EDITORIAL STAFF

E. L. SHANER Editor-in-Chief Inwin H. Such Editor WM. M. ROONEY News and Markets Editor D. B. WILKIN Engineering Editor J. D. KNOX Steel Plant Editor Guy HUBBAND Machine Tool Editor DON S. CADOT Art Editor ALLEN G. GRAY Consulting Editor

ASSOCIATE EDITORS

G. II. MANLOVE • W. J. CAMPBELL JAY DEEULIS • F. R. BRIGGS VANCE BELL

ASSISTANT EDITORS

JOHN PARINA JR. • H. C. TUTTLE HENRY J. HOLTZ • DOLORES K. BLAHA VIRGINIA B. HARMS • WALTER F. TOERGE RICHARD D. CONLY

RESIDENT EDITORS

E. C. KREUTZBERG Washington Editor L. M. LAMM Associate Editor, Washington B. K. PRICE Eastern Editor, New York L. E. BROWNE Associate Editor, New York E. F. Ross Chicago Editor J. C. SULLIVAN Pittsburgh Editor A. H. ALLEN Detroit Editor VINCENT DELPORT European Editor, London

EDITORIAL CORRESPONDENTS

R. W. KINGEY, Birmingham L. C. FELDMANN, Buffalo SAMUEL S. CANN, Cincinnali MAC HUTCHENS, St. Louis GEORGE R. REISS, Youngstown MAURICE BEAM, Los Angeles ROMENT BOTTORFF, San Francisco R. C. HILL, Scattle C. K. CATES, Dallas F. S. TOBIN, Toronto J. A. HONTON, Birmingham, Eng.

MAIN OFFICE

Penton Building, Cleveland 13, Ohio

BRANCH OFFICES

| New York 17 | 16 East 43rd St. |
|---------------------|------------------------|
| Chicago 11 | North Michigan Ave. |
| Pfitsburgh 19 | |
| Detroit 2 | 6560 Cass Ave. |
| Washington 4 | 6 National Press Bldg. |
| Los Angeles 4 130 N | New Hampshire Ave. |
| London 2 Caxton St. | Westminster, S.W. 1 |

Published by The PENTON PUBLISHING Co., Penton Bide, Cleveland 13, Ohio, E. L. SHANER, President and Treasurer; G. O. HAYS, Vice President and General Manager; R. C. JAENKE, Vice President; F. G. STEINEBACH, Vice President and Secretary; E. L. WERNER, Assistant Treasurer.

. .

Member, Audit Bureau of-Circulations; Associated Business Papers Inc., and National Publishers' Association.

Ishers' Association. Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, oue year 86; two year \$10; all other countries, one year \$12. Single copies (current issues) 25c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879. Copyright 1946 by the Penton Publishing Co.

Business Staff on Page 4



The Magazine of Metalworking and Metalproducing

VOL. 118, NO. 21

ないのないない

MAY 27, 1946

NEWS-

| Recovery from Strikes To Be Slow | 57 |
|---|----|
| Price Increases Being Readied for Nonferrous Metals | 59 |
| Steel Leaders Ask Return of Right To Manage | 60 |
| Distributors Hear Pleas for Balanced Labor Program, OPA Elimination | 63 |
| NICB Appraises Progress Made since V-E Day | 65 |
| Great Lakes-St. Lawrence Seaway Project Again Is Before Congress | 66 |
| Propose Government Insurance for Exporters Against Nonpayment | 69 |
| Airport Construction Program, To Cost \$520 Million, Is Authorized | 70 |
| Patent Right to New Steel Given to Public | 76 |
| Officers Elected by 11 Chapters of Steel Warehouse Association | 77 |
| Kaiser Purchases Eagle Mountain Iron Mine in Southern California | 78 |
| Wason Charges Administration Lacks Program | 79 |
| | |

TECHNICAL-

| Injection Molding Steel with an Electronic Melting Furnace | 86 |
|--|----|
| New process utilizes simple equipment for high-speed production | |
| Use of Cobalt-Base High-Temperature Alloys | 88 |
| Wartime applications of high-temperature alloys have peacetime uses | |
| Selective Induction Hardening of Parts Previously Hardened | 92 |
| Induction hardening of aircraft parts provides wear-resistant surfaces | |
| Improved Measurements for Industrial Processes | 94 |
| Use of electronic instruments for maintaining quality in production | |
| Engineering News at a Glance 1 | 04 |
| Half-Century of Forging at Eric Foundry 10 | 07 |
| Company's evolution in 50 years from 600 lb machine to 50,000 lb giant | |
| A Research Program for Smaller Concerns 1. | 12 |
| Setting up "an organized search for a better way" within the budget | |
| Design and Performance of Plastic Rolling Mill Bearings 1. | 16 |
| Phenolic bearings save power, lubricants and increase production | |

FEATURES

| s the Editor Views the News | 53 | Men of Industry | 80 |
|-----------------------------|-----|-----------------------------|-----|
| Present, Past and Pending | 59 | Obituaries | 85 |
| Vindows of Washington | 66 | Industrial Equipment | 123 |
| firrors of Motordom | 73 | The Business Trend | 144 |
| ctivities | .76 | Construction and Enterprise | 168 |
| | | | |

MARKETS ·

| Steelmaking Shows Signs of Slowing Its Decline | 149 |
|--|-----|
| Market Prices and Composites | 150 |
| | |

Index to advertisers

F



180



Since 1892 when Victor Edwards invented the Flying Shear and made continuous rolling practical, Morgan engineers have pioneered in rolling mill developments. Escapement and Carry over Cooling Beds, Twist Guides, Continuous Heating Furnaces are only a few "firsts" we might mention.

Many others—developed to meet some special situation—are in daily operation but were never published by us.

Can we help with your problem?

MORGAN CONSTRUCTION COMPANY WORCESTER, MASSACHUSETTS

Rolling Mills – Wire Machines Gas Producer Machines – Regenerative Furnace Control

English Representative: International Construction Co. 56 Kingsway, London, W.C. 2, England

RM 4

As the EDITOR

Our Postwar Record?

Some Americans, perturbed by the confusion arising from the slow process of shifting the nation from a wartime to a peacetime basis, wonder occasionally how much of the news of our domestic troubles is transmitted to other nations.

Honolulu, truly the crossroads of the Pacific, affords one opportunity of checking the type of information pertaining to our home affairs that is emphasized for the benefit of foreign nationals who pass through this busy city. Here are a few of the headlines appearing in the "Star-Bulletin" and "Advertiser" on one day early in May:

"Ford Closes; Lack of Coal. AFL-CIO Sea Jurisdiction Battle Looms. Four More Rail Unions Will Vote on Strike. One Dead, 6 Wounded in Kentucky Coal Mine Dispute. Strike Closes Pacific Coast Cannery. Rail Unions Propose National Ownership. Coal Blackout Spreads."

These are but a few of the headlines appearing over articles dealing with labor trouble on the mainland. Another batch of headlines cover the confusion attending price control. One newspaper facetiously credits OPA with the headline "OPA Protects Hawaiians Against Overcharges on Ice Skates." In addition there are headlines pertaining to difficulties of the United States in its food conservation program.

The point of all of this is that at a time when the war-torn world is looking to the American republic for leadership in connection with the grave problems of rehabilitation and organization for peace, the best we are able to do is to put on a pathetic show of ineptitude in handling our internal affairs. The logical attitude of foreigners, under these circumstances, is to question seriously our right to play a prominent part in world affairs until we have demonstrated greater ability to take care of our own problems at home.

If this attitude is permitted to become strongly entrenched in the minds of people all over the globe, the job of organizing the world for lasting peace and for an orderly economy will be made much more difficult than need be. Somewhere in the United States there must be leaders of thought and action whose influence, if exercised effectively now, might induce Congress to correct the mistakes which Washington is making and which are undermining the prestige of the nation so seriously at a most inopportune time.

We have been resting on the oars of our war record too long. Now we must pull for dear life to achieve a presentable postwar record.

BREAK NEEDED: Strikes this year have cost potential 1946 steel production in excess of 11 million tons of ingots, or more than 7 million tons of finished steel products. That's as much metal as the automobile industry would chew up in 11 months of peak operations.

Such loss is irretrievable. It can never be made up. As a matter of fact, should the coal strike be definitely settled without further interruption of mining, and the threatened paralyzing walkout of railroad workers be averted, millions more tons of steel

VIEWS

the NEWS



will be lost before mills resume normal operations. However, 1946 may still prove to rank high as a peacetime steel production year. In the first four months ingot output totaled 17,648,616 net tons. May and June will add possibly 5 million more tons to bring total make for the first six months to around 22 million tons. In event labor difficulties are eliminated by the end of June to permit near capacity operation the remainder of the year, 1946 total production could exceed 63 million tons of ingots.

There, of course, is no assurance that such output

will be attained. In fact, the chances for such are slim. Nevertheless, given a reasonable break the steel mills can be counted upon to make a mighty respectable showing despite the heavy hand of labor strife. Recovery from the coal strike will be less rapid than was that from the steel walkout but it may be speedier than many now predict. —p. 57

GLEAM OF PROMISE: As expected, steel industry executives meeting in New York last week at the annual conventions of the American Iron & Steel Institute and the American Steel Warehouse Association, devoted major attention to the labor problem which has harried them in their reconversion efforts.

Transition to peacetime in steel has been fraught with more handicaps than had been expected last August when the war ended. Since the first of this year, steel producers and distributors have contended with a succession of work stoppages which has thrown their high hopes out the window. What looked like a record peacetime year, as a result, has gone by the board.

At the moment there appears a gleam of promise the economic storm may clear away soon. At any rate, the intolerable labor situation seems heading for a showdown, if such is not already here. If labor can be jacked back onto the track without too much delay there is still promise a measure of economic sanity can be restored to the nation before the year ends. —pp. 60, 63

HIGH - TEMPERATURE ALLOYS:

First reports on jet engine performance quickly caught the public's fancy. Man's dreams of ever faster flight were materializing. But the engineer looked upon this novel creation and wondered how it survived its thermal ordeal—a compressor often working at 75° below zero, a nearby turbine working in blazing heat, and exhaust gases shooting through the jet at close to 1500°F. Without Vitallium and other high-temperature alloys, this never could have been.

