be handled from either side, the 8-w feature has made important contrib tions to truckloading. Two units can set into the truck the narrow way or o the wide way and one the narrow, maki possible many different loading arrang ments. (See the Pallet, June 19 published by the Naval Ordnan Materials Handling Laboratory, U. Naval Ammunition Depot, Hingha Mass.)

Less handling space is required b cause a fork truck need make only half turn from an aisle to enter the co ner of an 8-way pallet. Consequently, place of the 12 to 14 ft aisle required a 4000-lb capacity fork truck handli 2-way standard Navy 48 x 48-in. pallet 7 ft is ample provided that there a cross aisles of the same width to expo the corners of some of the pallets. Whe cross aisles are not desired, 8-way palle can be handled from an 8-ft aisle pr vided there are occasional 4-ft gaps the stowage to permit corner entr After one row has been removed the will be a regular 12-ft aisle.

The value of corner entry is greatly i creased if a fork truck can come in fro a wide variety of angles. Three facto govern its ability to do so—narrow fork slender vertical supports in the pallet, a wide clearance between the vertical su ports. See diagrams Figs. 3 and 4. Und proper conditions a skilful operator c find many other applications for this way feature.

Stronger unit loads are possible wi 8-way pallets, since material can easily bound to them by athwartships straps well as by fore and aft straps. Goo athwartships strapping may eliminate t need for swaybracing in freight ca simplifying loading and unloading oper tions. In ships, where units will probab receive rough handling and are alwa subject to considerable lateral stress



Someone Said, "That's a Stamping Job for Presteel"

The two pieces in this loud speaker assembly—about 12 in. dia.—had to be stamped for a press fit. Parabolic contours also had to be exactly right to throw the sound correctly. This sort of job is not done in a few operations (note peak in bottom of casing), but the costs were still well within the desired limits. Presteel has established a reputation for producing stampings to close tolerances. Whenever you have a production problem that might be handled on presses, take advantage of the advice and assistance offered by the Presteel engineering staff.

WORCESTER PRESSED STEEL CO.

509 Barber Avenue — Worcester 6, Mass.

ALLOY STEELS AND OTHER METALS COLD FASHIONED SINCE 1883

Representatives in Alexandria Virginia, Buffalo, Canton Ohio, Chicago, Denver, Detroit, Fort Worth, Indianapolis. Los Angeles, New York, Philadelphia, Syracuse, Toronto

the vessel rolls, this added strength is a welcome safety factor.

Under the guidance of the Naval Ordnance Materials Handling Laboratory, a variety of structural designs have been worked out for 8-way pallets in order to gain the durability and strength of steel with a minimum of weight. All are designed to be handled by fork trucks, hand pallet trucks, and cranes.

The best of these pallets can be expected not only to provide new conveniences in handling, but to last a lot longer than the ordinary ones in service today.

Announce Maintenance Refractory for Boilers

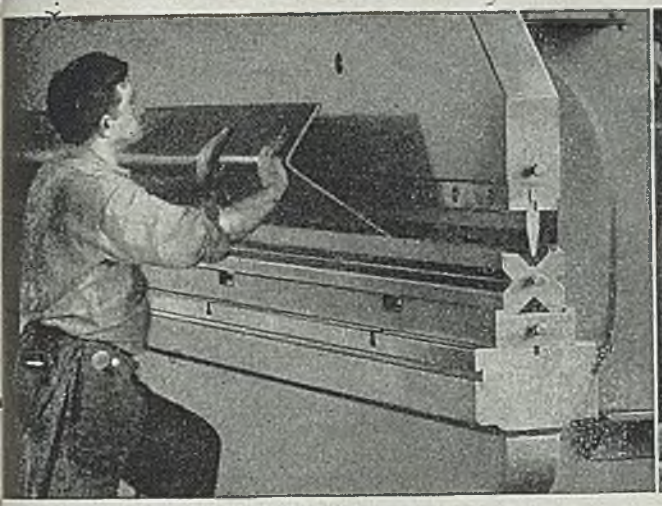
A zirconium silicate base refractory for forming a hard, dense working surface to withstand high furnace operating temperatures and unusual furnace conditions has been developed by Basic Refractories Inc., Cleveland. The fine grained material, Zircoat M, is mixed with water for application by spray gun and is used as a protective coating on silicon carbide, fireclay, sillimanite, mullite, silica and other acid type refractories. In the industrial boiler field it is applied to protect brickwork exposed to severe flame impingement and corrosive action of clinker of fly ash.

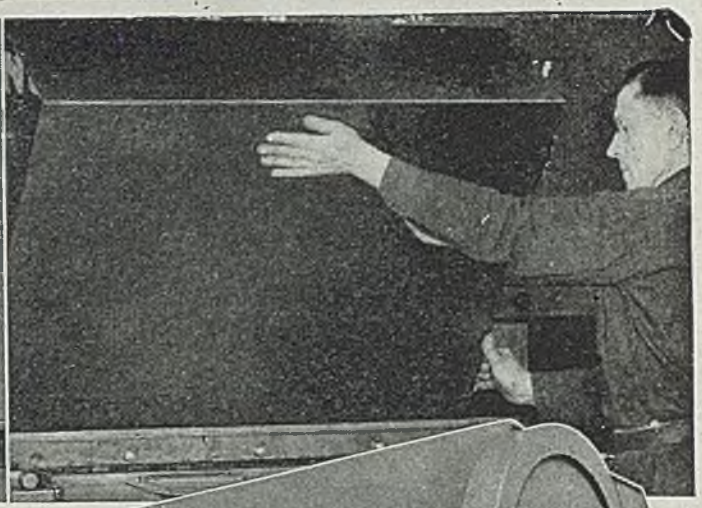
Applications of from ⅛ to ¼-in. on inside brickwork of marine boilers reputedly have increased continuous operation between repair layups from 2 to 6 months. Several advantages claimed for use of the material in aluminum melting furnaces include increased life of brickwork, and lowered cost of cleaning dross from furnace sidewalls, as the refractory is not wetted by the aluminum.

Rubber Latex Insulation Meeting With Approval

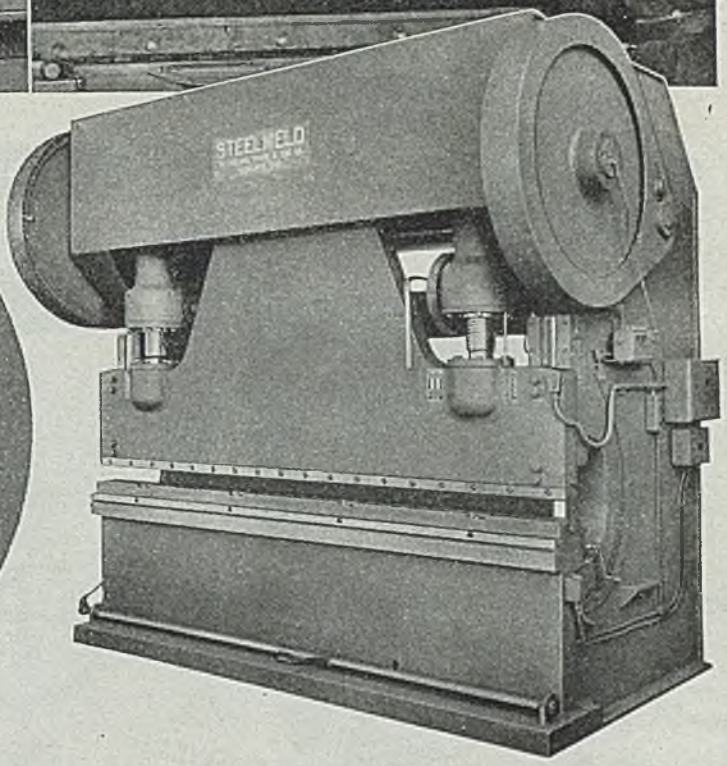
Increased use of synthetic rubber latex insulation for electrical and communication wire is foreseen in constructing and remodeling homes and other buildings. Nubun, one of the wartime-developed products of this kind, is applied by a continuous dipping process perfected by the United States Rubber Co., New York, and can be used on all types of wire and cable having conductors ranging in size from Nos. 10 to 22 American wire gage. Process makes possible production of wire which is small in diameter and light in weight with improved electrical properties and flexibility.

This insulation is understood to be resistant to effects of oxygen aging, is not affected by exposure to metallic copper or copper salts, and is resistant to mineral oils. Chemical composition of synthetic insulation can be adjusted readily and controlled in the laboratory, enabling the chemist to build a variety of special compounds to meet varying conditions.





BEND LIGHT OR HEAVY PLATES QUICKLY WITH CLEVELAND STEELWELDS



Above Left:
Bending a 10' x 5/8" steel plate.

Above Right:
Forming a drawer of 16 gauge steel. Corners produced are straight, sharp and accurate.

You can shift from braking operations on 20 gauge plate to ½ inch or 1 inch plate all in the matter of a few minutes with Cleveland Steelwelds. Size of plate makes no difference as long as you keep within the tonnage rating of the machines.

If yours is a jobbing shop or plant where only a small number of any part is produced, you will find the versatility of Steelwelds advantageous. Equally satisfactory are these presses for mass-production runs of thousands of similar pieces.

Hundreds of Cleveland Steelwelds are speeding production and cutting costs in plants in the United States and many foreign countries.

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CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

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STEELWELD
BENDING PRESSES
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

Heat Treating Practice

(*Continued from Page* 157)

standard test consists of heating a sample of steel in a carburizing mixture for 8 hours at a temperature of 1700° F and then slowly cooling it in the carburizing box. After this carburizing treatment, the sample is cut, polished, etched to bring out the grain boundaries and from the carburized case the grain size and "normality" is rated. Grain sizes 1 to 5 on the ASTM standard are classed as coarse grains, while sizes 5 to 8 are considered fine grains.

Several of the most important treatments are shown graphically in Fig. 20 in relation to the transformation temperatures of the case and core and the properties developed. In all except treatments E and F the carburizing treatment is assumed to be followed by a box cool. These treatments and principal characteristics of resulting products are described in following paragraphs.

Treatment A — Reheat to just over the critical temperature range of the case and quench. Since the critical is below the temperature for hardening the core, it will retain grain size caused by prolonged heating at carburizing temperatures. Thus this treatment is best adapted to steels which retain fine grain size in the McQuaid-Ehn test. Provided carbon concentration in the case is kept down (no hypereutectoid cementite present), a hard, highly refined case is obtained which is conducive to good wear resistance. Advantages, as applied to fine grain steels, are that core and uncarburized portions of parts are left in a readily machinable condition and distortion is minimized by hardening only once from low temperatures. However, the parts as a whole will not have the best impact resistance or toughness.

Treatment B—If the reheating temperature of treatment A is raised somewhat, a partial core refinement and core hardening will be obtained. Treatment B when using appropriate temperatures, provides a case in fine grain steels showing only minor coarsening and a core of improved strength. In this instance, a moderate amount of hypereutectoid carbon will be dissolved at these intermediate quenching temperatures.

Treatment C—When reheating temperature is raised above the critical temperature of the core, there will be somewhat more coarsening of the case structure, but complete refinement will be produced in the core, which on quenching will be hardened and provide approximately the highest strength procurable in steels of given low carbon content. Widely used for automotive gears. Provides a product in which the case secures support for heavy duty service from a hardened core. Only one quenching treatment is used and distortion on hardening is minimized.

If excess carbide is not sufficient to raise A_{cm} temperature of case above A_{c_3} range of core, treatment C will dissolve such carbides completely.

This treatment is best adapted to fine

FASTEST most efficient for UNLOADING SHEET STEEL and for other point-of-operation jobs!

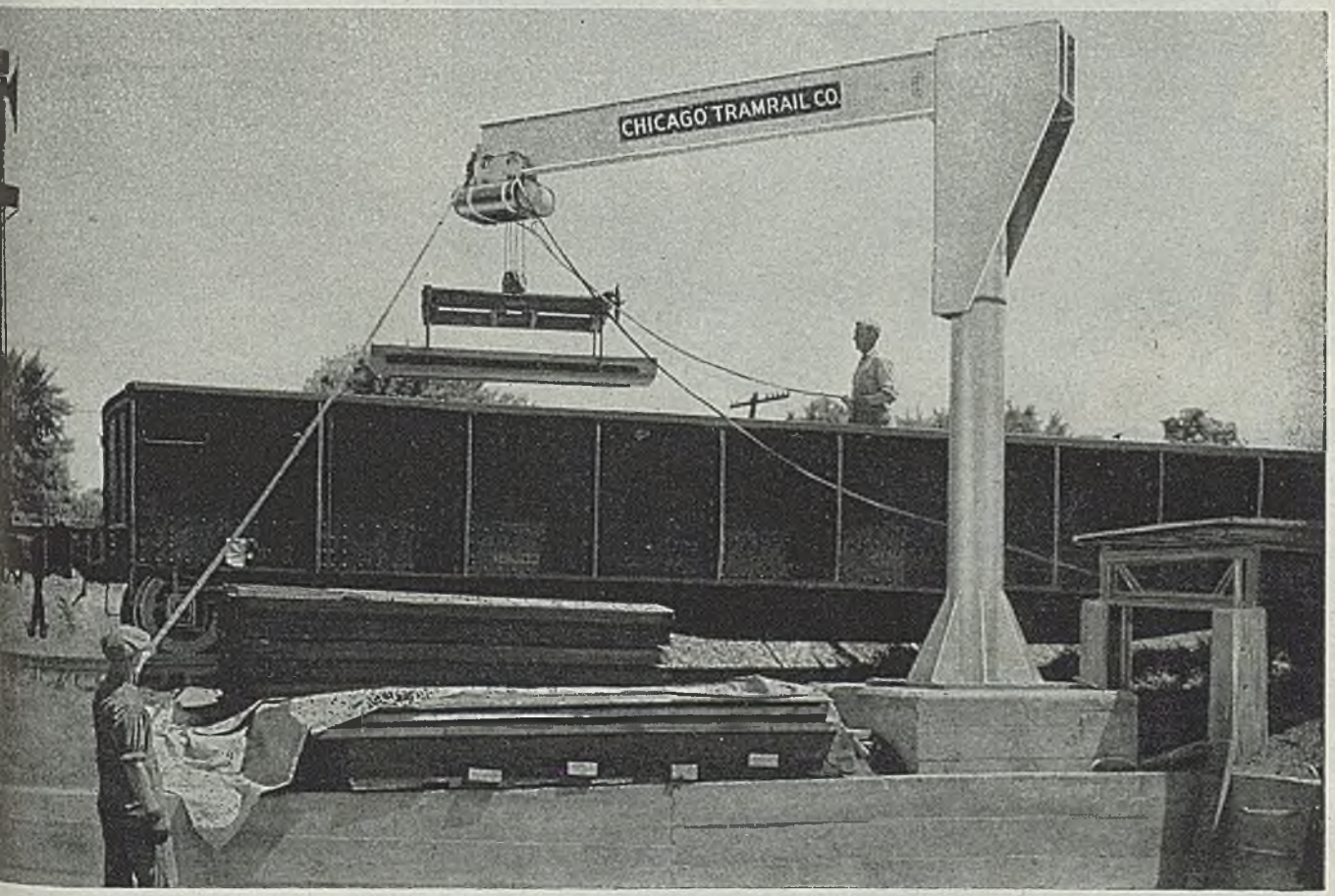

Photo Courtesy Ice Cooling Appliance Co., Morrison, Illinois

There's a place for JIB CRANES in your "Efficiency Program" . . .

Mechanize your plant operations by installing Chicago Tramrail Jib Cranes now and you will be taking a long step forward toward counteracting high wage rates that will continue to prevail after the war. The unloading of sheet steel from gondola railway cars as shown above provides a vivid example of the speedy handling and savings which can be accomplished using Jib Cranes. Moreover, there are certain advantages this picture does not reveal such as reduction of worker fatigue, reduction of accidents and compensation costs. Note how the Chicago Tramrail crane swings out over the car, picks up bundles and swings back around as much as 360°. Easy to back motor trucks under at the loading platform. The fixture shown is a grab for sheet steel. Any other type fixture may be used for handling pipe, boxes, steel bars, bundles, coil strip and coil wire stock. Maximum capacity of these Jib Cranes is 5 tons. Furnished with hand-operated or electric hoist. Supplied in various heights and widths, be sure to mention desired height and length of jib when you order. Act today for real production savings! Write.

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CHICAGO Tramrail

grain steels. If used with steels having marked air hardening tendencies from the presence of relatively high proportions of alloying elements, the high quenching temperatures, which favor the retention of austenite, may result in a slight reduction in case hardness.

Treatment D — If treatment C is followed by reheating for case refinement and requenching, the best toughness and ductility obtainable in the case hardened steel will be developed. This full treatment is desirable for coarse grained steels where coarsening of case in treatment C is marked.

Treatment E — If carburized steel is quenched directly from carburizing box without any intermediate cooling, no refinement will be obtained in either case or core, but both will be hardened. This treatment provides conditions favorable to the retention of austenite and with sufficiently high carbon concentration there is evidence that the case while soft in the usual indentation hardness tests (rockwell, shore, etc.), is file proof and exhibits a high resistance to fatigue and wear.

Other advantages include retention in solution of all excess carbide, lessening of distortion due to austenite retention and economy because of eliminating all reheating for quenching. Treatment requires considerable care in selection of steel and determination of carburizing conditions. Since there is no subsequent refinement of either case or core, both will be characterized by grain size existing at end of carburizing cycle. This generally restricts the method to steels exhibiting a fine grained structure under the conditions of the McQuaid-Ehn test.

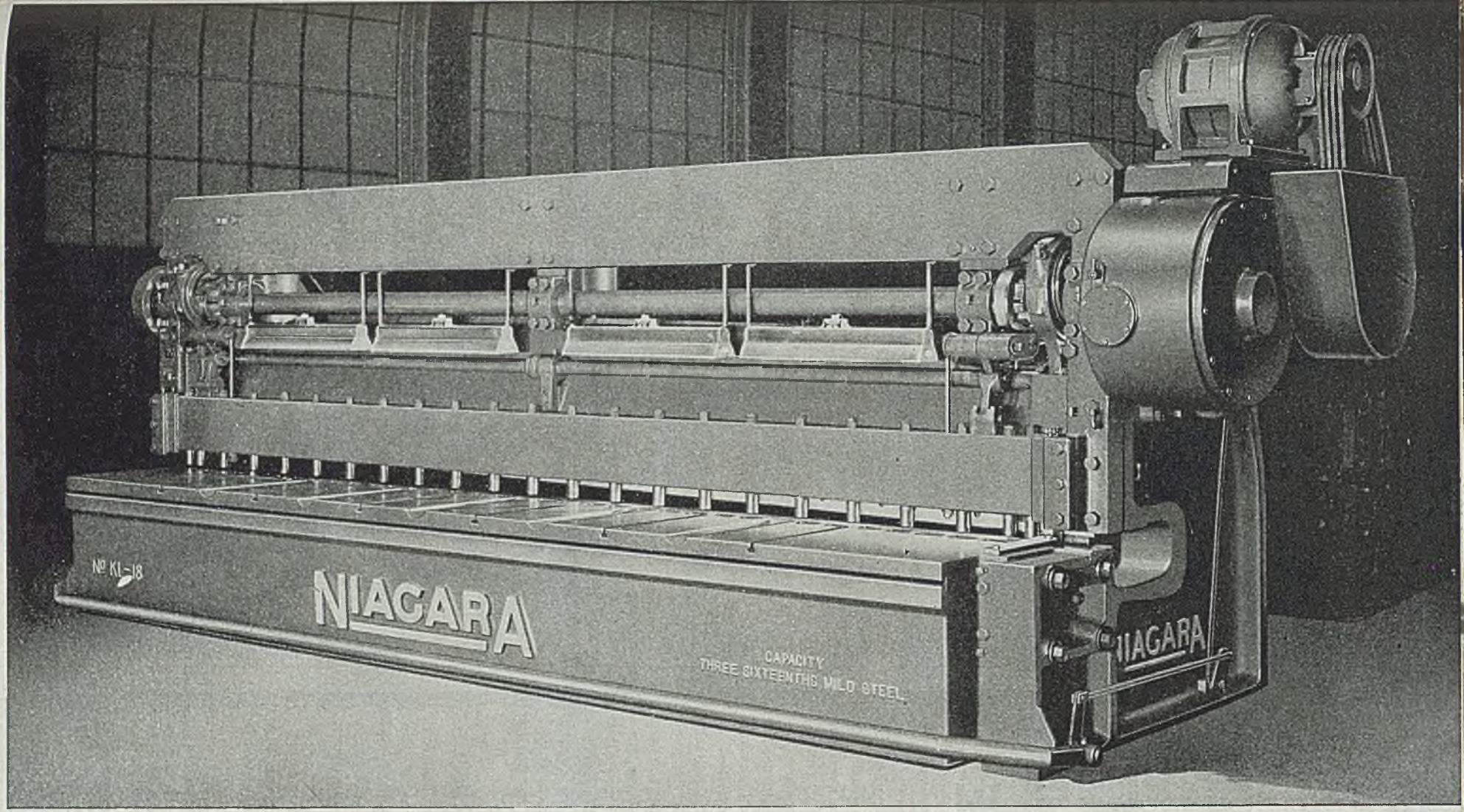
Treatment E is now being applied more extensively in the manufacture of automotive gears after carburizing technique regulated to secure cases of high carbon content (1.10 to 1.40 per cent) in fine grained steels Nos. 5 to 8).

Treatment F—If treatment E is followed by reheating to just over critical temperature range for case refinement and requenching, maximum toughness and ductility of case is obtained.

Since reheat is below the temperature for hardening core, it will remain soft and will not undergo structural refinement but will retain the grain size left by the prolonged heating at carburizing temperature. For this reason, this treatment is only adapted to fine grain steels.

Treatment F is favored over A where the parts are slow-cooled from the carburizing temperature. The quench from the carburizing temperature retains more carbide in solution of the case after the final quench. Therefore, the case will have less carbide network, which will increase the strength and toughness as well as decrease the likelihood of cracking and spalling in service.

The selection of the proper quenching medium would depend upon the cross-section of the part, the hardenability of the steel used and the ultimate results desired. For parts of irregular sections



More production per hour on shearing long sheets is made possible by the advanced design of 16, 18 and 20 foot Niagara Power Squaring Shears. Features include accurate, flat cutting; convenient handling of stock and offcut; more working strokes per hour; instant acting 14-point engagement sleeve clutch; gears mounted between anti-friction bearings; clutch and gears operate in oil-tight case; self measuring, ball bearing, parallel back gage. Write for Bulletin 72. Niagara Machine & Tool Works, 637-97 Northland Avenue, Buffalo 11, N. Y. District Offices: Cleveland, Detroit, New York.

BUY VICTORY BONDS

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory re-grinding service by the same skilled men who grind new Niagara knives.

—Advt.

oil would be selected as a quenching medium instead of water because its cooling rate is slower, providing less temperature differential between the thin section and heavy section, tending to reduce quench cracks and distortion. When using oil as a quenching medium, steel with a higher alloy content would be required to increase hardenability. In the past, carburized parts always were quenched in oil or water, but recently the martempering method has been proved to have many advantages.

(*Continued next week*)

Gas Turbines for Air Transport Promising

Gas turbine operated propellers, rather than jet engines, may power the future long-range air transports. This prediction, and an analysis of the applications for several new combinations of aircraft motive power, was made recently at a Los Angeles ASME meeting by S. R. Puffer and J. S. Alford, General Electric engineers.

High-speed jet propulsion, said these engineers who have helped in the development of the AAF jet engines, may be relatively expensive for single flights over 500 miles. For greater distances the cost increases, but could be justified on the basis of faster service. Flights not greatly in excess of 500 miles cost only a little more than do those of present day transports.

The internal combustion engine combined with an exhaust gas turbine gives the best performance of any power plant for use at extreme ranges. With water injection added to this engine, a tremendous reserve of power is obtained at all altitudes where the turbine nozzle pressure does not fall off. This combination has the highest rate of climb of any power plant.

Because of its low specific weight, the gas-turbine propeller combination provides a power unit which, except at very high speeds gives a performance approaching that of the jet and, with much better range. Though the power or thrust output does decrease with diminishing air density, the performance of the gas turbine does not decrease; the cold air at high altitudes has a favorable effect on the overall gas turbine output and probably makes up for the lack of supercharging.

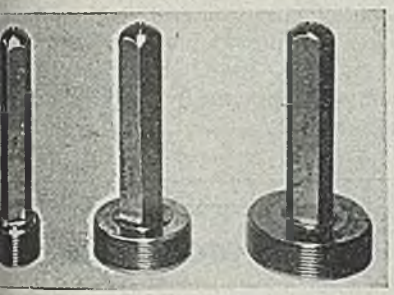
The present internal combustion engine equipped with turbo-superchargers and utilizing the exhaust gases through a jet, is nearly equal to the jet propulsion unit in speed and surpasses it in climbing power.

Adler and Puffer stressed the importance of relatively small improvements in compressor and turbine efficiencies in obtaining gains in net power output of the gas turbine. Temperature of the gases entering the turbine was cited as another factor greatly affecting performance and economy. Gas temperatures as high as 1750° F are possible for

craft applications, they said. If the esent rate of improvement in materials ntinues, temperatures of 2000° F will obably be achieved.

leehanite Gages Used in lanufacturing Bomb Heads

A new use for Mechanite thread ges, shown in the accompanying illustion, was in manufacturing fragmentan bomb heads. This method was deloped by Continental Gin Co., Birmgham, Ala., to meet a serious shortage



f steel thread gages. Many of these ges have a record of service and have t only proved successful but have conributed advantages to production and spection. Ready machinability of this aterial permits an increase in the quanty of gages machined and finished. ecords of service life indicate that leehanite gages provide improved wear roperties, giving as high as 25 per ent longer life than steel gages.

New Type Motor Improves Time Switches

An industrial type, self-starting synhronous motor, adding years to life f time switches, is a recent improvement in the Paragon 300 Series time witches, according to Paragon Electric o., Chicago. Among operating advantges claimed for the Telechron motor re: Almost instantaneous self-starting at ull rated load; gear reduction fully ealed to exclude dust and dirt; and low ower consumption. It is constructed to ive efficient performance, is light in eight, small and compact in design, and as switch capacity of 3000 w per pole ith easily mounted, accessible terminals, skip-trip feature, knockouts on oth sides, back and bottom, and two-earing plate construction.

The 300 Series time switches are used or controlling signs, commercial lights, ttic fans, stokers, oil burners, etc.

—o—

A sample package of Ampco-Trode, a oated aluminum bronze weldrod, consistng of a selection of five grades in three izes, ⅛, 5/32, and 3/16-in. diameters, is ffered by Ampco Metal Inc., Milwaukee . It gives welders a selection suitable or trial purposes and allows small shops o purchase a small lot for stock emergency use.

THE BUSINESS TREND

Labor Unrest Threatens Reconversion Progress

SPREADING labor unrest threatens to impede seriously the progress of reconversion. While prompt removal of wartime restrictions put industry in a position to move full speed ahead into peacetime production, it now appears quite possible that much of this advantage may be lost. Nevertheless, the desire to enjoy the fruits of the huge accumulated demand for goods undoubtedly will bring about some solution to the problems that would hamper reconversion. The question isn't whether complete reconversion will be attained but how much faster reconversion would be if it weren't hindered by labor unrest.

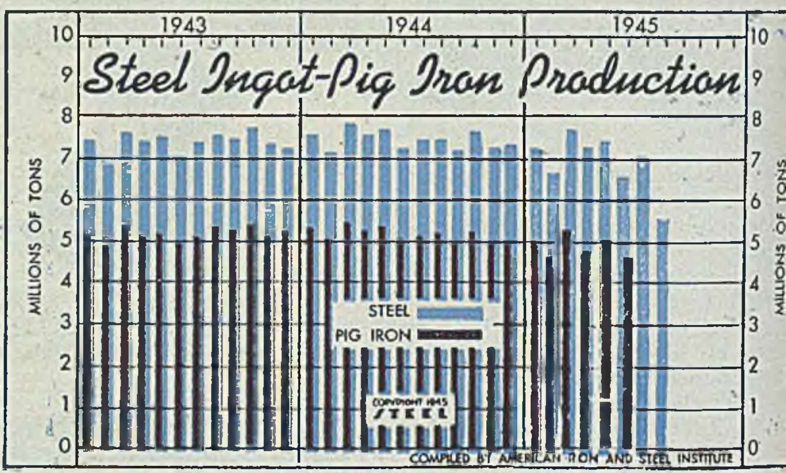
AUTO PRODUCTION—One of the first indicators to reflect the current labor difficulties is automobile production. Were there no obstacles, auto production undoubtedly would be decidedly on the upgrade. However, in the week ended Sept. 15 auto production was 300 units less than in the previous week, a short work week because of Labor Day.

STOCK MARKET—Labor unrest supplied the basis late in the week ended Sept. 15 for a long expected reaction, which was noted particularly in the industrial section of the list. The industrial-share average closed the week 1.34 points below the previous week's closing. It has been customary not to sell stocks on strike news but the troubles in labor circles come at a time when resumption of peacetime production is going forward, and Wall Street is studying the possibility of a slowdown in progress of reconversion.