Exceptional qualities of this series of alloys based on nickel, chromium, cobalt and iron have been known for many months, but composition and test data verifying their high strength and hardness at red heat, resistance to wear and corrosion were kept under wraps until a fortnight ago. The alloys which have built an impressive record as turbine blades and supercharger buckets are to be made available for extremes of service met by injector nozzles, sleeves, scale pivots, compressor blades, bushings. and the like. —p. 88

SIGNS OF THE TIMES: Shortage of steel spring wire for automobile seats and seat backs is the latest problem of a harassed automotive industry (p. 73). Cause lies in the now familiar pattern for such shortages: First, an OPA price ceiling which discouraged manufacturers; and second, strikes and work stoppages. . . . Three "roadblocks" retarding prosperity, according to NAM President Robert R. Wason, are: Production hindering OPA controls; inflationary deficit spending; and the partisan labor program of the CIO which has been adopted by the administration as its own (p. 79). . . . A postwar airport building program that should supply a lift to employment and business in the next seven years is assured by the recently signed measure providing \$520 million in federal aid for such construction (p. 70). With matching local financing plus auxiliary construction at airports, the total expenditures may reach \$10 billion, according to some estimates. . . . Steel products weighing up to 15 pounds now are injection molded (p. 86) with the aid of the electronic heating apparatus. Homogeneity of the metal's alloys is assured by the electromagnetic force released by a high-frequency coil in the melting chamber of the equipment. . . . Aircraft parts such as gears and pinions (p. 92) are hardened to an intermediate hardness, then are given a selective induction hardening treatment on areas calling for higher hardness for wear resistance. . . . The Great Lakes-St. Lawrence seaway project again is in the news (p. 66) as result of the Senate committee's recommendation that the "bill do pass." Action at this session, however, is doubtful. . . . A pessimistic note was sounded recently by Dr. Virgil Jordan, president of the National Industrial Conference Board, who said the people now stand in greater danger of losing their freedom than they did before the war (p. 65). . . . Regardless of the settlement of current labor disputes, industrial production is in for rough sledding ahead (p. 57) due to shortages of critical materials and components, which will require months to relieve, and to the probability of a wave of minor strikes in industries whose workers will want the same or greater advantages granted the major unions. . . . A "two-band" system of price increases for nonferrous metals is being prepared by the Office of Price Administration (p. 59). This is intended to bring out more of the copper and other scarce metals held by dealers.



EDITOR-IN-CHIEF

RESEARCH

That seeks and develops new and better products

• Inland metallurgists continually strive for perfection, a goal that can never be fully attained. Theirs is a constant search to obtain from the materials and the furnaces improved results in the making of Inland Steels.

This work goes on endlessly in Inland's efficient metallurgical laboratories.

We are determined to derive the utmost from all our materials and facilities. Processes and processing controls are improved as techniques are advanced . . . and new products for many uses are developed!

Research . . . consistently and successfully applied . . . is a part of Inland's service to you!





GIVE HEAVY-DUTY GEAR DRIVES Heavy-Duty Protection

E SPECIALLY made to give long-lasting protec-tion to gears and bearings of heavy-duty reduction drives, Texaco Meropa Lubricants have a load-carrying capacity more than ample to protect any gear.

Texaco Meropa Lubricants have demonstrated in service a very high oxidation stability and an outstanding resistance to thickening. They do not separate in use or in storage, and are noncorrosive.

There is a complete line of Meropa Lubricants

to meet the requirements of every type of gear drive. Operators also use them with excellent results on coiler, edger roll, slab shear and runout drives, table manipulator gears, and many other places.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N.Y.





Symbolic of the enforced idleness of hundreds of industrial plants closed by the coal strike, other work stoppages, or by shortages caused by previous stoppages, is this expanse of empty rail lines at the Ford Motor Co.'s Rouge plant. Within the Rouge are 150 miles of tracks over which there is a constant flow of materials when the plant is operating. Today, the cars and tracks are empty

Recovery from Strikes To Be Slow

Steel operations recede further. Coal output drops as miners leave pits when govern-... ment takes over. Ingot loss now 3 million tons

STEEL mill operations continued to give way last week to the increasing coal shortage while operators watched hopefully for signs of settlement of the coal and railroad disputes. Ingot operations dropped 4 points to 45 per cent of capacity. Since the beginning of the coal strike approximately 3 million tons of steel production has been lost.

Failure of government seizure of the railroads to avert the strike by the railroad unions caused steel companies to take off a number of furnaces late last week, as they faced a complete tie-up of rail transportation.

Covernment seizure of coal mines last week resulted in lowered rather than increased output of fuel. Thousands of miners who had returned to the pits following declaration of the truce two weeks ago walked out after the government took over the mines. Alabama's captive mines were entirely idle on the first day of government operation. In western Pennsylvania, coal production dropped to 51,000 tons a day, compared with a normal 300,000 tons.

J. A. Krug, secretary of interior, took possession of the mines for the government and placed Vice Adm. Ben Moreel in actual charge of their operation.

While the cost of work stoppages in the major industries this year is being figured in millions of tons of coal and steel and in billions of dollars of lost wages and production, the more hopeful optimists point out that if the current disputes are cleared up in time to resume large-scale steel production by the first of July, 1946 may still be a fairly good steel year. During the first four months, production amounted to 17,648,616 tons. For May and June, output is figured at possibly 5 million tons to bring the first half total to about 221/2 million tons. Should the industry be given a respite from work stoppages during the last half, the industry conceivably could operate at around 90 per cent and bring the year's total production to 63 million tons.

Settlement of "big ones" won't bring quick return of high operations. Wave of small stoppages on horizon. Many shortages have accrued

BUSINESSMEN who expect a quick recovery in industrial activity soon after the big strikes, currently plaguing business, end are likely to be disappointed.

The climb to normal postwar operations after the coal mines resume and the railroad dispute is finally adjusted will be long and laborious.

There are two principal reasons why this must be so.

First, the wave of strikes that has interrupted production since V-J Day and the uncertainties and bungling that have attended price control have created serious strains and stresses throughout the economic system that will require months to alleviate. Acute shortages have been built up in critical items which will retard production of many lines of goods even after abundant supplies of fuel and steel become available.

Second, a large wave of small strikes

STRIKES

is piling up on the horizon. These will affect suppliers and will prevent a full flow of materials, parts and components to assemblers of civilian products. Indicating what is ahead in small strikes are the figures of the Department of Labor where strike notices poured in at a rate of more than 800 a month during March and April and are expected to increase.

A good example of the first cause was brought to light last week when automobile producers curtailed operations because they were unable to obtain spring wire for seats and seat backs. The cause for this shortage is fairly typical. Early this year, the manufacturers of spring wire found they could not produce profitably under the prevailing price ceilings. Price relief was slow in coming and some of the manufacturers turned to other lines on which they could break even cr make a small profit. Then tardily, price relief was granted, but the established manufacturers were booked on other lines and could not immediately switch back to the production of spring wire. The steel strike and other work stoppages accentuated the shortage and the market for spring wire today is probably tighter than for any other steel product.

Copper Shortage Serious

Another example is found in copper. Strikes by miners and smelters interrupted production. Producers were unable to obtain price relief which would permit them to meet the strikers' wage demands. The result is an alarming shortage which is retarding the production of electric motors, one of the most critical of all components, and other electrical products.

A check of manufacturers of electric motors by STEEL last week revealed one large plant will be able to operate at not more than 50 per cent of capacity during June. The plant will close during the latter part of June in an attempt to build up stocks.

Another motor manufacturer reports shipments of copper wire to its plants have been entirely discontinued and the company has been operating entirely on its reserves, which now are nearing exhaustion.

A third company has been able to maintain partial operations by rerolling trolley and other used wire.

Copper wire suppliers estimate that six weeks to two months will be required after the smelters' strike ends before shipments can be resumed at a normal rate.

The Civilian Production Administration has advised the industry that the supply of copper wire and bars in June



Seizure of the soft coal mines by the government was effected last week with J. A. Krug, left, secretary of the interior, taking charge. Vice Adm. Ben Moreel, right, was delegated by Mr. Krug to direct actual operation of the mines. The immediate results of the seizure were disappointing, as thousands of miners who had returned to work during the truce declared by John L. Lewis left the mines after they were taken over by the government. NEA photo

will be lower than for several years. Supply is expected to be 10,000 tons, against requirements for 50,000 to 60,000 tons.

Other nonferrous metals, particularly zinc and lead, are critically short and are causing curtailments in production of civilian goods.

The flood of small strikes occurring now and which in all probability will continue after the big ones are settled have been overshadowed to a large extent by the headlines devoted to the coal strike, the railroad dispute, and, earlier, to the steel, automobile and electrical strikes. However, the small publicity they had received have made them no less serious in holding down production. During March, the Department of Labor received 842 strike notices from restless unions. In April, the number was 869, and some officials expect that the total will climb to 1000 a month before the year ends. These figures do not tell the whole story since many union leaders do not bother to file a strike notice and their work stoppages go unheralded in the Department of Labor.

Generally the issue in these smaller strikes are demands for the same wage increases granted the big unions and blessed by the administration. Seldom are the strikers willing to take into consideration local conditions or problems that may be peculiar to their industry.

Geneva Works Sold to U.S. Steel

THE Geneva Steel plant at Provo, Utah, largest of the government owned, war born steel facilities, was sold last week to the United States Steel Corp., for \$47,500,000. Purchase price includes plant and inventory.

The sale was approved by the Price Review Board of the War Assets Administration after the latter's steel committee had recommended the bid of U. S. Steel be accepted and that all other bids submitted for the Geneva project be rejected.

The purchase price includes \$40,000,000 for the plant and \$7½ million for inventory.

U. S. Steel plans to spend an additional \$18,600,000 for the installation of new facilities at Geneva to convert the plant to peacetime operations. The improved equipment would enable production of 386,000 tons of hot-rolled coils for cold reduced sheets and tin plate. The corporation also is erecting a modern cold reduction mill at Pittsburg, Calif., home of its subsidiary, Columbia Steel Co., at an estimated cost of \$25,000,000.

Disposal of the Geneva plant, built at a cost of about \$190,000,000, has been a controversial subject since the war ended.

"Two-Band" System of Price Increases Being Readied for Nonferrous Metals

One level of prices to be permitted producers who have granted basic wage increases, and another for producers whose wage adjustments are pending. OPA's delay in granting relief is keeping available copper supplies off the market

"TWO BAND" system of price increases for nonferrous metals industry was being prepared last week by the Office of Price Administration.

This system provides two levels of price rises—one to be taken by firms that have made wage adjustments and second for firms with wage adjustments pending.

In the copper industry, for instance, an increase of 1.8 cents a pound may be granted to all producers to reflect increased production costs other than labor costs—on top of this a second increase band of slightly less than 0.6 cents may be provided for companies which already have granted basic wage increases.

This would provide a total of slightly less than 2.4 cents per pound, raising price of copper from 12 cents to less than 15 cents per pound.