EMPLOYMENT—While the War Manpower Commission predicts that employment in the next six months may exceed prewar levels in a number of durable goods industries, it emphasizes that ultimate employment levels will depend largely on the extent to which management, labor, and government can agree on price, wage, co tract termination, and surplus property disposal policie

STEEL—Bright spot in the reconversion picture is st ingot production which has regained most of the grou it lost during V-J week. Continued advancement c pends largely on the labor situation. Shortage of lab has for some time prevented the steel ingot rate fr rising as far as it could have gone to fulfill consum demand, and now labor unrest that would hamper st shipments to industry could also be an important fac in holding back the rate.

CASTINGS—Shipments of gray iron castings in June c creased 2 per cent from the previous month but were per cent higher than in June, 1944. Unfilled orders the end of June, 1945, were practically unchanged fr the end of the previous month.



Iron, Steel Production
(Net tons—000 omitted)

	Steel Ingots 1945	Steel Ingots 1944	Steel Ingots 1943	Pig Iron 1945	Pig Iron 19
January	7,206	7,593	7,424	4,945	5,2
February	6.655	7,194	6,824	4,563	5,0
March	7,708	7,826	7,673	5,228	5,4
April	7,292	7,594	7,375	4,786	5,2
May	7,452	7,703	7,550	5,016	5,3
June	6,842	7,234	7,041	4,605	5,0
July	6,987	7,498	7,416	....	5,1
August	5,713	7,499	7,592	....	5,2
September	....	7,235	7,519	....	4,9
October	....	7,621	7,819	....	5,2
November	....	7,279	7,374	....	4,9
December	....	7,366	7,266	....	4,9
Total	....	89,642	88,873	....	61,3

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	80.5	73.5	60	96
Electric Power Distributed (million kilowatt hours)	4,106	3,909	3,939	4,395
Bituminous Coal Production (daily av.—1000 tons)	1,632	2,025	1,923	1,832
Petroleum Production (daily av.—1000 bbls.)	4,538	4,518	4,934	4,745
Construction Volume (ENR—Unit $1,000,000)	$60.4	$30.8	$49.1	$42.5
Automobile and Truck Output (Ward's—number units)	13,910	14,210	11,205	20,865

*Dates on request.

TRADE

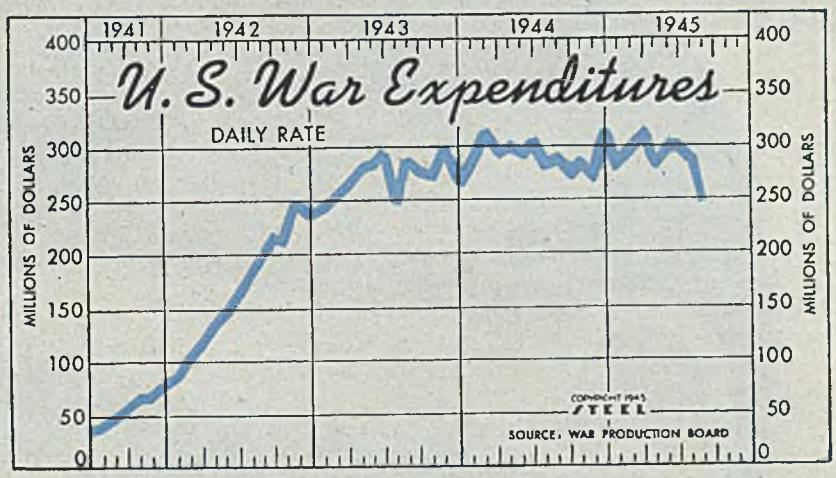
	Latest Period*	Prior Week	Month Ago	Year Ago
Freight Carloadings (unit—1000 cars)	825†	731	653	892
Business Failures (Dun & Bradstreet, number)	7	19	5	23
Money in Circulation (in millions of dollars)‡	$27,793	$27,750	$27,351	$23,495
Department Store Sales (change from like wk. a yr. ago)‡	−1%	0%	+18%	+14

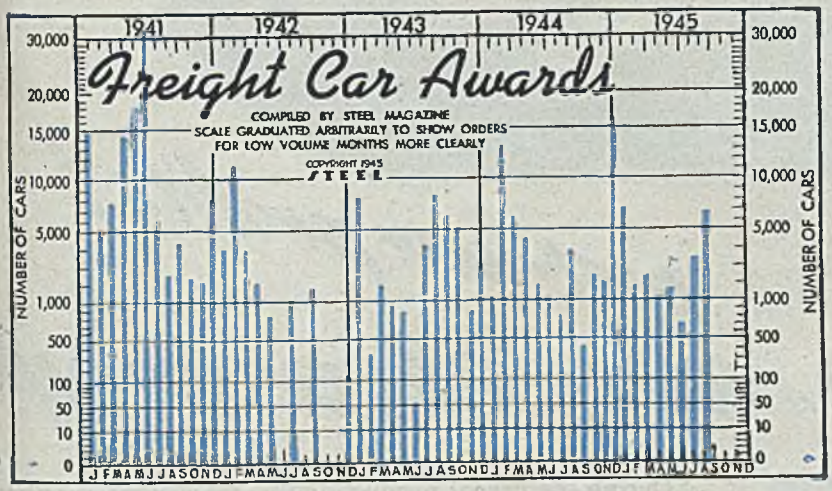
†Preliminary. ‡Federal Reserve Board.

War Expenditures

(millions)

	1945 Monthly Expenditures	1945 Daily Rate	1944 Monthly Expenditures	1944 Daily Rate
Jan.	$7,519	$278.4	$7,416	$285.2
Feb.	6,965	290.2	7,808	312.3
March	8,318	308.1	7,948	294.4
April	7,045	281.8	7,493	299.7
May	8,166	302.5	7,918	293.3
June	7,885	303.4	7,957	306.0
July	7,324	281.7	7,355	282.9
Aug.	6,398	246.1	7,798	288.8
Sept.	....	....	7,104	273.2
Oct.	....	....	7,447	286.4
Nov.	....	....	7,095	272.9
Dec.	....	....	7,835	313.4
Total	....	....	91,174	Ave. 292.4





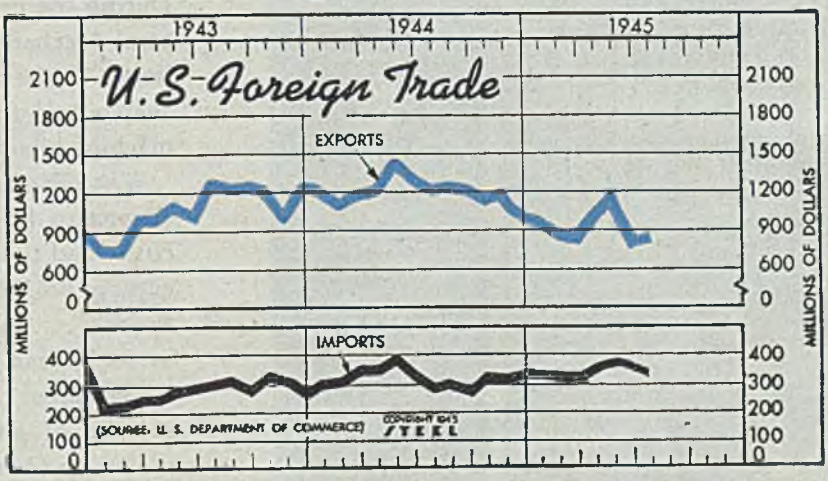
Freight Car Awards

	1945	1944	1943	1942
Jan.	7,200	1,320	8,365	4,253
Feb.	1,750	13,240	350	11,725
March	2,500	6,510	1,985	4,080
April	1,120	4,519	1,000	2,125
May	1,526	1,952	870	822
June	670	1,150	50	0
July	3,500	795	4,190	1,025
Aug.	7,240	3,900	8,747	0
Sept.	....	400	6,820	1,863
Oct.	....	2,425	5,258	0
Nov.	....	1,065	870	0
Dec.	....	16,245	2,919	135
Total	....	53,221	41,374	26,028

Foreign Trade
Bureau of Foreign and Domestic Commerce

(Unit Value—$1,000,000)

	Exports 1945	Exports 1944	Exports 1943	Imports 1945	Imports 1944	Imports 1943
Jan.	900	1,124	730	334	300	228
Feb.	882	1,086	719	324	313	234
Mar.	881	1,197	988	324	359	249
Apr.	1,002	1,182	980	366	359	258
May	1,133	1,419	1,085	372	386	281
June	866	1,271	1,002	360	330	295
July	882	1,198	1,262	345	293	300
Aug.	....	1,207	1,204	...	302	315
Sept.	....	1,199	1,235	...	280	285
Oct.	....	1,140	1,195	...	327	329
Nov.	....	1,184	1,074	...	322	317
Dec.	....	934	1,244	...	336	281
Total	.....	14,141	12,718	...	3,907	3,372



FINANCE

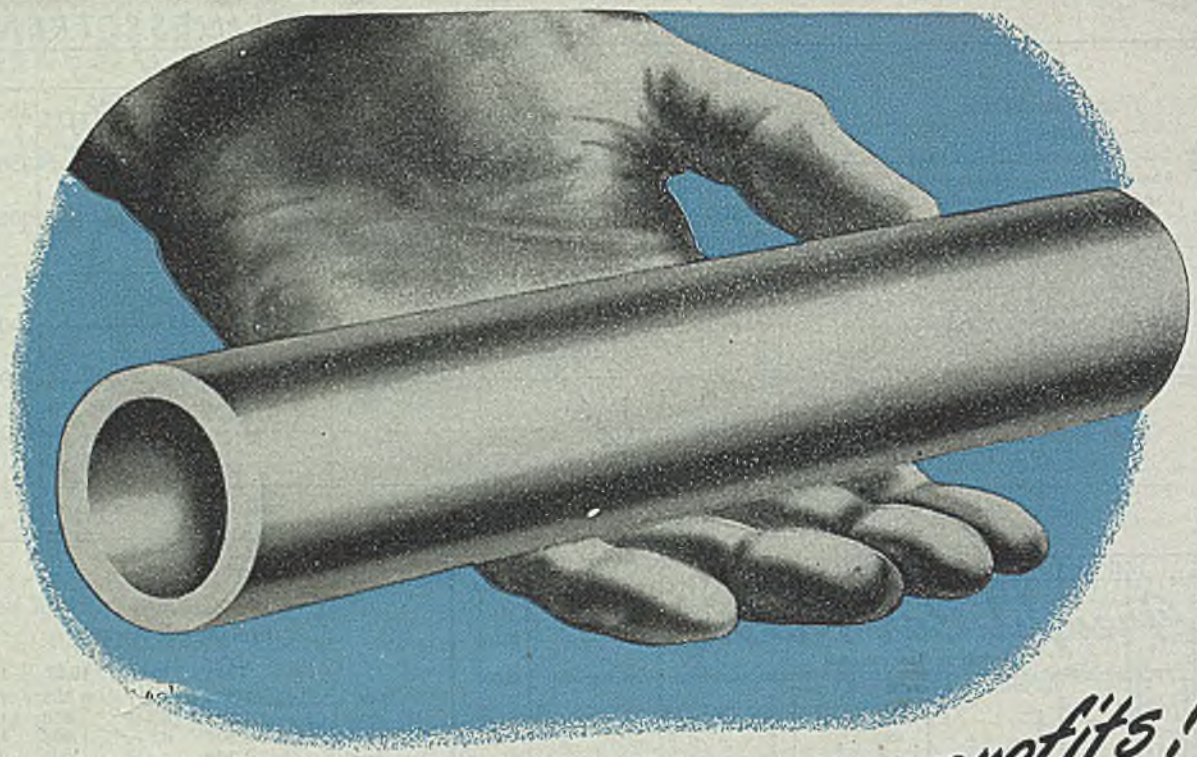
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,704	$9,331	$7,865	$8,177
Federal Gross Debt (billions)	$263.2	$263.2	$263.0	$211.3
Bond Volume, NYSE (millions)	$25.9	$30.6	$18.1	$30.8
Stocks Sales, NYSE (thousands)	6,425	5,141	3,096	3,644
Loans and Investments (billions)†	$62.4	$62.5	$63.1	$55.5
United States Gov't. Obligations Held (millions)	$46,182	$46,371	$46,771	$41,446

†Member banks, Federal Reserve System.

PRICES

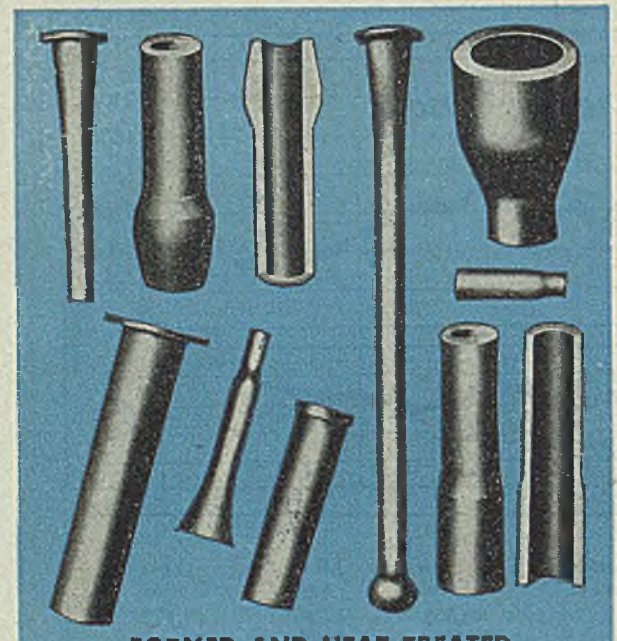
STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$56.73
All Commodities†	105.0	105.2	105.7	103.6
Industrial Raw Materials†	115.3	115.8	117.7	112.8
Manufactured Products†	102.0	102.1	102.0	101.1

†Bureau of Labor Statistics Index, 1926 = 100.



post-war profits!

SHORTCUT TO ~~WAR PRODUCTION~~



FORMED AND HEAT TREATED TO SPECIFICATION

It may be less expensive to buy and assemble product parts than to make them. Pittsburgh Steel Company has complete facilities for cutting, forming and heat treating tubes to specification. Upsetting, swaging, expanding, tapering, flanging, etc. provide already finished parts similar to the ones above. Send us your blueprints for recommendation and quotation.

During the urgent production-for-war period, Seamless Steel Mechanical Tubing was one of the most *critical* items . . . because in its wide variety of analyses, sizes, shapes and forms, tubing saved millions of man and machine hours, and countless tons of vital steel.

When Pittsburgh Seamless Mechanical Tubing can be adapted to the job in place of solid stock or forgings, such costly and time consuming operations as boring, rough cutting, finishing, grinding, etc. can often be eliminated entirely . . . measurably increasing production. Savings in tool wear, materials and handling likewise result.

Remember that post-war profits may hinge on the balance of *production efficiency!* If you are not now tooled up for tubing your competitive production position may be adversely affected. Investigate the application of *Pittsburgh* Seamless to your post-war production problems, *now.*

PITTSBURGH STEEL COMPANY

1653 GRANT BUILDING, PITTSBURGH, PA.

Pittsburgh (P) Seamless

MECHANICAL TUBING

CARBON, ALLOY, STAINLESS STEEL

Steel Deliveries Extended Well Into Next Year

Civilian demand swamps mills . . . Labor situation causes concern . . . Sheets, bars, wire tightest products . . . Steelmaking climbs higher

IN SPITE of concern over growing labor agitation in the metalworking industries, the automotive industry in particular, demand for steel continues heavy, inquiry for sheets being almost as active as at any time during the war, and for carbon bars, especially in smaller sizes, taking a sharp spurt.

Producers of some wire specialties are booked well into next year and pipe producers are in about the same situation. Shape sellers are booked solidly into December and some platemakers now are quoting December, reflecting a shrinkage in capacity but a better demand than had been expected.

Contributing to extended deliveries on various products is difficulty obtaining labor in some centers, combined with efforts of the industry as a whole to get back to the 40-hour week. Demand for sheets has reached the stage where many consumers no longer insist on definite delivery promise, placing orders for a position on books, and none too close a position in numerous cases, on the chance that delivery can be made. This doubtless is causing order duplication in many instances and producers are tightening policies in acceptance of such orders. At least two sheetmakers have not formally opened books for first quarter on major grades until they know more definitely where they stand. They are assuring regular customers, however, that they will endeavor to take care of them on at least the basis of fourth quarter.

At present most sellers of hot and cold-rolled sheets and galvanized sheets quote second quarter and in case of one important specialty, electrical sheets, producers generally are booked for first half. In a number of instances, particularly where civilian type products have been involved, war contract cancellations have not been reflected in steel mill cancellations.

Closing of outlets to automobile builders, as a result of strikes, allows sheetmakers to ship more tonnage to other users, thus reducing effect of the labor situation.

Almost paralleling interest in sheets has been recent demand for carbon bars, especially in smaller sizes. One large independent producer within the past fortnight has advanced promises on small rounds and flats from late November and December to April and beyond. Carbon bar sellers generally have little to offer in any size before February. Automobile needs are outstanding in small and medium sizes but there is great diversity of inquiry, extending even to larger diameters. Cold-drawn bar deliveries now fall mainly into next year but alloy bars still can be had in November, due mainly to wartime expansion in production.

Steel production continues its upward march from the low point following the end of the war, as steelmakers are able to rearrange schedules and resume output more nearly normal. Last week the estimated national steelmaking rate advanced 2½ points to 83 per cent of capacity. Increases in various districts were small. Pittsburgh gained ½-point to 84 per cent, Chicago 4½ points to 88 per cent, Youngstown 4 points to 89 per cent, Cincinnati 5 points to 81, Cleveland 2 points to 85, eastern Pennsylvania 1 point to 76 and New England 2 points to 80. Detroit dropped 2 points to 87 and Wheeling 1 point to 94. Rates were unchanged at St. Louis 68, Birmingham, 95 and Buffalo 81½.

Reduced supply of scrap, resulting in part from lack of labor for preparation, coupled with smaller reserves in hands of melters, sustains prices at ceilings for all grades except borings and turnings, which show some weakness, though on a better level than a few months ago. Steelmakers are taking all offerings at full prices, seeking to build inventories for the winter, as steel production is expected to near normal.

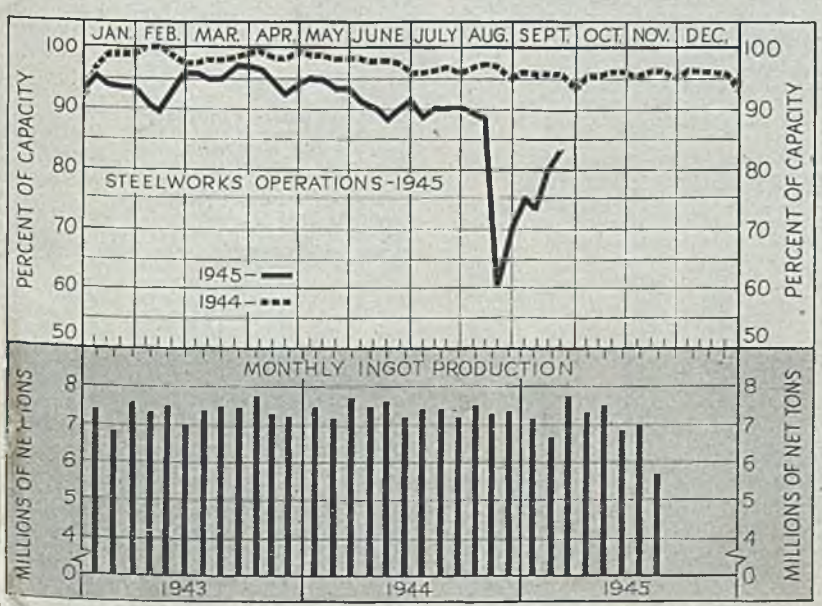
Average composite prices of steel and iron products show no change, holding at OPA ceilings, finished steel composite at $58.27, semifinished steel $27.80, steelmaking pig iron $24.05 and steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Sept. 22	Change	Same Week 1944	Same Week 1943
Pittsburgh	74	+0.5	90.5	99
Chicago	88	+4.5*	99	100
Eastern Pa.	76	+1	95	96
Youngstown	89	+4	90	97
Wheeling	94	—1	96	104
Cleveland	85	+2	91	93.5
Buffalo	81.5	None	88.5	90.5
Birmingham	95	None	95	100
New England	80	+2	92	95
Cincinnati	81	+5	94	96
St. Louis	68	None	84.5	93
Detroit	87	—2	89	92
Estimated national rate	83	+2.5	96	99.5

*Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	Sept. 22	Sept. 15	Sept. 8	One Month Ago Aug., 1945	Three Months Ago June, 1945	One Year Ago Aug., 1944	Five Years Ago Aug., 1940
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$56.73	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	36.45	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	24.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.07	19.07	19.17	18.80

Se inished 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,

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material

	Sept. 22, 1945	Aug., 1945	June, 1945	Sept., 1944
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	2.17	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 ⅜-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron

	Sept. 22, 1945	Aug., 1945	June, 1945	Sept., 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$26.19	$25.19
Basic, Valley	24.50	24.50	24.50	23.50
Basic, eastern del. Philadelphia	26.34	26.34	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.69	24.69
No. 2 foundry, Chicago	25.00	25.00	25.00	24.00
Southern No. 2, Birmingham	21.38	21.38	21.38	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	25.30	24.30
No. 2 fdry., del. Philadelphia	26.84	26.84	26.84	25.84
Malleable, Valley	25.00	25.00	25.00	24.00
Malleable, Chicago	25.00	25.00	25.00	24.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	25.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$19.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.45	16.05
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	13.67	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, 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 Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $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., Kaiser Co. Inc., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. 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., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $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.ob. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—⅜ in. inclusive, per 100 lbs., $2.15 Do., over ⅜—⅞-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; 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. & Suply Co., may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		4100 (.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. 3.87c; 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 (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 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 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; 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; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 4.30c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St Louis. Geneva Steel Co., 3.25c, Pac. ports; Kaiser Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.75c
Spring wire 3.35c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.90; galvanized, $2.55; Pac. ports ..... $3.40 and $3.05
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.20c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.55c
Woven fence, 15½ gage and heavier, per base column ..... .67c
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	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

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½,3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28¼	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
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., f.o.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, base, cents per lb.; Reg. carbon 14.00c, extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Pitts. base per lb
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
....	4	2	8	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb., f.o.b. mill base.

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

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 prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅜ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
1-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
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	13.05
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	10.80
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.28

*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	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[13]	4.244[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.172[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.152[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Bethlehem, Pa.[o]	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.[o]	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.[o]	.....	.....	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[10]	3.85[21]	4.669	5.60[23]	5.75[23]
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[10]	3.75[21]	4.35	5.60[23]	5.75[23]
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[12]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[12]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[12]	4.40[24]	3.85[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.900[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.448[24]	4.543[12]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	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.[o]	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.[o]	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	5.85[23]
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[23]	6.087[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[23]	6.18[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[16]	4.568[24]	4.08[21]	4.78	6.08[23]	6.19[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[23]	6.281[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[23]	.....
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[24]	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[21]	4.61	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[9]	3.763[3]	4.313[6]	4.313[3]	5.313[20]	4.10[10]	3.75[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[6]	5.683[22]	5.613	5.85[23]	5.95[23]
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[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[13]	5.633[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00[22]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.05[15]	5.883[21]	.....	.....	8.00[23]

[o]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; [19]—one to six bundles; [20]—100 to 749 pounds; [21]—300 to 1999 pounds; [22]—1500 to 39,999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for 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 less $7 freight allowance	52.80

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnace

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31,	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa, base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, 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)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos. f.o.b. furnace, Lyles, Tenn	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$68.50

First Quality

Pa., Ill., Md., Mo., Ky	54.40
Alabama, Georgia	54.40
New Jersey	59.35
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; add $6 for packed c.l., $10 for ton, $13.50 less-ton, f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is seller; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is seller; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .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 $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum, 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 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.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 36.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon 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.

Siminal: (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 155 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	8.00
Mixed Borings, Turnings	8.00
Short Shovel Turnings	11.06
Chemical Borings	13.81
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. Hvy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	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. Hvy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn	12.50-13.00
Short Shovel Turnings	15.75
Cast Iron Borings	12.50-13.00
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	11.00-11.50
Short Shovel, Turnings	12.50-13.00
Cast Iron Borings	11.50-12.00
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	8.00- 8.50
Shoveling Turnings	10.00-10.50
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	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots, Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99 50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, nominal, $125 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. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.48c, 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. Grasseli, 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 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10 250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, 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.

Sheets, Strip . . .

Sheet & Strip Prices, Page 186

So strong is demand for sheets and strip that some producers not only are sold through this year but have little to offer before the middle of 1946. In general, sheet bookings are about as heavy as at any time during the war. On low-silicon grades one producer says he is sold for all next year. To prevent some consumers obtaining more than a fair share of production mills are enforcing an allocation plan based on volume of prewar buying.

New York — Certain leading sellers of hot and cold sheets are now sold through the first quarter of next year, with schedules in general about as tight as at any time in recent months. The situation in galvanized also is far extended and in the case of electrical sheets some sellers have little tonnage to offer before the second half of next year. On low-silicon grades one producer asserts he is practically sold out for all of 1946 despite the fact that he is devoting a normal percentage of his capacity to these lower grades.

At least a couple of producers have not yet formally opened books on hot and cold-rolled sheets for first quarter; however, they are tentatively promising their regular customers in this district the same amount of tonnage that they have promised to supply them in the fourth quarter. As indicated by the manner in which sheet deliveries are being extended in general, fourth quarter requirements are well in excess of supply.

Boston — Heavy buying of stainless strip for automobile trim has extended delivery schedules with several mills to December-January. Carbon strip is generally in December, with limited tonnage for November with some mills. Demand is heavy for shoe shank strip and most producers are well booked through the remainder of the year on narrower widths. Orders for typewriters and other civilian products are substantial. Sheet buying holds close to the peak, with reconversion requirements heavy. Hot-rolled pickled, cold-rolled and galvanized are sold well through first quarter with most producers and November schedules are filling on plain hot-rolled.

Cleveland—Strikes and threatened strikes in the automotive industry so far have not resulted in any requests for deferment of shipments from sheet mills or changes in rolling schedules. Due to the unbalanced demand-supply situation, automobile manufacturers will wait as long as possible before relinquishing their positions on rolling schedules. However, sheet producers point out that the storage facilities of automobile manufacturers are limited, that the cost of materials mounts sharply in proportion to the amount of handling that is required, and that the mills can maintain efficient operations only as finished material moves out regularly, with maximum storage placed at about three days' output. Therefore, a further spread of the strikes or intensification of those in progress are a distinct threat to mill operations.

Many sheet sellers are accepting orders for 1946 delivery but are not drawing up rolling schedules until a more accurate estimate of production is available on which to base their customers' quotas. Estimates of production take into consideration the necessity of closing practically all units for extensive repairs before the year end. It is estimated that the mills will be able to furnish from 50 to 75 per cent of the base tonnage, in many instances the 1939-40 average. Production is still restricted by shortage of manpower, especially in annealing and pickling departments.

Chicago — Sheet demand continues unabated, with pressure concentrated heaviest in light gages of hot-rolled, cold-rolled, galvanized and long ternes. Gages of 20 to 24, inclusive, predominate. Consumers are more insistent on delivery promises on specified tonnages, but sheetmakers report that in most cases they are willing to accept less tonnage in a given time than was ordered. Should widespread work stoppage occur in the automotive industry, mills would merely divert rollings to other consumers. A manufacturer of beer barrels is seeking to place 1500 tons of sheets.

St. Louis — Sheets continue in enormous demand with deliveries dropping back steadily. The labor situation has cut production in the area's largest rolling mill to 70 per cent of capacity, lowest since 1938. Deliveries on some hot and cold-rolled and electrical sheets now are scheduled for the end of 1946. Readiness of veterans to work is expected to relieve the labor situation soon. A number of finishers from this source last week enabled shipment of several hundred tons of unfinished sheets. Biggest demand for sheets springs from warehouses and industrial repairs and expansions.

Cincinnati—Sheet mills are confronted with the problem of allocating available tonnage, which is insufficient to meet pressing demands. Cessation of cancellations has clarified the situation to a degree, but efforts to give equitable distribution present difficulties in scheduling. Ordering is of such proportion that backlogs are extended in all grades. Lack of manpower hampers attempts to get capacity production.

Pittsburgh — Unusually heavy influx of orders shows no sign of letting up and continues to exceed output in some instances. Backlogs on hot-rolled pickled and cold-rolled sheets are extended into January and February, with galvanized, electrical and enameling items through first quarter. Confusion created by war contract cancellations has cleared up somewhat, although it is still a factor in formulating rolling schedules. Heavy backlogs and continuation of demand have forced most producers to scrutinize new orders closely in an attempt to limit bookings to actual needs, and to portion out available production as equitably as possible. Sheet and strip output has recovered rapidly the past ten days, with most schedules now near capacity. However, manpower shortages in finishing departments continue a retarding factor. Practically all cancellations are now in on stainless steel and sellers report deliveries on most items are available in October and November except on polished sheets, which are scheduled well into next year. In addition to stainless steel basing point changes announced last week, Republic Steel Corp. has established a base at Canton on forging billets, hot and cold-rolled bars and strip, cold-drawn and cold-rolled flat wire, plates and sheets.

Steel Bars . . .

Bar Prices, Page 186

Steel bars in small diameters are in heavier demand and deliveries have been considerably further deferred recently, little capacity being open before February, with some producers filled further. Medium and large diameters are available in late fourth quarter. Small open capacity in December for cold-rolled bars is expected to disappear soon. Some interruptions in shipment because of strikes in the consuming plants have allowed other tonnage to be moved up earlier.