The wage band cannot be determined, however, until more companies settle labor disputes—to date only the 18½ cents per hour increase granted by Anaconda Copper Co. has been approved by Wage Stabilization Board.

However, Anaconda's participation in government's premium payment plan for marginal producers excludes it from any price relief for hardship, a government spokesman said today.

Reason for using "two band" system is that if a total price increase were arrived at including materials and wage costs rises producers who have not reached wage settlements could take advantage of the higher prices in the interval.

OPA's delay in granting price relief to nonferrous producers is keeping available copper supplies off the market by causing dealers who have bought up surpluses to withhold them in the hope of higher ceilings and causing Metals Reserve Corp. to sell at considerably less than they were forced to pay for imported copper.

Trailer Production Goal For 1946 Set at 60,000

Truck trailer manufacturers, despite production difficulties, expect to turn out approximately 60,000 freight trailers this year, according to John B. Hulse, secretary-manager, Truck-Trailer Manufacturers Association, Washington. This figure compares with a previous peak of 41,869 in 1941 and 32,987 in 1945.

Mr. Hulse said that the goal will be achieved "if conditions stabilize in the relatively near future." He noted that the industry in January built 4868 trailers rated at capacity of five tons or more, an increase of 33 per cent over December. "This is an estimate of what the trailer manufacturing industry can do if permitted to obtain necessary materials and if given freedom from labor troubles."

GM Head Says Peacetime Output Can Beat Wartime's

Debunking the theory that Americans cannot produce as much in peacetime as they did in war, C. E. Wilson, president of General Motors Corp., told employees of the corporation in his recent annual message that the corporation is planning for all-time high employment and production levels.

Mr. Wilson outlined the company's plans for plant modernization and expansion, and said, "into this far-reaching program we are putting many millions of dollars—good evidence of our faith and confidence in the future."

Present, Past and Pending

ALUMINUM CO. PLANS TO BUILD \$30 MILLION PLANT

DAVENPORT, IOWA—Aluminum Co. of America plans to construct a \$30 million plant near this city, Thomas D. Jolly, vice president and chief engineer, said last week. Equipment to be installed will be able to process the largest aluminum ingots manufactured and will have monthly capacity to produce more than 10 million pounds of sheet and plate, including new record widths.

ALLOY STEEL PRICE RISE OF 8.2% IS IMMINENT

WASHINGTON—An advance of 8.2 per cent in all alloy steel prices was expected momentarily to be made official late last week. This action will be retroactive to Feb. 15 and will replace the 4 per cent increase which was authorized originally as of that date.

BOLIVIA HOLDING OUT FOR HIGHER TIN PRICE

WASHINGTON—Bolivian interests have not yet accepted the Reconstruction Finance Corp.'s offer of 62.50c a pound of tin content in Bolivian ore plus a bonus of about 1 cent a pound for all deliveries in excess of 15 per cent of the 1943-44 deliveries. Independent Bolivian mines have asked for a price of 65 cents a pound.

LACLEDE STEEL PLANS TO BUILD NEW ROD MILL

ST. LOUIS—Laclede Steel Co. would use \$1,500,000 of proceeds from proposed \$2,-500,000 promissory note for a new rod mill at Alton, Ill.

\$100 MILLION CONSTRUCTION IN CLEVELAND FORECAST

CLEVELAND—Expenditures for construction in this area of between \$90 million and \$100 million in 1946, double the 1945 figure and largest since the peak year of 1925 when the total was \$106 million, are forecast by the district Civilian Production Administration office. About half of the money will be spent for housing.

WAA CONSIDERS PLANS TO STIMULATE SURPLUS SALES

WASHINGTON—War Assets Administration is considering these proposals to stimulate sales of surplus government-owned equipment: Machine tools and other equipment less than 25 years old would be sold to rebuilders for resale with a performance guarantee; manufacturers would be permitted to trade in their obsolete tools for modern tools in possession of the government.

AUTOMOBILE PRICES INCREASED 4 TO 8 PER CENT

WASHINGTON—Ceiling prices for new passenger automobiles produced by seven major manufacturers were raised last week 4 to 8 per cent, or an average of \$74, above former price levels. The new ceilings reflect "higher costs of purchased materials and parts."

ALLIS-CHALMERS APPRENTICES CONTINUE TRAINING

MILWAUKEE—Allis-Chalmers Mfg. Co. has arranged for full-time vocational training while its main plant here is on strike. More than 200 apprentices will continue their training at local schools under instructors from Allis-Chalmers shop supervisory forces and engineering departments.



WALTER S. TOWER



DR. HAROLD G. MOULTON



LEO WOLMAN

Steel Leaders Ask Return

Production of large volume of steel products for civilian goods no great problem if industry is given respite from strikes and work stoppages. Restoration of free economy needed for continued progress and prosperity

PERMITTED a respite from work stoppages and strikes, the iron and steel industry soon can solve the problem of supplying large quantities of its products for civilian consumption. However, it cannot play its full part in restoring the country to a sound economy and continued progress until it regains the right to manage its affairs.

This was the keynote of the fiftyfourth general meeting of the American Iron & Steel Institute, held in the Waldorf-Astoria, New York, May 23, as sounded by President Walter S. Tower.

The general meeting, first held by the institute since the end of the war, attracted about 1000 steelmakers and related industrialists. The 1945 general meeting was canceled to conform with wartime ban on conventions. All officers of the institute were re-elected.

While a majority of the men from the armed services already are in civilian clothes, the steel industry which helped make possible the military victory still lives in fetters, asserted Mr. Tower.

"You still have to win back your freedom to exercise sound judgment, born of long experience, in the management of your companies," he said. "Such freedom does not exist as long as wages are dictated and prices are set by inept dabblers in the art of economic sleight of hand.

"Your industry was able to make its contribution to victory in war, because over the years of peace it had the privilege of making modest profits. It was able to accumulate some of its own funds for expansion and technical progress. It could attract additional capital from investors who had reasonable expectation of some return on their investment. Financial health and industrial strength cannot endure without profits.

"Anyone who thinks that OPA is primarily concerned with price ceilings as a check on inflation does not read the signs correctly. Its real concern is profit control, holding stubbornly to a base which, almost from the outset has been wholly unrelated to current costs or volume.

"At least for the present industry has lost the verdict in respect to sound policy on wages and prices. Against good judgment, you have just been forced to give the largest wage increase in the history of the industry. In magnitude it was contrary to every consideration of the national welfare. It had to, be coupled with one of the broadest price advances ever attempted. Even that advance was not enough, for a cloud of doubt hangs over the field of future profits. Already there are hints that labor will presently come back with new demands. When that happens the answer will be difficult, for controls will still be upon you.

"Controls originally intended to further the war program have been perverted in the effort to prolong planning, to redistribute wealth, to serve political ends, and so on. When the original reasons for imposing controls are gone controls should go promptly, otherwise they become self perpetuating and subject to divers abuses.

Urges Termination of Controls

"The only sound policy of price control is that policy which not only will permit but actually will encourage the production of all needed goods. That we have not had. Instead, the guiding principle in price control has been limiting profits, blindly ignoring the effects of price on production and supply. There is only one way to escape from those economic shackles which restrain production, destroy long used channels of distribution, undermine industrial strength, and imperil the very existence of many companies. That way is to admit that the war is over; to cease substituting politics and social theory for business judgment; to terminate controls and let productive abilities operate freely.

More peaceful labor relations in American industry will be achieved by creating the conditions essential to peace, not by establishing new machinery or by passing new laws, Dr. Leo Wolman, Columbia University, declared in speaking on "The Conditions of Labor Peace."

"Our troubles are due not to specific provisions of statutes, but to our underlying philosophy and policy of labor relations. Until we grasp that essential fact we shall remain confused and impotent, and whatever we do through patching up existing laws will yield only

/TEEL

of Right To Manage

temporary breathing spells and cause per ton may be but 1 per cent of the more labor crises in the not too distant future.

"The causes of the dissension and disturbances in industry, which have put us a good year behind in our schedules of reconversion, are man-made and government-made. They consist, above all, in the establishment of private organizations, clothed with immense power and ranging in their operations over the whole nation and over all American economic life. These organizations have become uncontrolled and uncontrollable. Today they make the economic policies for this country. They are in the position to dely the government as well as any private interest. It is in their hands to determine what policies and practices are in the public interest."

Quincy Bent, vice president, Bethlehem Steel Co., estimated that for the next few years, the steel industry can expect annual demands calling for approximately 80 000,000 tons of ingots, following closely the prewar pattern of distribution as to commodities with substantial increases in the lighter products.

and costs, then we must come more and more towards standardization in manufacturing processes and methods," said Mr. Bent. "This should be for the bene-

era, I would stress first the importance of quality as reflected in the service of the steel for the designated purpose; without which we will have no customers, or at the best, dissatisfied ones. And, then the most economical production of our steel commodities.

towards this maximum economy are:

terials and the avoidance of waste of any

"Effective recovery and use of all of

"Overall economy of large tonnage units.

"Minimum of man hours required to

produce a ton of shipped product, accomplished by improved facilities, better processes and more efficient labor.

"Maximum yield of acceptable products from the ingot.

"Savings in repairs and maintenance and the consequent idle time of our productive units when under repairs.

"A reduction in cost of only 50 cents

"If our objectives be quantity, quality fit of both producer and consumer.

"Of all of our problems in the postwar

"Some of the most obvious approaches

"Selective use of properly prepared ma-

our by-products.

May 27, 1946

"And finally, two results of the war period have brought before us strong emphasis on the possibilities of research and the opportunities for new and increasing uses of steel. These are considerations not only for a single company of our industry but stand as a challenge to our collective thought and ingenuity to make more steel, of better quality at a lower ultimate cost to the consumer than any other competitive material."

Pointing out that 80 million tons of ingots would require 90 million tons of iron ore, 100 million tons of coal and 20 million tons of purchased scrap, Mr. Bent warned that serious thought must be given to country's future iron ore supply. Present high grade natural ores must some day, he declared, be augmented by beneficiated low grade iron ores.

Mechanized Mining Scen

Coal apparently is ample in quantity for some time, but he said indications are that coal mine operators will be forced to mechanized mining, in which event the coal must be cleaned or washed to produce a satisfactory quality of metallurgical coke. As to scrap, the speaker said that considering requirements and the drain on dormant stocks that has taken place over the war years, "We must face squarely the use of a greater percentage of pig iron in our open hearth mixtures."

He also reminded producers that they should never cease to be concerned about the supply of manganese ore, without which neither carbon nor alloy steels could be made. Less than 10 per cent of the industry's requirements are produced in the United States. For an 80 million ton annual production of steel ingots this means a yearly requirement of some 1,100,000 tons of imported manganese ore.

Commenting on tin and zinc, Mr. Bent said there are possibilities of their electrolytic disposition on steel, "Whereby we may expect a more serviceable coating with a lesser amount of these two deposited metals than at present resulting from the hot dip processes.

"We shall certainly want to explore," he continued, "the gains that might be made from continuous annealing and pickling followed by a continuous proc-

STEEL INSTITUTE



ENDERS M. VOORHEES



QUINCY BENT



WALTER E. WATSON

STEEL INSTITUTE



CHARLES FONDERSMITH

ess—on both sheets and tin plate, whatever coating material may be used."

Striking at the whole theory that government can fix prices and profits to the benefit of anyone, Enders M. Voorhees, chairman of the Finance Committee, United States Steel Corp., called for a return to the free competitive system in which such price and profit factors are governed by the customer.

"All government efforts to fix reasonable profits or to determine prices by profits or profits by prices," he said, "are unalterably opposed to the American fundamental that producers must compete while competing customers — the public—decide. All such government efforts are either open or disguised measures to protect the customer from himself. Actually the customer never needs protection—except in that ancient and continuing struggle to escape frustration and exploitation by government under the guise of protecting him."

The steel industry, he said, has in prospect a period of high production, but he doubted if its earnings would bring a satisfactory return.

"I believe that under existing conditions few or maybe none of us will have a sustaining return upon the more than five billion dollars of tools that represent the steel industry's assets and which we could use for an all-out production," Mr. Voorhees declared. "But while we are shifting back into production of peacetime products we are not yet shifting back into competitive business. It can scarcely be said that during the war years we were really in business. We were just producing iron and steel according to directions.

"We have, as an industry, been operating between rigidly controlled prices and uncontrolled costs.

Drastic changes are needed in the administration of OPA if it is to survive, said Walter E. Watson, vice president, Youngstown Sheet & Tube Co.



J. L. MAUTHE

CHARLES L. POTTER

The powers of the OPA administrator

must be specifically defined and limited,

said Mr. Watson, expressing the hope

that the agency "will lean more in the

direction of sound business sense, which

is, that to continue in business, industry

must make profits and the shareholders'

interests must not be entirely forgotten."

rates, higher coal costs, and other raw

material costs," said Mr. Watson, "and

one doesn't have to be very smart to

WANTED: STEEL

steel have become so acute that

the Frankford, Pa., arsenal direct-

ed an appeal to Walter S. Tower,

president of the institute, to ask

producers assembled at the meet-

ing to come to its rescue. The

steel is badly need.d for rockets

for training purposes. "Ask pro-

ducers," the appeal ran, "if any

one would be responsive to re-

c.ipt of such an order."

Difficulties in obtaining strip

"We are faced with increased freight



SAMUEL D. GLADDING



HERMAN F. DOBSCHA

evaluate these factors when comparing present selling prices with costs.

"Unfortunately OPA officials make all of the rules, and they consistently ignore all arguments having to do with changes in product mix, reduced operations, or possibilities of high wages and materials costs. They do not look forward, but hold to the principle of looking at costs already established, and do not consider estimates of increasing costs bound to occur. They do prophesy future costs, usually downward, because of future conditions as they appear to them, and in arriving at conclusions, they always find some new factor that will cloud the issue and delay the answer."

The dinner meeting was addressed by Dr. Harold G. Moulton, president, Brookings Institution. Dr. Moulton's remarks were "off the record."

The afternoon technical session was presided over by J. L. Mauthe, vice president, Youngstown Sheet & Tube Co. Four technical papers were presented.

Herman F. Dobscha, superintendent of blast furnaces, Edgar Thomson Works, Carnegie-Illinois Steel Corp., Pittsburgh, delivered a paper on "The Use of Sized Ore and Nodules in Blast Furnace Operations."

"The Preparation of Raw Materials for Fast Melting Operations in Electric Furnaces" was presented by S. D. Gladding, superintendent, Alloy & Tool Steel Division, Bethlehem Steel Co.

"The Preparation of Coal and Coke for Coke Oven and Blast Furnace Operations" was read by Charles L. Potter, manager of coal and coke research, Jones & Laughlin Steel Corp., Pittsburgh.

"The Effects of Variations in Raw Materials on Open Hearth Operations and Production," was presented by C. R. FonDersmith, steel plant superintendeni, American Rolling Mill Co.

Abstracts of these technical papers will be presented in the June 3 issue of STEEL



Distributors Hear Pleas for Balanced Labor Program, Elimination of OPA

Further rise in steel prices likely as result of sharply increasing costs of labor and materials, warehousemen warned at thirtyseventh annual meeting. Jobbers advised to study problems of consumers more closely

NEW YORK

PLATFORM for enlightened labor relations was advanced by Charles M. White, president, Republic Steel Corp., Cleveland, speaking last week at the thirty-seventh annual meeting of the American Steel Warchouse Association in the Plaza Hotel, New York.

In his address Mr. White sharply criticized bureaucratic government and defended the private enterprise system against the attacks of those who would replace it with another and less desirable form of economy,

Mr. White was one of 14 speakers who addressed the two-day meeting which was one of the best attended in the organization's history, a surprise considering the uncertainty with respect to transportation due to the threatened railroad strike. Topics of the various speakers ran the gamut of subjects of critical interest to the steel distributing industry. The meeting was concluded with a dinner and dance the evening of May 22, many of the delegates remaining over to participate in the annual meeting of the American Iron & Steel Institute on Thursday, May 23.

In his platform, Mr. White urged passage of the Case bill in its original form, and called for free collective bargaining between labor and management. He advocated changes in the Wagner Act which would place responsibilities on unions equal to those on employers; return to employers freedom of speech; penalize labor unions and strikers for violence; force unions to disclose their financial position to members and hold secret ballot elections; and asked for approval of a strike by the majority of workers through secret ballot vote.

The speaker proposed the end of comrulsory unionization, believing employees should have the right to join a union or not as they wish; and the elimination of the check-off on the basis that a labor union should stand or fall on its own merits.

He also declared against unionization supervisory employees, the compulsory arbitration of labor disputes, and the guaranteed annual wage for the steel industry.

"I do not believe that there is one

single provision mentioned in this platform which would not in the long run be of great advantage to all honest labor leaders and to an honest labor movement," said Mr. White.

In the interests of stimulating production and stopping the black markets, he called for elimination of OPA.

"It is said," he stated, "that the end of OPA will immediately send prices sky



CHARLES M. WHITE

high and result in inflation. The plain facts of the matter are that what is causing inflation is not withdrawal of OPA control of our markets but the ill-advised wage increases which have been recommended and supported by the administration under the pretense that an increase in wages would not call for an increase in prices."

In discussing labor he said, "Look at the labor situation in the United States today. Can management and unions sit down and bargain? No, because the government steps in. The union knows that if it waits long enough and makes conditions sufficiently difficult, the government will be forced to step in and accede to the demands which it has made. Government takes little consideration of the economics of the situation. It considers the political aspects.

"The question with the government is not whether or not an industry can absorb a wage increase, but how many votes will the wage increase make.

"The question is not whether prices

will be increased through a wage increase, but how many people will be pleased if the wage increase is granted. "The question is not whether it is a

sound policy to pursue a certain course, but how many votes that course will bring to the New Deal party."

Speaking on "Back To the Fundamentals," Harvey Conover, president, Conover-Mast Corp., described the results of a study of distributor-manufacturer relationships based on an opinion survey of basic questions covering the subject in its various phases. Mr. Conover brought out the high points of the study with the aid of colored slides.

Warehouses in broadening and improving their businesses are faced with the necessity of knowing consumers better and working more closely with them, Charles A. Livesey, assistant professor of business administration, Graduate School of Business Administration, Harvard University, told the convention. He said the jobbers must help consumers lick the many problems they have in connection with the purchase and application of steel products, thus helping them to get a larger volume of business which in turn would result in increased warehouse volume.

Emphasizes Importance of Warehouse

The importance of the warehouse industry in the scheme of steel distribution was emphasized by C. H. H. Weikel, manager of commercial research, Bethlehem Steel Co., Bethlehem, Pa., speaking on "Steelmaking—Its Drama and Change and the Distributor." Tracing the development of iron and steel making since early times, Mr. Weikel brought out the changes in practices and uses effected through the years.

The steel industry today has accurate knowledge of what happens to 80 to 85 per cent of the steel that goes direct from the mills to consumers, he said concluding his remarks, but knowledge is limited on the flow of steel through distributors to ultimate users. Thorough and accurate knowledge of the requirements of users is a fundamental and basic requisite to the extension of markets, he declared:

Whittling away of warehouse margins through four years of price controls was reviewed by William G. Carter, Faitoute Iron & Steel Co., Newark, chairman, OPA Warehouse and Jobbers Advisory Committee. This has developed in instances where distributors have not been permitted to pass on increases in full of mill prices including revisions in extras.

Citing but one operation reflecting increased costs to warehouse distributors, direct labor only in terms of man hours for cutting, J. Frederick Rogers, Beals McCarthy & Rogers Inc., Buffalo, declared advances range from 60 to 70 per cent since 1941.

Discussing disposal of surplus steel, George L. Tillson, Edgcomb Steel Co., said politics had crept into operations at some local offices despite apparent efforts of War Assets Corp. to maintain high level of standards in disposal. He told of reports of sub rosa sales and failure to make listings available. The warehouse share is 15 per cent, but bidders for material frequently have been forced to take smaller lots by allocations,

Other speakers on the two-day program included: Frank M. Daughety, Peter A. Frasse & Co. Inc., whose subject was "Standard Classification of Warehouse Accounts"; Paul O. Grammer, Grammer, Dempsey & Hudson Inc., who discussed chapter activities as affecting association values, remarks by W. W. Messersmith Jr., Woodward, Wight & Co. Ltd., following.

R. J. Foster, Republic Structural Iron Works, Cleveland, discussed the association's labor relations program, with remarks by John W. B. Foringer, United States Steel Supply Co., Chicago, and Milton H. Jacob, Jones & Laughlin Steel Corp., Pittsburgh; Dr. George W. Taylor, former chairman of the War Labor Board, spoke on "Management's Stake in Collective Bargaining," while the banquet speaker, Dr. Neil Carothers, dean, School of Business Administration, Lehigh University, Bethlehem, Pa., picked as his subject, "What Is Ahead?"

Walter S. Doxsey, president of the association, summarizing the two-day meeting at the close of the formal business session May 22 said the fact is inescapable we are well along the road to inflation, with virtually no unemployment, labor shortages in all quarters, and income and resources of workers at peak. At every turn, shortages of consumer products and services are encountered.