New York — Demand for small carbon bars is exceptionally brisk, with specifications from a diversity of sources. One large producer has advanced his delivery schedules within the past fortnight from late November and December to April of next year, and producers in general now appear to have little available before February in smaller sizes. Medium and large bars, however, can still be bought for delivery late this year, although another week or so may see the end of that. Some cold-drawn tonnage can be had for December shipment, but here also it should not be long before all sellers are out of the market for this year.

Pittsburgh — Demand for carbon steel bars remains comparatively strong, particularly from automotive, railroad and farm equipment industries. Mill deliveries on most sizes extend into late October and November. Alloy bars are in somewhat easier position, with most mills promising October shipment. Cold-drawn bar producers report a steady flow of new orders with operations well sustained at relatively high levels. Forge shops are operating well below wartime levels, but a moderate increase in new demand is indicated. With richer alloys now available there has been a definite trend in the purchase of these grades. However, the leaner NE alloys have proven adequate in many applications so it is believed that demand for the richer alloys will not develop to prewar scale. Producers also believe that size specifications will be standardized to a greater extent than in the prewar period. Strike at four rolling mills of the Carnegie-Illinois Steel Corp.'s Clairton works last week resulted in loss of about 15,000 tons in bar and light shape tonnage. Of particular interest to the trade here was announcement last week of Steel & Tubes Division of Timken Roller Bearing Co. establishing Canton as a base on tool steel ingots, blooms, billets, slabs, hot and cold-finished bars, and forging billets.

Boston — Carbon bar mill schedules have clarified, with some producers not too far extended, November offered on more sizes in hot-rolled and November-December on cold-rolled. Buying is slightly more active following deep reductions in war tonnage. This is more apparent in carbon stock than in alloys. The latter are in October and November on hot-rolled and cold-finished, respectively.

Chicago — Demand for carbon bars has increased until schedules are filled for the balance of the year and producers are required to allocate tonnages to consumers. Requirements of forgers have dropped sharply, these shops reporting sizable inventories created by canceled

war contracts. Alloys continue comparatively easy, although some tightening is occurring in recent orders.

Steel Plates . . .

Plate Prices, Page 187

Philadelphia — Plate operations are being bolstered by some fairly large orders from abroad, particularly from Norway and Sweden and also from Holland. Recently there also has been some improvement in domestic demand of diversified character. Deliveries fall mainly in November and December, with two large producers offering nothing before December. The first export shipment from the Sparrows Point plant of Bethlehem Steel Co. since the end of the war left last week, including 500 tons of plates, sheets and bars consigned to the purchasing agency of the Norwegian Ministry of Supply and Reconstruction. In addition 601 tons of shapes from the Bethlehem plant and 368 tons of sheets from Lackawanna, N. Y., plant were included. One eastern plate mill last week was able to resume finishing operations after suspension of several days, due to lack of fuel gas because of labor difficulties. Ingot operations, which relied on fuel oil, were sustained.

Boston — Fabricators of small underground gasoline tanks are active buyers, as well as truck tank builders. Orders for heavier plates are slow, requirements of flame cutters being lower. Buying is especially active in plates 3/16-inch.

Chicago — Buying of plates is heavier than had been anticipated after the shipbuilding load dropped away, and some mills believe it will be necessary to allocate tonnages to customers soon. Industrial construction is rising to an extent which makes current business reminiscent of early months of the war. Product mix serves to restrict production.

St. Louis — An unexpected demand for plates has developed from prewar users. On the expectation that ship repairs for a year or more would provide the only major plate market, mills here had cut plate production to around 12 per cent of total capacity. There is some open plate tonnage in January.

Birmingham — Plate production maintains a steady pace in the South and, except for the lack of wartime pressure, is little changed over the past few months. Production is estimated at close to 85 per cent of capacity.

Seattle — Release of plate stocks for private construction has stimulated inquiry for elevated water tanks, many of which are projected by cities in the Pacific Northwest. One agency reports more interest in this type of construction in the last 30 days than during the entire war period. The outlook is promising for absorption of a large tonnage in the near future. H. D. Fowler, Seattle, representing Pittsburgh - Des Moines Steel Co., is low to Seattle at $110,306 for a million-gallon elevated steel tank for the West Myrtle street improvement. About 350 tons of plates and shapes are involved.

Tubular Goods . . .

Tubular Goods Prices, Page 187

New York — Most producers of merchant pipe are now booked solidly into first quarter. Some sellers of butt-weld, in fact, have little to offer before February or March. Some sellers are allocating tonnage to their various distributors, based on war purchases. Demand reflects particularly expanding requirements for building construction and repairs. Repair needs usually reach their peak late in the fall, before the winter season.

Mechanical and boiler tubing also are in good demand and despite substantial cutbacks in Navy work, most producers are booked weeks ahead.

Seattle — Increasing interest in cast iron pipe is noted as cities prepare to undertake improvements delayed by the war. Inquiry has developed for several major projects in this area. H. C. Purcell, Seattle, has been awarded 1200 tons of 12, 8 and 6-inch cast iron pipe by Everett, Wash. Seattle has awarded the general contract for the Hillcrest Ave. improvement, involving 70 tons, sub-award pending.

Boston — Deliveries on butt-weld have extended to January with several suppliers. Demand by distributors is active, most building inventories of merchant steel pipe in anticipation of more construction. Seamless tubing is less active, with deliveries in December on more sizes.

Wire . . .

Wire Prices, Page 187

Boston — Wire buying for reconversion is heavy. Orders cover a wide range, with the ratio of low carbon up

slightly, on which delivery in November is possible on some items. Most mills are sold through the remainder of the year on fine wire specialties, which are rationed to consumers on a monthly tonnage basis in some instances. Spring wire and merchant products are among the tightest. Demand for manufacturers' wire is brisk and aggregate volume of new orders is close to the wartime peak. While mill schedules still are subject to spot revisions they are more clarified. Heavy demand for razor blade steel is unabated and pressure for automobile industry stock holds. Except for scattered openings most mills are in first quarter on rod deliveries. Some Swedish steel is reaching district mills, resulting in a minor cancellation of rod in one instance.

Peak production by the automobile industry is expected to require 125 million complete antifriction bearing assemblies.

Chicago — Wiremakers report a few orders with MM ratings are beginning to appear and fear that confusion will result if they are numerous. Wire order books are virtually filled for the balance of the year. Pressure is persistent for high carbon spring wire, and demand is good for low carbon grades for the automobile industry and for houseware items. As for merchant products, consumer requirements for corn cribs, nails and steel posts give heavy volume.

Birmingham — Wire output is brisk. All items in wire, especially wire fencing, are in heavy demand throughout the trade area. Mills are scheduling production to give as much attention as possible to wire in the face of other needs.

Tin Plate . . .

Tin Plate Prices, Page 187

Cleveland—Acute shortage of tin continues to restrict production of tin plate. Books of most producers are filled through first quarter.

Fourth quarter tin allocations for tin plate manufacture have been cut 400 tons to 6400 tons, compared with the third quarter allocations by the War Production Board. This conforms to an earlier plan to cut to 90 per cent of base use as established in recent tin conservation amendments. Representatives of the industry have agreed that fourth quarter allocations should be sufficient for essential production needs.

Rails, Cars . . .

Track Material Prices, Page 187

New York — Inquiry for 1000 fifty-ton box cars for the Reading Co. is outstanding in an otherwise rather dull car market. Freight car awards are light and while a relatively substantial number of passenger cars have been figured over the past three or four weeks, few orders developed.

Philadelphia Transit Co., Philadelphia, in a $19,500,000 expansion program, plans to acquire over a 5-year period 320 buses, 300 street cars and 250 trackless trolleys. Orders have been placed with the ACF-Brill Co., that city, for the manufacture of 65 trackless trolleys with these units expected to be in operation over the next year.

Baldwin Locomotive Works, Philadelphia, has received orders for 72 steam locomotives for South America, including 47 for five railroads in Brazil, 14 for three railroads in Colombia, 6 for Guatemala, 3 for Ecuador and 2 for Bolivia. Also on order are 16 oil burning steam locomotives for the National Railways of Mexico, four switch engines for another Mexican railroad.

With both the New York Central and the Pennsylvania railroad figuring on substantial tonnages and others feeling out the market, a substantial spurt in rail buying for next year should develop shortly. Indications point to most railroads placing more than they were permitted under wartime restrictions to buy for the current year, although demand in some cases at least is comparable with what they originally asked for 1945. Meanwhile, deliveries on track accessories are expanding rapidly. In track spikes, one producer is booked until late spring of next year.

Structural Shapes . . .

Structural Shape Prices, Page 187

Chicago — Inquiries for structural steel fabrication are being received at a pace reminiscent of the early days of the war. With engineering offices short handed as to draftsmen and estimators, only from a third to a half of the inquiries can be processed. Plain shapes also have tightened considerably, mill books now being filled for the balance of the year, consequently a high proportion of the work now coming out must by necessity go over into 1946. For

the most part, the new construction involves plant additions and expansions for manufacture of civilian goods.

Boston — With contracts amounting to about 1500 tons, inquiry for estimates on fabricated steel is more active. Shape mill schedules are tightening, with December delivery applicable to most sizes. Industrial construction leads, with public works programs slow to get under way. Numerous small expansions by utilities are becoming active. Railroad buying is slow. Inquiry includes designs calling for some sizes which have been out of production during the war under the simplified program which reduced the number of shape sizes.

Cleveland — Aggregate inquiry for structurals is heavy, consisting mainly of many small orders for plant additions or alterations necessitated by reconversion. Little inquiry has been received involving highway work.

The lead time from placement of an order to delivery of the fabricated shapes is now about four months, compared with a normal span of about two and one-half months. Most fabricating departments are operating far below capacities and will not be able to step up operations until heavier shipments are made from mills. While plain materials are available in November and December, fabricated material is not available before January.

Seattle — Fabricating shops are still in a state of uncertainty following extended cancellations, but with materials more easily obtainable a potential demand, dammed up since the war, is beginning to come into the open. Many bridge jobs are projected and it is expected that considerable tonnage will be required in this and other industrial fields. The largest job assuming definite shape is the rebuilding of the Narrows bridge near Tacoma, Wash., destroyed by a gale in 1940. Engineers have agreed on the proposed design which increases the width from 39 to 60 feet. The piers and foundations of the original structure will be used. The work will cost about $6 million and involves a large but unstated tonnage. Bids will be called in January.

Birmingham — Shape output is consistently good. Fabricators report bookings well into next year and with little prospect of any material decrease. Considerable construction work is evident throughout the Southeast, many long delayed projects, which account for a substantial shape tonnage.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 187

Pittsburgh — Only moderate improvement in reinforcing bar output is indicated for October, but November production is scheduled to increase, almost doubling wartime output under CMP directive. Producers report heavy backlogs with considerable tonnage for delivery well into next year. Export tonnage represents a considerable tonnage, nearly one-third of current output, much for South America. Just prior to the cessation of lend-lease Italy was in the market for about 16,500 tons of reinforcing bars. Current domestic demand continues to expand, notably in the Detroit area. Highway work is not expected to reach full scale proportions until next spring. Dravo Corp., Pittsburgh, is low bidder on 1400 tons for reinforced concrete retaining ways at Portsmouth, O., for U. S. Engineers. Two veterans' hospitals are in the planning stage for Western Pennsylvania, both of which will require over 1000 tons if decided to go concrete.

New York — S. A. Healy, White Plains, N. Y., is low on the general contract for an aqueduct project for New York city board of water supply, requiring 2000 tons of reinforcing steel. Approximately 800 tons are required for a repair shop for the New York city fire department, with the Corbetta Construction Co., general contractor.

Chicago — Reinforcing steel suppliers are swamped with work and many inquiries pass almost unnoticed. Lack of engineers and draftsmen, as well as limited steel supply, all operate to create this situation. Most inquiry involves quantities of less than 100 tons, although a few of the projects current will require several hundred tons. Most of these are for building construction of miscellaneous character, but highway work and bridges are beginning to come out in large number.

Pig Iron . . .

Pig Iron Prices, Page 189

Increasing tightness shows in the pig iron market as foundries find the labor situation slightly eased. All tonnage produced is being shipped and no stocks are accumulated, either at furnaces or at melters' plants. Considerable inquiry for export iron is being entertained but

is not being accepted, for most part. Some observers see continued allocations to spread the supply equitably. A considerable number of blast furnaces are idle and output could be increased materially by relighting.

New York — Pig iron sellers here report that fourth quarter backlogs are increasing substantially, with indications that consumption in that period will be limited mainly by manpower available at foundries. Some expect an easing when colder weather sets in, but to date there has been no appreciable improvement in labor supply, despite cutbacks in various plants engaged in war work.

Buffalo — Pig iron producers report shipments to Michigan are being held up by the Ford shutdown and strikes among parts plants, but other demand absorbs full production. Foundries now report more civilian orders on books than they can handle with labor supply. Bethlehem Steel Co. has relighted its Lackawanna G stack, for basic iron production. Another stack will be blown out soon for repairs.

Chicago — Fact that pig iron demand exceeds available supply in this area leads to the conclusion that some form of allocation will have to be continued in fourth quarter. When the plan was kept operative for September, WPB had hoped that it could be dropped in succeeding months. Foundry melt still is held down by manpower shortage, and executives assert that even if adequate workers were available they would be unable to keep abreast of castings demand, so heavy are backlogs. Here and there, some shops are picking up a few additional workers; on the other hand, some report losses since V-J Day. Gray iron foundries are gratified over OPA's approval of a 10 per cent increase in base prices as of Sept. 17 although the relief is a little less than had been felt adequate. Of the district's 41 blast furnaces, 34 are active, Carnegie-Illinois Steel Corp. having returned one Gary stack and two South Chicago stacks to production within the past ten days.

Pittsburgh — Foundry pig iron consumption is steadily increasing, reflecting expanding production now that civilian goods output is gaining momentum. Indicated further gain in foundry operations is seen as largely offsetting somewhat lower requirements for steelmaking. Large export inquiries are reported, estimated at over 300,000 tons, and still further increase in foreign demand is indicated. Outlook for continued operations at the Struthers, O., furnace is uncertain at the moment. This unit is considered a high cost furnace and there is no longer the pressing demand for basic pig iron that existed during the war. However, this unit may share in the substantial volume of export tonnage. Continued limitation of pig iron inventories to 30 days is being discussed by blast furnace interests to prevent larger buyers from draining the market at the expense of smaller consumers.

Philadelphia — Increasing strength is noted in pig iron. Supply is still sufficient for requirements but the outlook for fall is tight, especially if labor supply eases in foundries. Also, substantial export demand overhangs the market.

Boston — Until more foundry labor is available pig iron melt in New England holds close to 25,000 tons per month, some consumers operating with inventories less than 30 days. Subcontracting on a broad scale by textile mill equipment shops continues and paper-mill machinery plants are slowly increasing requirements. Buffalo suppliers are furnishing most foundry tonnage and also basic to two steel plants and are unable to take on additional tonnage offered in some instances.

Cincinnati — Buying of fourth quarter pig iron has begun, and most buying is from customary sources. Supplies are tight, but shipments are coming in without undue delay. Demand for castings is well sustained, with persistent lack of labor the bottleneck preventing expansion in melt.

Birmingham — Pig iron output holds at capacity in the South. Eighteen blast furnaces are operating and demand for deliveries is increasing from merchant iron producers, one of whom is just getting back in stride after a recent strike and fire.

Scrap . . .

Scrap Prices, Page 190

Strength is the dominating feature in the scrap market, aided by scarcity, resulting from the industrial lull following the war end and lack of labor for yard processing. Steel mill consumers seek to build reserves for winter safety and find supply short. Much of the softening in borings and turnings noted recently has disappeared. Uncertainty as to demand for steelmaking grades resulting from widespread strikes in the

motor and other industries has not had appreciable effect on buying.

Buffalo — In spite of an occasional note of caution among buyers because of strikes, strength continues in the scrap market, with a sale of railroad material reported at the ceiling of $21 per ton. Additionally, dealers covering recent substantial sales have cut into available supply. Dealers report marked lessening in yard receipts, especially quality material. A leading mill consumer has been aided in building reserves by continued receipts of water scrap, a cargo of 5000 tons arriving from Duluth and a barge fleet with 2500 tons came from the seaboard during last week.

Seattle — Mill buying has been curtailed and there is a general decline. Prices have dropped from $14.50 to $12.50 for No. 1, delivered. Dealers expect it will be the end of the year before the situation is stabilized as many factors have to be adjusted, important among which is reconversion of plants using steel scrap. Supplies are ample for current needs and a moderate tonnage is moving to mills through dealers, who still are handicapped by lack of competent labor.

Boston—On scattered buying heavier grades of steelmaking scrap are at ceiling, with machine shop turnings and unprepared scrap the only soft spots. Supply of turnings is light and offerings of heavy melting steel as well. Cast grades remain firm at ceiling and are scarce. Machinery volume being scrapped in textile mills and shoe factories is light.

New York — Following a slight easing recently, borings and turnings again are in tight supply. This is ascribed not only to reduction in ordnance work, but to a more active demand by several leading consumers. Bethlehem Steel Co. continues to buy actively for its Bethlehem, Sparrows Point and Lackawanna plants. Several other eastern consumers of melting steel are buying in moderate volume, with some pressing hard for such tonnage as they already have on order. The scrap trade is watching closely the labor disturbances in the automobile and metalworking industries, particularly because of the effect they may have on steel consumption and in turn consumption of scrap. Scrap prices continue at ceiling levels on all major grades.

St. Louis — Scrap shipments are light because of labor shortage. Melters are not buying but shipments on old orders hold reserves at 30 to 45 days. Foundries are reported in better position than in several months. Sales are few, plants producing turnings having reconverted from shell work. No. 2 heavy melting steel is in greatest demand and cast scrap is easing somewhat. Virtually no termination scrap is on the market. Demand from the Chicago market shows no decline. Prices are at ceiling except for turnings, which are unchanged.

Philadelphia — Shortage of turnings is the feature of the scrap market. Demand is well in excess of supply as production continues to decline as a result of further ordnance cancellations. Heavy melting and cast grades are in strong demand and prices generally are at ceiling. An exception is unprepared scrap, with prices well below ceiling.

Pittsburgh — Scrap prices are nominal with no new buying of consequence. However, substantial tonnage recently bought by Republic Steel Corp. for Cleveland and Youngstown mills at full ceilings plus commission indicates current price strength. Purchases in other districts at top price levels also occurred this past week. The little tonnage moving in this district is said to be sold at full ceiling prices, plus commission. On No. 1 heavy melting up to $1 a ton springboard is being paid. While mill operations are off substantially from peak war pace, their inventories are relatively low and supply of good melting steel, low phos, alloy free turnings and cast scrap grades are limited.

Chicago — Buying of top grades of scrap by mills is general and prices hold at full ceiling. These include No. 1 and No. 2 heavy melting, No. 1 and No. 2 bundles, and electric furnace grades. Baled machine shop turnings, however, was sold for $16.75, representing a $2 break on a small lot, and in spite of the fact that turning supply has dropped sharply with the war's end. Blast furnace grades, previously untested, are now selling at $13 in limited transactions, this being a shading of 75 cents. This level also applies to cast iron borings. Volume of scrap is down considerably since V-J day, but virtually all mills are in need of material as steelmaking operations rise slowly to near normal level.

Cincinnati — Iron and steel scrap is moving at ceilings, the only exceptions being borings and turnings. The market,

however, seems dull in absence of volume buying and reduced shipments to melters. Despite approach of winter and accompanying handicaps to scrap movement, all interests show a degree of caution. One district mill will evidently be out of the market for scrap during a proposed shutdown for inventory taking.

Cleveland — A tight situation prevails in scrap, all important consumers being in the market, with supply unusually light. Orders recently have been placed at ceiling prices, with springboard added, in all grades, including borings and turnings. These orders were for mills here and in the Valley. Small shipments are being made against orders, but movement is far below needs.

Warehouse . . .

Warehouse Prices, Page 188

Chicago — In the face of strong demand, warehouses find themselves in short position. While this applies to most products, it is most aggravated for hot and cold-rolled sheets, galvanized sheets and long ternes. Consumer pressure is particularly heavy for light-gage sheets, including 20 to 24-gage. Replacements from mills are received slowly. Some rated business still is being accommodated, of course, but so far few MM or CC orders are coming in. Both classifications are expected to increase after Sept. 30 when CMP ends. Alloys are in relatively easy position as compared with carbon.

Pittsburgh — Shipments from steel distributors' stocks have leveled at about 10 to 15 per cent below former war stimulated pace. Extended mill deliveries on most steel products tend to sustain warehouse steel demand, particularly for light flat-rolled steel, notably galvanized, cold-rolled sheets and strip.

Philadelphia — September, the first full month since the war's end, is shaping up unusually well for most jobbers. Some leaders report business so far is 5 per cent above August on a daily basis, with business limited in certain lines, sheets in particular, because of inadequate stocks. Bar and shape demand is brisk.

Boston — Demand for steel from warehouse is strong for sheets and strip, with an increase of fill-in orders for reconversion. Alloy buying is slower, with distributors somewhat concerned as to NE grade inventories, anticipating a gradual return to double alloy stock. Mill replacement of flat-rolled stock, notably in galvanized sheets, has not improved and except for some heavier hot-rolled products only slight improvement in balance of inventories is noted.

Cincinnati — Sales by warehouses are sustained at high level, with active demand for structurals a feature. Considerable tonnage may be attributed to efforts at speed in reconversion. Stocks of structurals, sheets and strip are proving inadequate. Heavy plates are dull.

St. Louis — Warehouse inventories are improving but sizes and varieties remain scattered. Civilian orders are topping wartime peaks. With the number of customers on the increase, warehouses hesitate to accept orders, due to uncertainty of stock replenishment.

Seattle — While structurals, plates and alloys are moving freely from warehouse there is no change in the position of sheets, which are as tight as before the end of the war. Demand continues strong for sheets with deliveries months in the future, although interest in other items has dropped since Japan's surrender. Cold-rolled steel is in fair demand and deliveries have eased. The trade reports that while the volume of orders has held well, the weight per order is less and the tonnage turnover shows a drop. The 10c advance on cold-rolled is now in effect and jobbers are working through their national association to obtain a more equitable price level on other items.

Ferroalloys . . .

Ferroalloy Prices, Page 189

New York—Tungsten stocks appear plentiful. According to some leading trade interests there is now enough in government hands, exclusive of pre-war stocks, to take care of industry for two years. Private stocks are estimated at two to three months supply. Government stocks are well diversified as to wolframite, scheelite and other grades.

Over past months about 75 per cent of consumption has been supplied currently by shipments from foreign and domestic mines, the major portion foreign, with the remainder coming from stocks on hand. Recent imports have come largely from South America and there is still quite a sizeable tonnage coming in, particularly from Bolivia. Brazil is probably the second largest South American supplier, although a rather poor second as compared with Bolivia.

Some tonnage is coming in from various other countries and it is believed now that the war is over in the Far East that China will soon be assuming her more normal position as this country's principal supplier of wolframite, the grade in heaviest demand here regularly, for ferrotungsten and certain other requirements. Incidentally, scheelite has been used in increasing quantities for direct addition to steel, it is said.

The first large shipments of ferromanganese from India to this country in some time are scheduled to get under way this month. In fact, one shipment of size was scheduled to leave India Sept. 20.

Ferromanganese now is coming principally from Russia and the Gold Coast, West Africa, Russian shipments having been resumed earlier in the year following a wartime suspension. Some tonnage is also coming from Brazil where one large steel company owns properties, and from Cuba; also from Chile, from where, despite difficulties of offshore loading, approximately 20,000 tons per month have been coming in for the past couple of months or so.

There should be some definite word soon with respect to resumption of manganese ore, and also chrome and other mineral from the Philippines. Shortly, or almost simultaneously with the recapture of Philippines, mining experts began making a survey of the minerals situation. A full report is being expected shortly. Philippines were never large suppliers of manganese but prior to the war they furnished a fair tonnage to this country.

Complicating the water movement of foreign ores to this country is continued application of war risk insurance rates;

once these are dropped and the trade feels that they could be dropped at any time, there should be a livelier interest in ore now in rather short supply, notably chrome for metallurgical purposes.

Metallurgical chrome is still coming in principally from Rhodesia, notwithstanding the fact that the rail situation in that country is rather bad. There has been no important resumption of metallurgical chrome shipments from Turkey. Turkish interests are still quoting prices unattractive to American buyers, prices which had become inflated as a result of purchases by the Allies to keep supplies from falling in the hands of the enemies and which to date, notwithstanding the fact that the war is over, have undergone little readjustment.

Government stocks in this country, barring a strategic reserve owned by the Treasury Department for account of the military services, are fairly well picked over as far as metallurgical chrome is concerned, it is said. Some metallurgical ore is coming in from New Caledonia and the Transvaal, the chrome from the latter being high chrome high iron used by some consumers for direct addition.

Incidentaly, chrome interests expect production of low carbon ferrochrome to be well sustained. particularly in view of anticipated peacetime requirement for stainless steel.

Meanwhile most of the refractory ore is coming from Cuba, although this situation should change somewhat with the resumption of output in the Philippines. Normally most of the refractory ore consumed in this country comes from Cuba and the Philippines.

Iron Ore . . .

Iron Ore Prices, Page 188

Consumption of Lake Superior iron ore in August showed considerable drop, with a total of 5,658,278 gross tons, compared with 6,532,273 tons in July and 7,341,964 tons in August, 1944, according to the Lake Superior Iron Ore Association, Cleveland. Cumulative consumption for the year to Sept. 1 was 52,536,854 tons, compared with 59,003,927 tons in the comparable period last year.

Ore on hand at furnaces and Lake Erie docks Sept. 1 totaled 34,781,382 tons, compared with 37,243,322 tons at the corresponding date last year. Furnaces in blast Sept. 1 numbered 146 in the United States and six in Canada, compared with 158 and seven a month earlier and 167 and six a year earlier.

Three less vessels were in the iron ore trade Sept. 15 than a month earlier, 244 compared with 247. As of Sept. 15, 1944, vessels carrying ore numbered 293. Smaller requirement expected during the winter has taken some pressure off ore transportation, compared with war years.

Canada . . .

Toronto, Ont. — With controlled buying largely eliminated from the Canadian iron and steel markets, business gradually is settling down to a more normal basis. Cancellations on war account have not greatly eased the situation, and some Canadian steelmakers are out of the market on further orders for delivery this year. Large commitments are re-

ed on civilian consumption account and while mills are doing their best to fill the growing demand they are indefinite regarding delivery on new orders. However, with some producers declining orders for delivery in 1946, there has been some curtailment in new bookings but it is believed there will be a new flood of orders when books are opened for first quarter.

Sheet cancellations following the end of the war were below expectations, while demand on civilian account has shown considerable volume, with the result that the supply remains tight and sheetmakers are making no promise regarding delivery on new orders. Most producers report solid bookings to the end of the year with large tonnage carryover into 1946.

Barmakers report a continuous flow of orders, with only small additional capacity available this year. Demand centers largely on carbon bars, with slackening demand for alloy bars. Bookings are equally heavy on heavy and light sizes.

No improvement in supply is reported in wire and nails. Demand is heavy on both commodities and some producers, unable to accept additional business for shipment this year, have withdrawn from the market. Stocks in the hands of producers and warehouse operators are negligible and consumers are said to be having difficulty obtaining supplies for current needs.

Scrap iron and steel continues under ceiling price regulations, and in most materials trading is done at ceiling. However, consumers are insisting on deliveries being to specifications and are not paying top prices for inferior scrap. Demand is brisk for better grades of steelmaking scrap as well as for all iron grades. Dealers report some improvement in receipts although incoming scrap is not equal to consumption.

Steel in Europe . . .

London — (*By Radio*) — Fuel and labor scarcity in the steel industry of Great Britain are limiting production. Structural steel demand is quiet. Shortage of billets is causing some anxiety. Sheet mills are operating to capacity.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1500 tons, warehouse, St. Paul, for Paper-Calmenson & Co., to Minneapolis-Moline Power Implement Co.

900 tons, box plant for Hinde & Dauch Paper Co. at Watertown, Mass., to American Bridge Co., Pittsburgh.

500 tons, pilot building, Argo, Ill., for Corn Products Refining Co., 360 tons to Vierling Steel Works, Chicago, and 140 tons of miscellaneous to David Architectural Iron Works Inc., Chicago; Ragnar Benson Inc., Chicago, contractor; bids Aug. 14.

500 tons, Wynnewood Apartments, Philadelphia, to Belmont Iron Works, Eddystone, Pa.

500 tons, power house addition for New Bedford Gas & Light Co., New Bedford, Mass., to A. O. Wilson Structural Co., Cambridge, Mass.

455 tons, dairy mill building and warehouse, Lyons, Kans., for American Salt Corp., subsidiary of Cudahy Packing Co., to Darby Corp., Kansas City, Kans.

277 tons, crane runway, Waterloo, Iowa, for Deere & Co., to Pittsburgh-Des Moines Steel Co., Pittsburgh; bids Sept. 5.

225 tons, building addition for Lever Bros. at Cambridge, Mass., to Lehigh Structural Steel Co., Allentown, Pa., through Stone & Webster Engineering Corp., New York.

200 tons, factory building, South Bend, Ind., for Roach-Appleton Mfg. Co., to American Bridge Co., Pittsburgh; bids June 11.

165 tons, power plant for Montaup Electric Co., Fall River, Mass., to American Bridge Co., Pittsburgh.