"During the war," said Mr. Doxsey, "steel production reached extraordinarily high levels—levels which many believed in excess of peacetime requirements. Yet we find this tremendous capacity is inadequate for the present insatiable demand.

"It is entirely erroneous to look back to wartime production records and expect the same levels to be achieved in the months and years just ahead. War orders are for long runs of heavy items. In peacetime, mills receive few comparable specifications. Normal demand is for limited runs of lighter items which require frequent roll changes and otherwise reduce total output from wartime peaks.

"Some facilities pressed into service to meet the emergencies of war cannot eco-



WALTER S. DOXSEY

nomically be operated in normal times. Nor can peacetime economy pay for the overtime hours freely spent during the war. Relaxation of labor is an inevitable product of victory, but it cuts down production.

"While hundreds of millions of dollars have been appropriated for new steelmaking facilities, we cannot expect relief from such sources much short of two years."

Mr. Doxsey said he believed the mills are making every possible effort to give warehouses their, reasonable share of production. Last year warehouses received more than 16 per cent of the steel produced—more than 9,000,000 tons and so far as can be determined the mills are striving to give warehouses about this same percentage of their total production.

The warehouses were able to build up stocks during the last four months of 1945, but inventories fell by 40 or 50 per cent during the steel strike, and little or no progress in building up inventories since has been made. Stocks now are badly unbalanced.

Due to unnatural price controls some products are not being produced, the speaker said, and some territories are not being serviced because the mills cannot afford the freight absorptions on either part or the full range of sizes of some products.

Mr. Doxsey did not think the warehouses can expect any assistance from the Civilian Production Administration, pointing out that distribution cannot be effectively controlled during peacetime.

Further advances in steel mill prices appear very likely, Mr. Doxsey said, possibly coming within the next two or three months. Actually, the steel mills got only \$1.30 of the price increase of \$5 granted them because of the wage increase of 18½ cents per hour.

Since the first of the year mill operating

costs have increased, and the speaker said it looks like the petitions of producers for additional relief will receive favorable action.

The warehouse position with respect to prices is uncertain. Warehouse wages have spiraled upward and profits previously derived from cutting and other service operations have all but vanished. Other costs have risen and a serious shrinkage in business is expected.

Discussing trends in the steel warehouse industry, the speaker pointed out that as differentials between the cost of making deliveries by rail and by truck increase warehouse markets become more and more circumscribed and localized. If sellers are able to devise some method for charging their customers either all or part of motor truck services, then a rather sharp departure from the long accustomed method of arriving at destination prices may be witnessed.

Following removal or suspension of price controls, when individual sellers are again at liberty to price their merchandise in accordance with cost experience and to meet prevailing competitive conditions, it is probable that over a period of months there may be revisions in warehouse spreads and extras designed to remove the unnatural and peculiar practices that have been forced upon steel distributors as a result of price regulations of both the steel mills and the steel warehouses. Some of these probably will follow similar adjustments which will be made by the mills and others will arise from purely warehouse operations.

W. S. Doxsey Re-elected President

Walter S. Doxsey was re-elected president of the association. E. Jungquist, Percival Steel & Supply Co., Los Angeles, was elected vice president. Frank Pidgeon, Pidgeon Thomas Iron Co., Memphis, Tenn., also was elected a vice president, and L. B. Worthington, U. S. Steel Supply Co., Chicago, re-elected treasurer.

In addition to the four officers named the following members of the board of directors comprise the association's executive committee: C. H. Bradley, W. J. Holliday & Co., Indianapolis; Lester Brion, Peter A. Frasse & Co., New York; F. C. Flosi, A. M. Castle & Co., Chicago; E. D. Graff, Joseph T. Ryerson & Son, Chicago; P. O. Grammer, Grammer, Dempsey & Hudson Inc., Newark, N. J. A. W. Herron Jr., Jones & Laughlin Steel Corp., Pittsburgh; J. J. Hill Jr., Hill, Chase & Co., Philadelphia; Richmond Lewis, the Charles C. Lewis Co., Springfield, Mass.; and George L. Stewart, Edgar T. Ward's Sons Co., Pittsburgh.

NICB Appraises Progress Made Since V-E Day

Conference Board president pessimistic over trend of affairs, but Senator Taft says gains have been made

IN APPRAISING where the nation stood a year after V-E Day, the National Industrial Conference Board was told in its 30th anniversary meeting in New York recently that "our people stand in greater danger of losing their freedom than they did five years ago."

Maker of that statement, Dr. Virgil Jordan, NICB president, further indicated his pessimism over the trend of affairs by asserting that "in the deepest sense we have lost this war more utterly than we lost the last one in terms of economic, social and human values."

More optimistic, however, was Sen. Robert A. Taft (Rep., O.) who declared that "we have made progress in the last year, because we are getting rid of limitations on freedom. We are laying the groundwork for a program of progress in social welfare, in labor relations and in full employment through private enterprise. Those goals can be obtained consistently with liberty. Congress and the people are determined on that course.

Cites Key to Conflict

"Regardless of party, the key to nearly all the conflicts in government during the past 12 months is the battle between the advocates of a planned economy and those who believe that progress can be achieved only through the freedom of the individual and of economic activity," Senator Taft emphasized.

In the appraisal, another speaker, Henry W. Jones Jr., president, American Tube Bending Co., New Haven, Conn., said: "Congress has created conditions, and administrative agencies have intensified them, so that the businessman, and particularly the small businessman, harbors feelings of apprehension, resentment, distrust, and fear. We as a nation can never enjoy real prosperity so long as the segment of the economy which creates jobs, produces the goods to satisfy the wants of the people, and disburses a large part of the payrolls to purchase those goods, feels as it does. Truly, government has a seiling job of the first magnitude on its bands to correct this state of affairs." During the meeting, all officers of the Conference Board were re-elected.

version agencies. Symbols refer to designations of the orders

and official releases. Official texts may be obtained from the respective agencies

GOVERNMENT CONTROL DIGEST

Weekly summaries of orders and regulations issued by recon-

OFFICE OF PRICE ADMINISTRATION

Coal: "Captive" bituminous coal mines, heretofore without ceiling prices, that are ordered by the government to divert coal to regular commercial channels during the present emergency may sell at once at the ceiling price of the nearest mine in the same or substantially similar seam. This action, effective as of May 17, also makes provision for high-cost "captive" mines that cannot sell at the ceiling of the nearest similar mine without financial loss. Such mines retroactively charge any higher ceiling that may be authorized by OPA for such high costs. Sellers of bunker fuel also are authorized to sell at adjustable prices, entering into agreements with their buyers to retroactively charge for any ceiling increase granted to cover higher wage costs. (MPR-120; MPR-189; OPA-T-4545)

By-Product Coke: By-product coke may be sold, effective May 16, at the present ceiling prices, subject to the condition that the purchaser agrees to pay also the amount of any ceiling price increase that may result from a study of the operations of these producers now under way. (MPR-29; OPA-6494)

Air Compressors: Industrial air compressors, 10 horsepower and under, including integral parts and accessories, maximum prices increased 19 per cent over October, 1941, prices. This interim price increase was effective May 21. (MPR-136; OPA-T-4520) Barbed Wire: Maximum prices have been established on the following types of barbed

Barbed Wire: Maximum prices have been established on the following types of barbed wire declared surplus by the armed forces and offered for sale in regular civilian channels: Two-strand galvanized steel, type A, 12 or 12¼ gage wire of four point barbs, four inches apart, 85.65 per 100-pound spool; single-strand concertina barbed wire of 14 gage with barbs spaced 2% inches apart, 815.50 per 100-pound coil after annealing, pickling, galvanizing and rewinding. (SO-94; OPA-T-4540) Price Control Suspension: Effective May 22,

Price Control Suspension: Effective May 22, price control was lifted from the following products: Steel strapping, industrial steel wool, steel gas cylinders, copper engravers' sheet and plate, nonferrous lockseam tubing, metal washers, and asbestos textiles. Fabricated iron and steel strapping covered by the action includes flat bands used to reinforce boxes or packages. It also covers ferrous corner clips and seals. However, cold and hot-rolled strip wire sold for general purposes and bale ties remain under price control. Both nonferrous and ferrous metal washers are included in the suspension action. (SO-129; OPA-T-546)

Cast Iron Boilers: Manufacturers' prices for cast iron boilers increased on the average of about 15 per cent, effective May 21. They now must pay only the first 60 cents per hundredweight and the buyers will pay the additional freight costs, if any. The increases allowed, together with others previously allowed, aggregate 41 per cent over October, 1941, prices, in the case of radiation and 27.5 per cent in the case of boilers and parts. (MPR-272, MPR-591; OPA-T-4548)

Outboard Motors: Outboard motor prices at the manufacturers' level increased 10 per cent, effective May 21. (MPR-188; OPA-6501)

Bicycles: Prewar model bicycle prices advanced 18 per cent at the manufacturers' level, effective May 21. (MPR-188; OPA-6502) Metal Office Furniture: Profit factor for manu-

Metal Office Furniture: Profit factor for manufacturers of metal office furniture to use in calculating individual firm reconversion adjustments reduced from 5.4 per cent to 2.9 per cent, effective May 27. The factor is used by reconverting manufacturers unable to operate under the industry-wide increase of 10.5 per cent over 1941 prices authorized in April. (SO-119; OPA-T-4535)

Industrial Equipment: Special ceiling prices for special price class purchasers of machines, parts and industrial equipment, which were formerly frozen at base date levels lower than to all other buyers of the same products, have been eliminated, effective May 27. (MPR-136; OPA-T-4547)

Cast Iron Soil Pipe: Manufacturers' maximum prices for cast iron soil pipe and fittings increased 4.5 per cent, effective May 28. This increase, the second granted in six months, brings soil pipe prices to a level about 35 per cent above March, 1942, prices. (MPR-100; OPA-T-4552)

Solid Fuels: Adjustable pricing for sellers of solid fuels has been extended to: Retail sales of bituminous coal in quantities of 5 tons or less; sales of briquets and packaged fuel, made from bituminous coal; retail sales of coke. (MPR-121, MPR-122; OPA-6503)

NATIONAL HOUSING AGENCY

Experimental Housing: Applications for housing for experimental or testing purposes will be considered for authorization and priorities assistance now under priorities regulation No. 33. Applications for such authorizations should be made to the director, Technical Research Branch, National Housing Agency, Washington. (PR-33; NH-68029)

Husbands Leaves RFC, Joins Transamerica Corp.