110 tons, building addition, Chicago, for Madigan Bros., to Wendnagel & Co., Chicago.

STRUCTURAL STEEL PENDING

9000 tons, estimated, telephone building, Boston; Stone & Webster Engineering Corp., New York, engineer-contractor.

6000 tons, more or less, Narrows bridge, near Tacoma, Wash.; bids probably in January to Washington Toll Bridge Authority, Olympia, Wash.

6000 tons, building for John Hancock Insurance Co., Boston; Turner Construction Co., Boston, contractor.

2000 tons, including 1500 tons in soda fountain building and building addition, Chicago, and 500 tons, manufacturing building, Morrison, Ill., for Liquid Carbonic Corp.

1500 tons, two buildings for Schaeffer Brewery Co., Brooklyn, N. Y.

1200 tons, eleven-span plate girder bridge for New York state; bids Sept. 26.

1200 tons, fiber box factory for J. & J. Corrugated Box Co., Fall River, Mass.

930 tons, bridge, Farley, Mo., for Chicago, Burlington & Quincy railroad; bids Sept. 21.

900 tons, factory building for Celanese Corp., Bridgewater, Va.

728 tons, bridge over North Canadian river, McAlester, Okla., for Missouri, Kansas & Texas railroad; bids Sept. 8.

550 tons, cantilever bridge over barge canal, Brooks Ave., Rochester, N. Y.; bids Sept. 19.

500 tons, alterations to blast furnace No. 6, Gary, Ind., for Carnegie-Illinois Steel Corp.; Chicago Bridge & Iron Co., Chicago, contractor.

500 tons, mill building, Aurora, Ill., for All-Steel Equip. Co.

500 tons, store building, Gary, Ind., for Montgomery, Ward & Co.

450 tons, fabricating plant, Chicago, for Ceco Steel Products Corp.

400 tons, plant addition for du Pont interests, Houston, Tex., bids now closing.

375 tons, warehouse, Green Bay, Wis., for Joannes Bros.; bids Sept. 28.

330 tons, highway bridge, Freeport, Ill., for state highway commission; Illinois Steel Bridge Co., Jacksonville, Ill., low; bids Sept. 14.

300 tons, manufacturing building, Denver, for Sam Judd.

215 tons, addition to power generating plant at Fall River, Mass.

REINFORCING BARS . . .

REINFORCING BARS PLACED

500 tons, veterans tuberculosis hospital, Rutland Heights, Mass., to J. Morgan, through F. D. Rich Co., contractor.

400 tons, culverts, Norfolk & Western Railway, Lambert's Point, Va., to Virginia Steel Co., Richmond, Va., through McDowell & Wood, contractors.

400 tons, wharf, U. S. Coast Guard, Boston, to Bethlehem Steel Co., Bethlehem, Pa., through Merritt, Chapman & Scott, contractors.

250 tons, reservoir for Philadelphia Navy Yard, to Bethlehem Steel Co., Bethlehem, Pa., through Hughes, Foulkrod, Philadelphia.

100 tons for J. T. Lewis Paint Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa., through Turner Construction Co., New York.

REINFORCING BARS PENDING

2000 tons, aqueduct, New York board of water supply, S. A. Healy, White Plains, N. Y., low on general contract.

1000 tons, speedway at Atlantic City, N. J.; McCloskey & Co., Philadelphia, contractor.

992 tons, including 922 tons bars and 70 tons mesh, additions to body buildings, Indianapolis, for Chevrolet Commercial Body Division, General Motors Corp.; project revived following abandonment in November, 1944.

800 tons, repair shop, municipal fire department, New York City, Corbetta Construction Co., New York, general contractor.

300 tons, office building, Elkhart, Ind., for General Electric Co.

300 tons, sewage disposal plant, Baltimore.

200 to 300 tons, treatment building, Jacksonville, Ill., for Jacksonville State Hospital; bids Sept. 25.

188 tons, road paving and circle overpass, Camden county, New Jersey.

150 tons, grade crossing elimination at Massapequa, New York, for Long Island railroad.

149 tons, addition to warehouse, Chicago, for Service Wholesale Drug Co.

120 tons, addition to brewery, St. Paul, for Theodore Hamm Brewing Co.

120 tons, bridge and access road, Prince Georges county, Maryland.

Unstated, assembly building and office, Janesville, Wis., for Chevrolet Motor Division, General Motors Corp.; bids Sept. 24.

PLATES . . .

PLATES PENDING

350 tons (including shapes) elevated water tank West Myrtle street project, Seattle; Pittsburgh-Des Moines Steel Co. low, $110,306.

240 tons, stack, Chicago, for Chicago Fire Brick Co.

PIPE . . .

CAST IRON PIPE PLACED

1200 tons, 12, 8 and 6-inch Class 150, Everett, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

RAILS, CARS . . .

RAILROAD CARS PLACED

Philadelphia Transportation Co., Philadelphia, 65 trackless trolleys, to the ACF-Brill Co., Philadelphia.

St. Louis-San Francisco, 200 seventy-ton steel ballast cars, to American Car & Foundry Co., St. Louis shop.

RAILROAD CARS PENDING

Reading Co., 1000 fifty-ton box cars, bids asked.

Some Confusion Expected From New Basing System

(*Concluded from Page* 91)

market had been expanding steadily, resulting in about a tenfold increase in output in ten years. Production of stainless steel amounted to only 55,907 tons in 1934, jumped to 179,620 by 1939, to 371,984 by 1941, to 457,448 by 1943 and to an estimated total of around 500,000 tons last year.

In addition to the advantages gained by increased production facilities to meet competition in the postwar markets, the industry has benefited by improved techniques which were developed to meet exacting specifications in military orders. Research in steel metallurgy was the most intensive in the history of the industry.

In the rolling department, for instance, much thinner sheet is now being produced than was possible in the prewar period, opening up many new applications where light weight and high strength are demanded. These characteristics, plus those of resistance to corrosion and high reflectability, are the chief reasons for the market expansion.

Stainless steel railroad car orders which have been placed and those which are pending are forerunners of a large volume of business in that field, the industry believes. Other markets which were just entering the comparatively big tonnage stage when the defense and war programs interrupted them and which are being reopened rapidly include household appliances, construction, communication equipment, metalworking machinery, chemical and food processing equipment. The airplane and accessory industries, of course, will continue to be important outlets for stainless steel.

Orders being received from reconverting industries, coupled with military orders still on the books, have extended delivery schedules on some products well into 1946. Some mills are booked solidly through the first quarter of next year on highly polished sheet with other finishes available in earlier months, depending on widths and gages.

Reich's Potential Steel Production Still Large

(*Concluded from Page* 99)

they're too important to tear out.

British engineers are clearing the Rhine-Herne canal, and the Wesel-Datteln canal, hoping to get them into operation this fall so they can help in the coal movement. The Dortmund-Ems canal was badly wrecked, probably will require more time.

One of the problems is retrieving many of the canal tugs which must be gotten out, both because they are menaces to navigation and because they are needed to haul the coal-laden barges.

One of the top problems of the German steel plants, were they permitted to rebuild, would be one of personnel and of housing facilities. Many of the steel plants' most expert workers have been scattered, others were killed in the bombing raids. Adjacent cities were so badly smashed up, losing so many dwelling units, that finding adequate living quarters for repair gangs and then for operating crews would be difficult.

Production charts taken from the Krupp factories in the Ruhr showed heavy production losses in 1943 and 1944 from absenteeism during air raids; one chart covering April, 1944, showed 20 per cent of the potential working hours were lost that month because of absenteeism resulting from workers being bombed out, stranded without transportation, being injured or ill or killed, or absent for other reasons; and 8 per cent of the working hours were lost during air raids or air raid alarms when they were sent to the shelters.

CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—Atlas Toy & Products Co. has been incorporated with 500 shares at $100 each and 3000 shares no par value, to manufacture toys and other products, by H. W. Schwab, agent, 32 Elmdale Ave., Akron, and associates.

CLEVELAND—Modill-Stevens Electronic Co. has been incorporated with $500 capital and 250 shares no par value to manufacture electric and electronic controls, by Hal H. Griswold and associates, 1128 Standard Bldg.

CLEVELAND—Harris, Seybold, Potter Co., A. S. Harris, president, 4310 East 71st. St., will build a $140,000 addition and install $300,000 worth of equipment, to triple output of offset presses. Expansion of the plant at Dayton, O., will also be undertaken at cost of $125,000.

CLEVELAND—Reliable Stamping & Mfg. Co., Conesco Products Inc. and Teco Mfg. Co. have been incorporated, each with $500 capital and 250 shares no par value, for manufacture of automobile accessories and tools, by E. J. Flesher, 1102 Scovill Ave.

CLEVELAND—Builders Structural Steel Co., Herman Friedman, manager, 2880 East 34th St., will build a one-story 60 x 175-foot warehouse at 2958 East 34th street, to cost $15,000.

CLEVELAND—Pioneer Mfg. Co., 3053 East 87th St., will build a two-story plant at that address, 57 x 140 feet, costing about $40,000.

COSHOCTON, O.—General Electric Co., William H. Milton Jr, manager plastics division, Pittsfield, Mass., will build plant here for manufacture of laminated plastics, covering 285,000 square feet floor space.

MANSFIELD, O.—Empire Steel Corp. has plans for a $250,000 program for expanding facilities, including pack furnace and mill, flash coating furnace, to be ready by Jan. 1.

MAINE

LEWISTON, ME.—North American Phillips Co., Lisbon Rd., has let contract to Stewart & Williams Inc., 185 Water St., Augusta, Me., for a one-story 160 x 165-foot plant addition, costing about $75,000.

CONNECTICUT

BRIDGEPORT, CONN.—Underwood, Elliott, Fisher Co., 575 Broad St., will ask bids soon for a boiler house costing about $95,000. Lockwood Greene Inc., Rockefeller Plaza New York, is engineer.

FAIRFIELD, CONN.—Handy & Harmon Co., 1770 Kingshighway, has let contract to Gallatly Construction Co., 25 Housatonic Ave., Bridgeport, Conn., for a 50 x 65-foot melting plant addition, 30 x 60-foot box shop, 15 x 25 and 15 x 35-foot machine shop additions and a refining plant addition, all one-story.

MERIDEN, CONN.—New Departure Division of General Motors Corp., 269 North Main St., Bristol, Conn., will let contract soon for a boiler plant addition. Albert Kahn Associated Architects & Engineers Inc., 345 New Center Bldg., Detroit, is engineer.

NEW BRITAIN, CONN.—Stanley Works, 195 Lake St., R. E. Pritchard, president, has let contract to Turner Construction Co., 420 Lexington Ave., New York, for two manufacturing buildings. Bldg. 150 will be seven stories, 95 x 222 feet with two wings 77 x 106 feet; Bldg. 153 will be six stories 77 x 201 feet with wing 75 x 95 feet. Plans by J. H. Fellows, New Britain, engineer.

NORWALK, CONN.—Fletcher Thompson Inc., engineer, 211 State St., will let contract soon for a boiler plant and equipment for Norwalk Tire & Rubber Co., Norwalk.

ROCKY HILL, CONN.—Hartford Rayon Corp., Dividend St., Hartford, Conn., has plans by Buck & Buck, 650 Main St., Hartford, for a plant addition costing $40,000.

WINSTED, CONN.—City, J. W. Darcey, mayor, City Hall, has voted to build sewage disposal plant and additional sewers, to cost about $1 million. Buck & Buck, 650 Main St., Hartford, Conn., are consulting engineers. E. Keefe, City Hall, is city engineer.

NEW YORK

JOHNSON CITY, N. Y.—Ozalid Products Division of General Analine & Film Corp., 230 Park Ave., New York, has plans by Conrad & Cummings, 99 Collier St., Binghamton, N. Y., for a plant addition costing $270,000.

PENNSYLVANIA

BRACKENRIDGE, PA.—Allegheny Ludlum Steel Corp., H. G. Batcheller, president, Oliver Bldg., Pittsburgh, plans research laboratory and pilot plant, to cost about $2,500,000.

EAST STROUDSBURG, PA.—Art Metal Works Inc., 250 Harris St., has plans by H. C. Hill, 112 South 16th St., Philadelphia, for a manufacturing building to cost about $350,000.

LEECHBURG, PA.—Allegheny Ludlum Steel Corp., H. G. Batcheller, president, Oliver Bldg., Pittsburgh, plans cold rolling mill for stainless and silicon strip at West Leechburg, to cost about $2,500,000.

PHILADELPHIA—Dana Tool Co., 30 North Fifth ST., has plans by Frank E. Hahn Inc., 1511 West Oxford St., for a machine shop addition costing about $75,000.

ROYERSFORD, PA.—Royersford Spring Co., Main and First Sts., has let contract for building additions and alterations to R. M. Shoemaker, 1619 Sansom St., Philadelphia, to cost about $40,000. Douglas March Blum,, 23 South Main St., Phoenixville, Pa., is architect.

WILLIAMSPORT, PA.—Bethlehem Steel Co., care J. B. Ferguson, Williamsport, has let contract to Lundy Construction Co., Williamsport, for a wire rope plant costing about $1 million. C. V. Lehr, Bethlehem, Pa., is engineer.

MICHIGAN

BRIDGMAN, MICH.—Mathieu Foundry Inc., has been incorporated with $350,000 capital to manufacture foundry products, by Walter H. Steere, 409 Ridge St., Marquette, Mich.

DETROIT—Detroit Machinery Corp., 9325 Forest Ave., has been incorporated with $100,000 capital to manufacture machinery, by Phillip K. Mebus, 1306 Whittier St., Grosse Pointe Park, Mich.

DETROIT—Mi-Lo Tool & Gauge Corp., 2519 McKinstry St., has been incorporated with $10,000 capital to manufacture tools, dies, gages, and fixtures, by George F. Miller, 20039 Indian St., Detroit.

DETROIT—Resco Mfg. Corp., 6201 Grand River Ave., has been incorporated with $50,000 capital to manufacture refrigerators, by John R. Miller, 18252 Wildemere Ave.

DETROIT—J. K. Lytle Corp., 3166 Penobscot Bldg., has been incorporated with $100,000 capital to conduct a general manufacturing business, by James K. Lytle, same address.

ILLINOIS

BELLEVILLE, ILL. — Griesedieck-Western Brewery Co., 1201 West E St., will let contracts soon for a one-story 152 x 435-foot bottling plant. Plans are by O. Janssen, Chemical Bldg., 721 Olive St., St. Louis.

CHICAGO—Ingersoll Steel & Disc. Co., 310 South Michigan Ave., will let contract soon through A. J. Boynton & Co., engineers, 58 East Washington St., for a one-story 100 x 440-foot heat treating building, 35 x 360-foot leanto and other additions.

CHICAGO—Illinois Auto Electric Co., 2101 Indiana Ave., will build a one and two-story factory and office building costing about

$200,000. Engineering Systems, 221 North LaSalle St., is engineer.