Sam H. Husbands has resigned his position with the Reconstruction Finance Corp. to become executive vice president, Transamerica Corp., with headquarters at San Francisco. The change will be effective June 15. Formerly identified with a bank at Florence, S. C., Mr. Husbands joined the RFC 14 years ago and served as director from 1939 to January, 1946. During that period he carried the responsibility for a large part of the RFC activities and was an officer or director of a number of its important subsidiaries.

Iron & Steel Engineers To Hold Meeting, Show Oct. 1-4

The Iron and Steel Exposition, sponsored by the Association of Iron & Steel Engineers, will be held in the Public Auditorium, Cleveland, Oct. 1-4. The exposition, which will be held in conjunction with the annual convention of the AISE, will feature exhibits of over 150 manufacturers supplying equipment to the iron and steel, metalworking, and allied industries.

Technical papers on various phases of plant operation and practice will feature the annual convention.

Great Lakes-St. Lawrence Seaway Project Again Is Before Congress

Foreign Relations Committee recommends passage of bill, but action is doubtful due to some hostility to project and to Senate's overcrowded calendar. Hearings before subcommittee revealed much controversy on proposal

THE Great Lakes-St. Lawrence seaway project again is before the Senate as a result of a majority vote by the Foreign Relations Committee with the recommendation that "the bill do pass." Whether it will be approved by the Senate is doubtful. There is a fair amount of hostility to the project, and the Senate's already full calendar may prevent its being called up this year.

The committee's action is in line with the recommendation of a subcommittee appointed in December, 1945, consisting of Senators Carl A. Hatch (Dem., N. M.), Lister Hill (Dem., Ala.), James M. Tunnell (Dem., Del.), Robert M. La Follette Jr. (Rep., Wis.), and Wallace H. White Jr. (Rep., Me.).

This subcommittee held hearings in February and March in which it compiled some 1400 printed pages of testimony. All the subcommittee members joined in recommending approval excepting Senator White. The latter may file a minority report if he feels it may be helpful in blocking approval on the Senate floor.

This is the second time the project has come before the Senate. The Foreign Relations Committee held extensive hearings on it in 1932-33 and reported favorably but when the project came to vote in March of 1934, 46 senators voted for and 42 against, so that it failed by a wide margin to win the necessary twothirds approval.

Project Continually Favored

The project dates back to 1895 when the governments of the United States and Canada appointed a Dcep Waterways Commission. Since that time studies have been conducted by numerous international and other groups and millions of words of testimony accumulated. Without exception, all these groups found the project feasible and recommended that it be pushed to conclusion.

The present bill, S. J. Res. 104, provides for ratification of an agreement signed at Ottawa on Mar. 19, 1941, following the expenditure of \$1,350,000 on plans "which are now available and ready to be put into execution," the Senate Foreign Relations Committee now states. The committee report also points out that a big majority of the House Rivers & Harbors Committee approved the St. Lawrence Scaway project on Aug. 8, 1941, and that only the attack on Pearl Harbor prevented the project from being presented to the House.

During the hearings this year every effort was made to study the various viewpoints. The committee attempts to sum these up, and strike a balance between the views for and against. But its overall opinion is expressed as follows:

"Many groups have claimed that the seaway will be injurious to their vested interests. Among these are the railroads, port cities, coal interests, and lake carriers. The claimed disadvantages spring primarily from the age-old tradition of preferring the status quo. It is noteworthy that every technical and mechanical advance in the history of the world has been viewed by some with alarm. This was true of the railroad, the automobile, the airplane-of the development of each new resource and each section of this country. But the nation has become great by utilizing every natural and human resource at our command."

The committee feels the fears of the railroads are without justification. It cites present traffic through the canals of the Great Lakes as between 9 and 10 million tons and estimates that the seaway will add an additional 16 million tons, making a total of approximately 25 million tons for the canal system as a whole. Of the potential increase of 16 million tons, about 10 million tons will accrue out of United States needs. Instead of crippling the railroads, the committee feels, the seaway "will merely take care of a small part of the anticipated general increase in commerce and trade."

Further, the committee believes, the seaway will relieve the railroads of a considerable part of the burden of carrying extra rolling stock equipment to serve during peak-load periods. "What the seaway in effect will do," says the report, "is to shave down the summer peak burden of the railroads, thus resulting in better average utilization of rolling stock that the railroads would otherwise have to maintain in order to handle the summer peak."

The report shows the committee was not much impressed with the fears expressed by representatives of port cities. "New York will lose some foreign traffic and Buffalo will lose some of its graintransfer business. On the other hand, New York Harbor will acquire new water-borne traffic to and from the Great Lakes area. Similarly, Buffalo also will gain new traffic, both domestic and foreign. In each case, the additional traffic resulting from the seaway will more than offset the losses. The net gain for Boston will be largest of all. This increase alone could easily offset or exceed any diversion of traffic from these ports caused by the seaway." The committee was not impressed with claims that the



This drawing shows the overall waterway and the proposed control dam, the main power dam and power station and canals and locks. Inset drawings are enlargements of proposed and completed construction projects by the United States and Canada. NEA Photo



It is reported that

General Electric engineers have devised a method of measuring the temperature inside a gas turbine by making some of the parts of a special chrome cobalt alloy which changes color with increasing heat.

get ready with CONE for tomorrow

New Holland Machine Co. expects to be ready to market a new flame cultivator that is expected to weed cotton at a cost of less than fifty cents an acre.

set ready with CONE for tomorrow

Patent 2,393,594 covers the use of ammonium nitrate in liquid anhydrous ammonia as a fuel for internal combustion engines. Since this fuel contains its own oxygen, an engine using it could operate at high altitudes without dependence on the atmosphere.

set ready with CONE for tomorrow

A novel automobile, designed by Preston Tucher of Ypsilanti, Michigan, now in the road-test stage of development, is reported to have many unique features, such as front fenders that turn with the wheels, three headlights that are dimmed by a photo-electric cell, sealed radiator and center steering wheel. The two-, four- or six-cylinder opposed engine has an alumi-num block and fuel injection, but no flywheel and is placed between the two rear wheels. A liquid "torque converter" replaces clutch, transmission, drive shaft and differential.

felready with CONE for tomorrow

Businessmen will soon be offered a triangular desk made of novel woods by Fletcher Aircraft Corp. of Pasadena.

fet roady with CONE for tomorrow

New York Central has a hot box alarm on its new passenger cars that signals by both smoke and smell. Pennsylvania Railroad has a new machine that prints tickets as they are sold and also takes care of the ticket seller's bookkeeping.

get ready with CONE for tomorrow

Sacro Mfg. Corp. of Bethlehem, Pennsylvania, has an under-thesidewalk electrical snow-melting system, designed by A. M. Byers Co., that is set in operation by the weight of snow.

get ready with CONE for tomorrow

General Electric expects to deliver the country's most powerful electric locomotive in 1946: weight 500 tons, length 143 feet, 8000 horsepower. The Bell System will test mobile radio-telephone service for automobiles on three highways: New York-Albany-Buffalo, Chicago-Springfield and New York-Boston.

get ready with CONE for tomorrow

The modern trend in retail store architecture has resulted in the triple expansion of the Pittsburgh Plate Glass Company's Pittco plant, that makes metal trim for all glass store fronts.

get ready with GONE for tomorrow

One of the new ideas in jet engines, developed by Carney Associates Ltd., New York, has two cylinders firing alternately and intermittently in such a way as to make rotating parts for air supply unnecessary.

get ready with CONE for tomorrow

Pontiac, Michigan, is experimenting with a small house, onethird of which is rolled aluminum. It is not prefabricated, but built on the site.



seaway could hurt business at such ports as Providence and New Orleans,

Opposition of the coal industry also failed to impress the committee unduly. After considering the gist of statements that the opening of the seaway would bring a deluge of cheap foreign coal to lake ports, particularly from Great Britain, the committee takes the view that "American miners have traditionally produced coal more efficiently and economically than British miners" and "American miners need not fear British competition as a result of the seaway."

Why, asks the report, should the seaway cause fears of coal importation, if there never has been any great influx of foreign coal through American and Canadian ports now open to ocean shipping? "It is a matter of record that before the recent war the average imports of coal from foreign sources into all of our coastal harbors was around 800,000 tons as compared with total national average annual production of 350 to 400 million tons. The fact is incontestable that no foreign producers of coal can compete with American coal in our coastal consuming regions, much less in the Middle West."

Fails To See Merit in Claims

The committee failed to see merit in claims by the Lake Carriers Association that the seaway would hurt their business. By far the largest portion of the traffic on the Great Lakes is between American ports and must be carried in American bottoms under the present statutes. "With only temporary exceptions, no foreign-flag ships, nor a foreign-constructed ship, can engage in coastwise trade between American ports. This in itself would eliminate the danger of competition from foreign vessels in an overwhelming percentage of the total American traffic on the Great Lakes.' The committee felt that loss of business through shifting traffic from coastwise trade in American bottoms to foreign trade in foreign bottoms would be negligible-"It may not be more than a million tons a year and it probably will be much less."

Rather, the committee thought, lake carriers would benefit from the enhanced industrial activity for the whole Great Lakes area, and in the expansion in shipments of agricultural products from Great Lakes ports.

About 90 per cent of the seaway is completed and the work to be done includes removal of the remaining ob structions to deep-water navigation, and the construction of facilities to develop close to 13 billion kilowatt-hours of hydroelectric power. The 27-mile Welland canal now is in process of being deepene from 25 to 27 feet. A lot of dredging has been done so that the down-bound channels through the Great Lakes and connecting rivers are now 25 feet; these channels must be deepened to 27 feet. The important MacArthur lock at Sau Ste. Marie, Mich., was completed as a Work has war-emergency measure. been advanced on deepening the Thousand Islands section of the St. Lawrence river.

Main work to be done by the United States is in the 46-mile stretch of the International Rapids section of the St. Lawrence river between Chimney Point and St. Regis, N. Y. This calls for channel work, construction of dams, construction of power generating facilities and of canals and locks to bypass the dams.

The completed seaway would be at a minimum depth of 27 feet over the entire 2347 mile route from the mouth of the Gulf of St. Lawrence to Duluth, Minn.

Cost of Work Uncertain

The report indicates the committee is uncertain as to what all this work will cost. The estimate of the Army Corps of Engineers is that, based on 1941 levels, the cost would be \$619,500,000. Of this amount \$455,086,000 still is to be spent-\$144,812,000 by Canada and \$310,274,000 by the United States. But what it would cost in 1946 or 1947 is uncertain. The Corps of Engineers estimated that costs rose about 20 per cent from 1941 to 1945. Since then costs have risen further, and further increases are in prospect. The committee estimates that it would take from four to six years to complete the seaway and power project.

Analyzing some of the economic factors involved in the project, the committee recognized no merit in the contention that the routes via the seaway to European ports would be much longer than from New York, and therefore impractical. The distance between Lake Erie ports and northern European ports by the seaway is stated to be less than by way of New York. "And in terms of transportation costs the seaway route is even nearer because it often costs as much to transport commodities from the Middle West to the seacoast as it does to take them from the seacoast overseas; thus the seaway is likely to reduce transportation costs of many commodities by as much as 50 per cent."

The committee estimates that the charge on overseas freight from Montreal to Chicago-assuming that there were such a charge on top of the charge for the ocean haul-should not exceed \$1.50 per ton on the average by the seaway. By comparison, the report says, carload shipments by rail from Atlantic ports to Chicago are often \$10 a ton or more. It estimates the United States cost of maintaining the seaway at less than \$1 per ton of the expected United States traffic.

The electric power generating part of the program, the committee feels, is of vital importance to the future of the nation-just as the power from the developments in the Tennessee Valley and the Pacific Northwest were so important in meeting the needs of World War II. Power charges should be low, the committee feels. It cites estimates that the cost per installed horsepower of capacity in the St. Lawrence project should be \$89 compared with \$90 at Boulder dam, \$96 at Mitchell dam, \$99 at Bonneville, etc.

The committee also rejected the claim that the seaway would adversely affect our iron ore industry through importation of cheap foreign ore, and quotes Oscar Chapman, under secretary of the interior, as authority for the view that imports in this field would not be harmful but helpful. Mr. Chapman is quoted as follows in the committee's report:

"One of the major problems of the lake area metal industry is the depletion of its low-cost, high-grade iron ores. There is no question that the highgrade Mesabi Range iron ores are slowly being exhausted. It is our hope that the taconites in the same area can be brought into production, and that their added cost will not exceed \$1 per ton. This would mean an increase in the cost of lake region pig iron of approximately \$2 per ton. There are new discoveries of high-grade ore in Labrador it would be very helpful to the lake area to have access to it.

Would Prevent Movement of Plants

"It may . . . be fairly said that it would be of considerable help to the lake area to have a certain supply of foreign ores available to it if and when American ores are approaching depletion. This matter is of particular importance to this area, as I have said, because the first and most obvious effect of importation of foreign resources will be a movement of lake area industry toward the Atlantic coast. The St. Lawrence seaway will help to cushion this shock to the lake area. It is to the interest of the whole country to have the lake area continue its progress without violent set-backs. The movement of a single steel mill from the lake area to some place closer to foreign imports would be a great economic shock to the local community and to the state, and, of course, to the workers in the plant.

"I consequently see the St. Lawrence seaway and power plant as cushions for the shock of our mineral depletion, both for the lake area and the mining regions." Another witness whose views were

accepted by the committee was Joseph Kres, Cleveland Industrial Union Council-CIO, who $i_{\rm S}$ quoted in the report as follows:

"The St. Lawrence seaway providing easy transportation from the East Coast to the Great Lakes steel industry will keep that industry intact. On the other hand, failure to provide water transportation now being used for iron ore from these new deposits (on the east coast of Canada) to the Lakes steel industry could result in an incentive to develop new steel mills on the East Coast when the Mesabi Range is depleted. If this should happen, it will disastrously affect the economy of the Midwest, This would wreck the economy of Cleveland and other industrial communities in the Great Lakes region."

Dr. N. R. Danielian, consultant to the Departments of Commerce and State on the St. Lawrence project, is quoted in the report as follows:

". . . . it would seem to me that the best insurance in peacetime is to bring in as much of the foreign ores as possible to "sweeten," as they call it, our own ores, the low-grade ores, with the foreign ores. It seems to me that the best stockpile we can keep at the present time is the open-pit ore that is available at the Mesabi Range, of which there are about 500,000,000 tons now, and that to utilize that in the next 10 years and then to use up your high-grade underground ore, and then depend upon beneficiation of low-grade ore, creates both economic and international security questions that require very serious study, at the present time, and it is not too early to consider the problem."

From the above considerations, the

report says, "it is clear that the seaway can be a vital factor in replenishing this country's resources and in slowing down the rate of exhaustion of high-grade ores. This is a vital national security consideration."

Favorable Action Asked On Bailey-Hays Bill

Favorable action on S. 1385, the Bailey-Hays bill, probably will be recommended to the full Senate Interstate Commerce Committee by the subcommittee which has been studying it. Testimony received by it during recent hearings has been overwhelmingly favorable.

Purpose of the Bailey-Hays Bill is "to provide for aid in industrialization of underdeveloped areas." It would authorize appropriation of \$5 million to the secretaries of agriculture, commerce and labor "to stimulate development and industrialization of regions and areas. . . . which heretofore have been without adequate industrial employment."

Objectives include providing jobs in such areas; raising production, incomes and standards of living; encouraging and expanding employment through private enterprise; encouraging and stimulating existing and new small business enterprises; supporting and complementing other measures aimed at full employment; and aiding private industry to make use of surplus war plants and equipment in such regions and areas.

The three secretaries mentioned would work toward these objectives by the use of grants-in-aid, by providing consulting service of a technical and economic character, by helping to train workers, by co-operating with utilities and transportation systems and all other means. The secretaries, after a preliminary period of two years, would recommend jointly to the Congress such further action as they regarded necessary.

Propose Government Insurance for Exporters Against Nonpayment by Foreign Customers

BILL to authorize the Export-Import Bank to insure American exporters against the risk of nonpayment by foreign customers has been introduced in the Senate by Senators Claude Pepper (Dem., Fla.) and James E. Murray (Dem., Mont.). The bank would earmark \$100 million for this purpose. Senator Pepper said he anticipates that premium incomes will be sufficient to defray costs of the system, as well as meet any losses incurred. Other nations, he pointed out, have for



ALL-PURPOSE BARGE: This all-steel barge can be converted from deck cargo to liquid cargo simply by installing pipelines and fittings and without altering design of the vessel. Designed by Avondale Marine Ways Inc., New Orleans, the barge has a capacity of 450 tons of deck cargo or 3200 barrels liquid cargo

years provided export credit insurance.

The measure, known as the "Export Insurance Act of 1946," is an outgrowth of recommendations made by various witnesses who appeared last year at hearings of the Foreign Trade Subcommittee of the Senate Small Business Committee. It is intended not only to protect the exporter against bad credit risks, but also against possible action of foreign governments in refusing to allow their nationals to make payment in acceptable currency.

Senator Pepper sees the bill as a stimulant to our foreign trade. The exporter, he said, would be "enabled to secure additional working capital for his credit sales abroad because, with the insurance, he will be enabled to discount his drafts on foreign customers in an amount additional to his normal line of credit.

"The unsound seller," he added, "will not find this insurance attractive, first, because sales, to be insurable, must be to proved accounts abroad, and, second, premiums charged will bear close relation to the loss experience of the policyholder."

The present prospects for prosperous conditions in the American export trade for the next several years, declared Senator Pepper, "provide an admirable climate in which to acquire experience in the operation of this insurance system, and provide favorable conditions for the refinement of its operational policy. It is when more normal conditions of worldwide competition return that the fullest beneficial effect of the proposed system will be felt."

Airport Construction Program, To Cost \$520 Million, Is Authorized

States and communities expected to match federal funds. Total expenditures as result of program may reach \$10 billion. Steel requirements estimated in hundreds of thousands of tons. Law calls for completion within seven years

A POSTWAR airport construction program that will supply a lift to business and employment over the next seven years has been approved by Congress and the President. The new law authorizes the Civil Aeronautics Administration to supply to the states and communities \$500 million for the building of national airports, plus \$20 million for airports in Hawaii, Alaska and Puerto Rico. An additional \$3 million is provided for preliminary planning.

Appropriation action by Congress is necessary before the program can be launched. It is expected the \$3 million for planning expenses will be included in the Civil Aeronautics Administration's appropriation for the fiscal year ending June 30, 1947. A separate appropriation will be necessary for the \$520 million for carrying out the program. It is expected these appropriations will be approved in plenty of time to permit a beginning of real work on the airport program at the beginning of the 1947 construction season.

Federal Aid To Be Matched

The \$520 million of federal aid is to be matched on a variable basis, depending on the conditions in each case, but the matching funds are expected to be at least equal to the federal expenditures. The federal aid program covers only ground work and construction of administration buildings. Because airfield needs today cover a wide range of facilities it is estimated roughly that the \$1 billion thus to be spent by the federal government and the states and communities on ground work and administration buildings will swell to \$10 billion or more.

The new law implements recommendations made by the Civil Aeronautics Administration in 1944. That recommendation envisioned the need for building 3050 new airports and improving 1625 existing fields—to bring the national total number of airfields to 6305. A Carnegie-Illinois Steel Corp. estimate gave the steel requirements of this 1944 program at 398,000 tons.

But the program's execution would call for a great deal more steel than that; in addition to the administration buildings a lot of steel would be required for construction of hangars, also various service buildings. It was figured that 40,-000 gasoline storage tanks would be required for the airports included in the CAA program, that 160.000 tons of steel culverts would be needed, also 104,000 tons of steel fence, also a considerable tonnage of steel for control towers.

In addition there will be large requirements of concrete reinforcing steel, kitchen and cafeteria equipment, luggage and storage racks, battery and gasolineoperated trucks of different types, etc. The program as a whole will provide work for a large variety of contractors' equipment.

Commercial, Private Flying Increase

The Civil Aeronautics Administration will start revision of its 1944 findings as soon as possible so that it is in a position to talk with the various states and territories and communities about the work to be done. Quite a few small airports have been built since V-J Day, but the work thus already accomplished is offset by increasing needs. The number of commercial air lines since the war has grown much faster than expected; the CAA says there are as many airlines in operation today as it had expected would materialize by 1949.

In addition, needs have increased by reason of the increasing amount of private flying, as well as the growing number of reconverted military planes which are being engaged in cargo and special charter services.

As Civil Aeronautics Administrator, T. P. Wright will exercise general supervision over the national airport program. Responsible for the carrying out of details is Charles B. Donaldson, assistant administrator for airports.

"The National Airport Bill," says Mr. Wright, "represents the nation's first planned effort to develop a civil airport" system worthy of the name. It follows, in a general way, the procedures worked out in 30 years of federal aid to highway building. In other words, local governments will handle, through contractors or otherwise, the actual construction, first submitting their proposed projects to the CAA for approval in light of national standards and requirements."

"Because of the necessity of building



T. P. WRIGHT



CHARLES B. DONALDSON

large fields for military planes, we now have 800 big airports—in Classes 4 and 5—whereas we had no airports in these categories in 1939," points out Mr. Wright. "Our most urgent need today," he says, "is for small airports to serve the swelling ranks of private flyers and local commercial air services. Under this bill we hope to correct the gross maldistribution of airports which exists in the United States today."