CHICAGO—Crucible Steel Co., of America, 405 Lexington Ave., New York, has let contract to Campbell, Lowrie & Lautermilch, 400 West Madison St., for a one and two-story warehouse and office building to cost about $150,000. C. A. Metz, 224 South Michigan Ave., is engineer.

EVANSTON, ILL.—Sentinel Radio Corp., 2080 Ridge Ave., has let contract to Ragnar Benson, 4744 Rice St., Chicago, for a new plant costing about $500,000. Victor Cham, 4744 Rise St., is architect.

PEORIA, ILL.—Advance Appliance Co., H. W. Lehman, president, has let contract to T. S. Willis and W. G. Best for a plant building at 808 South Washington St., costing $35,000, for manufacture of stokers.

INDIANA

EVANSVILLE, IND.—Seeger Sunbeam Corp., St. Paul, Minn., and Evansville, manufacturer of refrigerators, which recently announced $1,200,000 improvement at St. Paul will expand Evansville plant at cost of $2 million. Robert M. Reay is president.

NAPANNEE, IND.—Board of public works, Mayor R. L. Arnott, chairman, plans sewage treatment plant and interceptor sewer, to cost $250,000. Laramore & Douglas, 327 South LaSalle St., Chicago, are consulting engineers.

HAMMOND, IND.—Standard Oil Co. is building a research laboratory here, close to its refinery at Whiting, Ind., to unify various research facilities scattered through the Whiting plant. Robert E. Wilson is chairman of the board.

ALABAMA

BIRMINGHAM, ALA.—Tennessee Coal, Iron & Railroad Co. has let contract to Hutchinson & Burton Co. Inc., Birmingham, for three shafts 325 to 550 feet deep at Wenonah and Ishkooda iron ore mines, with ventilating installation at each shaft.

NORTH CAROLINA

CANTON, N. C.—Champion Paper & Fibre Co. plans expansion to increase capacity here at cost of about $5 million, to increase capacity to 1000 tons per day. Will include chemical recovery plant, pulp bleaching unit, 7500 kw turbine, high-pressure steam boiler and fourdrinier paper unit. H. K. Ferguson Co., Cleveland, is engineer.

MISSOURI

KANSAS CITY, MO.—Klassen Pattern & Foundry Co., 1414 Kansas Ave., has let contract to Universal Construction Co. for a one-story foundry addition.

KANSAS CITY, MO.—Acme Sash & Door Co., 17th and Askew Aves., plans one and two-story plant to cost about $200,000.

ST. LOUIS—Monsanto Chemical Co., St. Louis, announces it has listed 151 construction and expansion projects estimated to cost $48,000,000 for consideration in its postwar program. Francis J. Curtis is vice president in charge.

ST. LOUIS—Missouri Pacific railroad, F. E. Bates, chief engineer, Missouri Pacific Bldg., 1224 Olive St., has let contract to H. B. Deal & Co. Inc. 1218 Olive street, for a one-story 50 x 90-foot machine shop at 3001 Chouteau Ave., estimated to cost about $40,000.

OKLAHOMA

TULSA, OKLA.—Nelson Electric & Mfg. Co. has let contract to Creamer & Dean for a one-story foundry plant 75 x 140 ft.

WISCONSIN

GENOA, WIS.—Dairyland Power Co-operative plans new steam generating plant and extension of transmission facilities to cost about $3,500,000. REA has allotted $1,250,000 to finance first unit. Vern E. Alden, 120 South LaSalle St., Chicago, is engineer.

WAUKESHA, WIS.—Waukesha Foundry Co., C. C. Smith, president, has bought part of I. B. Rowell Co. plant to be used for pump manufacture. Company also plans to build one-story foundry 64 x 200 feet at Watertown, Wis.

IOWA

BALMOND, IOWA—General Mills Inc., Chamber of Commerce Bldg., Minneapolis has let contract to McKenzie-Hague-Simmons Co., 610 Wesley Temple Bldg., Minneapolis, for a 500,000-bushel capacity soybean processing plant addition, to cost about $153,000.

CEDAR RAPIDS, IOWA—Cherry-Burrell Corp., manufacturer of dairy and ice cream equipment, is building a one-story plant at Wilson Ave. and Sixth St. to cost about $1,500,000. H. R. Green Engineering Co., 417 First Ave. East, are engineers.

FORT DODGE, IOWA—G. L. Glaser Packing Co. has let contract to Smith Construction Co., Webster City, Iowa, for a packing house and equipment, to cost about $50,000. Plans are by Henschien, Everds & Crombie, 56 East Van Buren St., Chicago.

SIBLEY CITY, IOWA—City, R. D. Stewart, clerk, will open bids Sept. 25 for improvements to municipal power plant, including addition, boiler feed pumps and deaerating feed water heater. Ralph D. Thomas & Associates, 1200 Second Ave. South, Minneapolis, are engineers.

SIOUX CITY, IOWA—Sieg Sioux City Co., distributor of automotive parts and equipment, has let contract for one-story plant 100 x 118 feet, including machine shop.

WALNUT, IOWA—City, Marjorie Williams, clerk, will open bids Oct. 1 for improvements and equipment for municipal power plant, including diesel generating unit, cooler, switchboard and auxiliaries, with building changes to accommodate trolley beam and hoist. Ralph W. Gearheart, Cedar Rapids, Iowa, is engineer.

UTAH

COPPERTON, UTAH — Utah Copper Co., Kearns Blvd., Salt Lake City, has let contract to Bowers Building & Construction Co., 1033 South State St., Salt Lake City, for a machine shop and acetylene generator house at Copperton, to cost about $400,000.

CALIFORNIA

LOS ANGELES—California Cornice, Steel & Supply Co., 1620 North Main St., is building a storage building at 1601 Naud St., 122 x 130 feet and 50 x 120 feet, with two 5-ton cranes, to cost about $80,000.

LOS ANGELES—General Cable Corp., 3600 East Olympic Blvd., has let contract to McIsaac & Menke, 3440 East 22nd St., Los Angeles, for a plant addition 25 x 140 feet, to cost $20,000.

LOS ANGELES—Byron Jackson Co., 2301 East Vernon Ave., is having plans made for a plant building with 75,000 square feet floor space.

SOUTH GATE, CALIF.—Armstrong Cork Co., 5037 Patata St., will let contract soon for a plant addition 100 x 120 feet, to cost about $40,000.

OREGON

PORTLAND, OREG.—Beall Pipe & Tank Co., 1945 North Columbia Blvd., will build new factory building at that address, 200 x 500 feet, to cost about $500,000.

WASHINGTON

SEATTLE—Seidelhuber Iron & Bronze Works Inc., 1421 Dearborn St., will build a one-story 120 x 400-foot warehouse costing about $75,000.

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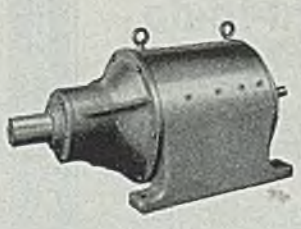

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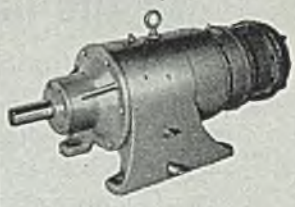

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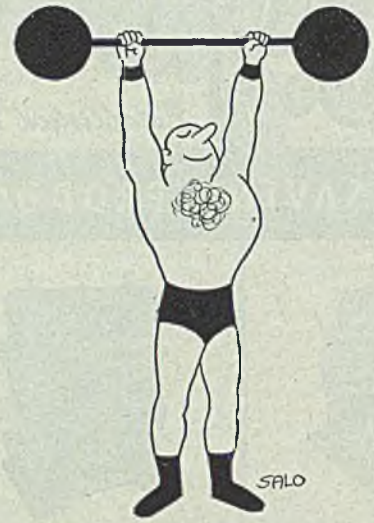

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WANTED: SALESMAN BY LARGE TUBING manufacturer of both seamless and welded in carbon, alloy and stainless steels. Must have Mechanical or Metallurgical Engineering college degree, or suitable alloy steel field sales experience. Give full details with application. Apply Box 181, STEEL, Penton Bldg., Cleveland 13, O.

INDUSTRIAL FURNACE ERECTING ENGINEER wanted for inspector of heat resisting alloy foundry located in middle west with good post-war business. Give full qualifications in your application along with salary desired. Address Box 208, STEEL, Penton Bldg., Cleveland 13, O

STEEL & IRON—QUOTATION AND CORRespondence man well versed this field. Export experience desirable but not essential. Good opportunity with long established import and export firm, midtown New York. Please give background, remuneration, etc. Address E. L. Senior, 441 Lexington Avenue, New York 17, N. Y.

INDUSTRIAL ENGINEER—FOR MILL IN Western Penna. producing hot and cold rolled stainless and alloy strip. To be in charge of new department being created. Apply by letter stating age, education, experience and expected salary. Address Box 148, STEEL, Penton Bldg., Cleveland 13, O.

ESTIMATOR WANTED BY LARGE EASTERN steel fabricator. Must be unemployed at present, immediately available, thoroughly experienced in structural steel estimating. Knowledge of general plate work desirable. Location New York City. Give full information re: salary, experience, references and availability in first letter. Address Box 210, STEEL, Penton Bldg., Cleveland 13, O.

MECHANICAL OR ELECTRICAL ENGINEER —To serve as the plant engineer for a mill in Western Penna. producing hot and cold rolled stainless and alloy strip. Apply by letter stating age, education, experience and expected salary. Address Box 149, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: CONSTRUCTION SUPERINTENdent-General Foreman-Carpenter Foreman. Give references and salary requirement. Address Orval Wessner, P. O. Box 2057, Milwaukee, Wis.

WANTED: FINISHING ROOM SUPERINTENdent. Southwestern Steel Foundry. Address Box 190, STEEL Penton Bldg., Cleveland 13, O.

WANTED—EXPERIENCED ESTIMATOR— General Construction Work. Give references and salary requirement. Address Orval Wessner, P. O. Box 2057, Milwaukee, Wis.

Accounts Wanted

I WANT TO HEAR FROM A MANUFACTURER WHO IS NOT SATISFIED WITH THE KIND OF REPRESENTATION HE IS GETTING IN DETROIT.

Can offer good contacts, plenty of calls and satisfactory sales volume, New Center Building address.

Address Box 196

STEEL, Penton Bldg., Cleveland 13, O.

Wisconsin Sales Representation

Established firm now distributing steel products wants additional lines of castings, forgings, or associated lines. Milwaukee office. Address Box 211, STEEL, Penton Bldg., Cleveland 13, O.

Accounts Wanted

MANUFACTURERS AGENT, COVERING CENtral section Ohio River Valley industrial section desires additional lines of production equipment, supplies or accessories. Twenty-two years industrial engineering, sales engineering background of engineered equipment. Fully informed on latest production methods, materials, alloys, treatments, welding, electric motors and controls, and special circuits. Address Box 216, STEEL, Penton Bldg., Cleveland 13, O.

IF YOU CONSIDER PHILADELPHIA TRADing Area a natural market for your products and believe that good volume may be secured by long established manufacturers' representative under straight commission exclusive territorial contract, write Box 171, STEEL, Penton Bldg., Cleveland 13, O.

MANUFACTURERS REPRESENTATIVE
Mechanical Engineer acquainted with the industrial trade in Metropolitan New York and New Jersey desires to represent high class company having products to sell manufacturers. Address Post Office Box 511, Newark, N. J.

MANUFACTURERS AGENT IN INDIANAPOlis wants accounts of producers of Cold Finished Bar Steel, Hot and Cold Rolled Strip Steel, and other steel products. Address Box 215, STEEL, Penton Bldg., Cleveland 13, O.

SALES REPRESENTATION WANTED
Experienced tool and design engineer, college graduate, interested in obtaining accounts in tools, machinery, and finished parts for representation in western Illinois and eastern Iowa. Address Box 208, Moline, Illinois.

Positions Wanted

METALLURGIST
Twelve years experience as Chemist and Metallurgist, gray iron jobbing foundries. Supervise melting, pouring, testing high strength irons for castings to 25 tons. Address Box 201, STEEL, Penton Bldg., Cleveland 13, O.

WIDELY KNOWN SALES REPRESENTATIVE interested in line of mechanical equipment for steel plants and blast furnaces. Address Box 207, STEEL, Penton Bldg., Cleveland 13, O.

Opportunities

YOUR REPRESENTATIVES IN CANADA
We will undertake special engineering services, design, manufacture or assemble your products in Canada. Supervision of distribution and sales if desired. We invite correspondence from responsible firms. Forty years experience in industrial engineering.

Conduits and Electric Raceways Limited
258 Ft. Leonards Ave., Toronto 12.

Employment Service

SALARIED POSITIONS $2,500—$25,000, POSTwar plans are creating lifetime opportunities now. This thoroughly organized confidential service of 35 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated, through a procedure individualized to each client's requirements. Several weeks are required to negotiate and each individual must finance the cost of his own campaign. Retaining fee protected by refund provision. Identity covered and present position protected. Plan now for postwar security. Send only name and address for details. R. W. BIXBY, INC., 110 Delward Bldg., Buffalo 2, N. Y.

Representatives Wanted

WANTED
AMBITIOUS REPRESENTATIVES

Exceptional opportunity to sell nationally advertised AAA products approved and used by all metal industries and metal users as well as large and small manufacturers for fabrication, salvage and reclamation. Territory—Several producing territories open. Exclusive franchise. High commission. Qualifications: Technical or welding background desirable. Sales experience indispensable. If you are a hard worker and have ability, our Regional Manager will show you fine results of other representatives. Send outline of technical and sales activities to:

Regional Manager,

EUTECTIC WELDING ALLOY CO.
40 Worth Street
NEW YORK 13, N. Y.

— WANTED —
SALES REPRESENTATIVES

Distributor, fabricator and manufacturer of steel pipe and tubular products desires aggressive and qualified sales representatives now calling on industrial and manufacturing plants in following areas—Ohio, Pennsylvania, Indiana, Michigan including Detroit, Southern Ohio and Kentucky, including Cincinnati. Prefer sales representative now handling other steel lines. Commission arrangement. Furnish full details regarding other lines handled, territory covered and references.

Address Box 183,
STEEL, Penton Bldg.,
Cleveland 13, O.

CLASSIFIED RATES

All classifications other than "Positions Wanted," set solid, minimum 50 words, 5.00, each additional word .10; all capitals, minimum 50 words 6.50, each additional word .13; all capitals leaded, minimum 50 words 7.50, each additional word .15. "Positions Wanted," set solid, minimum 25 words 1.25, each additional word .05 all capitals, minimum 25 words 1.75, each additional word .07; all capitals, leaded, minimum 25 words 2.50, each additional word .10 Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request.

Address your copy and instructions to STEEL, Penton Bldg., Cleveland 13, Ohio.

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