The airport program, Mr. Wright feels, is vital from the standpoint of stabilizing and promoting the airplane manufacturing industry. If a private flyer cannot enjoy convenient airport facilities, he very likely "will give it up in a year or two because he is not getting enough use out of it to justify the cost. A CAA survey shows that more than 60 per cent of plane purchasers did exactly that in the years 1931 to 1939. Thus the whole aviation industry, and to some extent the entire national economy, suffers from the gaps in our airport system."

To get the program launched effectively, Mr. Donaldson urges cities, towns, communities and states to expedite their airport planning. "The more of this kind of planning that is done," he says, "the shorter will be the task of the CAA engineers in harmonizing all local plans with the National Airport Plan, and the faster actual construction can be commenced."

Planning of the CAA will be decentralized as much as possible into the nine CAA regions, with headquarters at New York, Atlanta, Chicago, Kansas City, Ft. Worth, Santa Monica, Seattle, Anchorage, Alaska, and Honolulu, T. H.

"In addition," says Mr. Wright, "we hope to have approximately one district

office for every state. These district and regional offices are the focal points for airport action-delegations to Washington pressing for action on specific projects will serve only to slow down progress."

WAA Announces Plane Sale To Begin June 3 at Norfolk

Sale of more than 350 surplus Stinson AT-19 cabin monoplanes, formerly lend-

leased by the British, will begin June 3, the War Assets Administration has announced. Prices are \$1500, \$2000 and \$2500 each, depending on condition. Terms of the sales are for cash only, with no discounts.

The planes are located at Chambers Field, Naval Air Station, Norfolk, Va., and because no facilities are available for putting them in flying condition (their wings are disassembled), buyers must make shipping arrangements.

WAA Licenses Additional Dealers To Sell Surplus Tools and Equipment

WAR Assets Administration has licensed 136 additional "approved dealers" to solicit and negotiate sales of government-owned surplus machine tools and other production equipment.

Licenses as "approved dealers" have been issued to the following, in addition to those listed in previous issues of STEEL.

Alabama

Birmingham: Wimberly & Thomas Co. Inc., 1305 N. Eighth Ave.

California

Oakland: Holstead Machinery Sales, 8033 Ney Ave.; San Jose: Taggart & Bumb, 132 North Sixteenth St.

Colorado

Denver: Thomas C. Vittetow, 1420 Detroit St.; Weaver Electric Co., 1721 Larimer St.; Garwood C. Anderson & Associates, 1010 Seventeenth St.

District of Columbia

Washington: James S. Spivey, 704 H-2660 Woodley Rd. N. W.; Donald S. Sampson, 1101 Vermont Ave. N.W.; Stanley Berg & Co., 1026 Shoreham Bldg.; C. P. McDonald, 1101 Vermont Ave.

Florida

Orlando: DoAll South Atlantic Co., 805 E. Washington St.; Harry P. Leu Inc., 100 W. Livingston.

Georgia

Atlanta: Joseph R. Johnston Machinery & Equip., 1003 Spring St.

Illinois

Chicago: Martin F. Morrison, 425 Belmont Ave.; Ball Machinery Sales, 39 S. LaSalle St.; Meyer Supply Co., 170 N. Clinton St.

Oak Park: L. M. Keller, 1127 Washington Blvd.; Joliet: W. B. Manchester, 201 Nicholson St.; Bellwood: Hallahan & Sterling, 415 45th

Indiana

Hammond: Midwest Supply Co., 516 Kenwood St.

Iowa

Decorah: Sampson Machine Works, 508 W. Water St.

Kentucky

Louisville: Metal Míg. Corp., 30th & Gar-land Sts.; Equipment & Engineering Service of Kentucky, 785 S. Clay St.; Fink Equipment Co., 103 Board of Trade Bldg.

Louisiana

New Orleans: Patrick H. Dillon, 524 Howard Ave.

Maryland

Baltimore: Samler Machinery & Equipment Co., 11 E. Fayette St.; Elkton: Maryland Distributors Inc., 129 E. Main St.

Michigan

Michigan Detroit: L. J. Fenton & Son, 3408 David Broderick Tower; C. E. Jordan & Co., 308 Boulevard Bldg.: John S. Brinck & Associates, 600 Michigan Bldg.; Franklyn K. Morgan & Co., 7482 Cass Ave.; Knowles Service, 1546

Penobscot Bldg.; Kord Supply Co., 2925 Waver-ly St.; G. & E. Equipment Sales, 7310 Woodward Ave.; Ernest K. Baldwin Co., 2354 National Bank Bldg.

Birmingham: Carl F. McLaren, 991 Mohegan.

Montana

Helena: Barnett Iron & Machinery Co., 1530 National Ave.

New Jersey

Jersey City: U. S. Equipment Co., 40 Journal Square; Hudson County Machine & Tool Co., 14 Manning Ave.; Industrial Machinery Corp., 147 Provost St.; T. H. Pitt Co., 57 Sip Ave.

57 Sip Ave.
Newark: Falcone Engineering Co., 487
Orange St.; Cassell Machinery Co., 506 Central Ave.; Jack Nieluuhr, 25 Lincoln Park;
Highland Park: Frederick H. Hicks, 415 S.
First Ave.; Hillsdale: Ferdinand J. Snow,
38 Washington Ave.; Hillside: H. J. Zoubek
Conductance Richard Co. 173 Main St. Co.; Hackensack: Richards Co., 178 Main St.; West Orange: Charles M. Evans, 29 Black-burne Terrace; Union City: Callite Tungsten Corp., 540 39th St.; East Orange: Garnet Corp., 69 Glenwood Place; Glen Rock: Albert W. Travis, 21 Hillview Terrace; Perth Amboy: Plant Surplus Co., 25 Second St.; Clifton: Claridan Machinery Co.; Nutley: Claridan Machinery Co., 152 Coeyman Ave.

New York

New York: Industrial Trading Co., 30 Church St.; Fortrade Corp., 68 William St.; Saul Berman, 104 Fifth Ave.; Reliable Machinery Exchange, 174 Centre St.; North American Supply Corp., 225 Broadway; J. H. Trading Corp., 110 William St.; John A. Voskamp, 611 W. 177th St.; Heimlich Bros., 136 W. 25th St.; Clyde Iron Works Inc., 856 E. 136th St.; P. F. Booth, 19 Rector St.; Drew T. Doyle, 90 W. 103rd St.; Myron Jenner, 251 W. 92nd St.; Theodore Mann Co., 405 Lexington Ave.; Pro-duction Specialties Inc., 345 Madison Ave.; Walther S. Weiss, 881 W. 181st St.; Weslemain Co. Inc., 565 Fifth Ave.; R. E. Brooks Co., 50 Church St.; Pcerless Machinery Co., 208 Lafayette St.; Porto Rico Iron Works Inc., 120 Wall St.; Elgood Materials Co., 313 W. 53rd St.; Mahoney-Clark Inc., 217 Pearl St.; R. D. Stevenson, 33 W. 42nd St.; A. Zitenfield, 158 E. 40th St.

Broad Channel, Long Island: Martin F. Gronachan, 25 Eleventh Road; Rochester: DoAll Rochester Co. Inc., 293 Central Ave.; East Rochester: Wright & Williams Specialty Mfg. Co., 131 Woodbine Ave.; Douglaston, Long Island: Hugh A. Brown, 235 36th Ave.; Jamestown: Warren Ricketts, 2 Allen Square Jamestown: Warren Ricketts, 2 Allen Square Bildg.; Bronx: Bronx Machinery Exchange, 2590 Third Ave.; Flick Contracting Co., 1515 E. Bay Ave.; Long Island City: Magnus Machine Tool Co. Ltd., 38-02 22nd St.; Larchmont: McCabe Machinery Co., 42 Wendt Ave.; Yonkers: Standard Machinists, 595 Central Park Ave.; Mt. Vernon: John W. Wiegand, 190 Hillside Ave.; Morrisonville: C. M. Broadwell, Mason St.; Buffalo: W. S. Gallagher Co., 841 Grant St. 841 Grant St.

Brooklyn: James G. Cavanaugh, 1744 Troy Ave.; Egbert B. Colven, 25 Clark St.; Commander Machine Co., 1212 Ocean Ave.;

Fasone, 1665 63rd St.; Samuel Joseph C. Moskow, 856 Flushing Ave.; Joseph Sorgen, 615 Crown St.; William H. Ludwig, 656 Bushwick Ave.; Reliance Mica Co. Inc., 341 39th St.

Ohio

Cleveland: A. R. Jones Co., 18609 St. Clair Ave.; Continental Salvage & Machinery Corp., 1836 Euclid Ave.; General Commerce Co., Marshall Bldg.

Cuyahoga Falls: Vaughn Machinery Co.; Toledo: C. R. Ruse Co., 234 Spitzer Bldg.; Rocky River: Charles M. Ingersoll Co., 19930 Detroit Rd.; Wooster: Vernon L. Johnson, 555 E. Bowman St.; Alliance: James M. Kulka, Co. M. Kulka, J. J. Coumburg, H. L. Avres E. Bowman St.; Alliance: James M. Kulka, 1033 Farkwood Blvd.; Columbus: H. L. Ayres Machinery Co., Box 45; Cantwell Machinery Co., 830 N. Cassady Ave.; Cincinnati Cincinnati Milling & Grinding Machines Inc., 4701 Marburg; DoAll Cincinnati Co., 342 Reading Rd.; Norwood: Laurens Bros., 2780 Highland Ave.

Oklahoma

Tulsa: Petroleum Equipment Inc., Central Bldg.: DoAll Tulsa Co., 301 East Fourth St.; P-W Supply Co., 614 Petroleum Bldg.; C. H. Rawson, 207 Masonic Temple Bldg.

Oklahoma City: Robertson Sales Co., Box 1102.

Oregon

Portland: Surplus Sales Co., 329 S.W. First Ave.; Premier Gear & Machine Works, 1700 Northwest Thurman St.; Harry M. Euler Co., 225 S.W. First Ave.; Surplus War Supply Co., 224 E. Greenwood; Pelican Machinery Co., 1535 Elm St.

Pennsylvania

Pittsburgh: DoAll Pittsburgh Co., 507 Second Ave.

Tennessee

Nashville: Inland Equipment Co., 1608 Har-rison St.; C. D. Friss & Co., 800 Exchange Bldg.; Memphis: Dabney Industrial Supply Co., Box 4446; Summer Avenue Welding & Machine Works, 2999 Summer Ave.; Chattanooga: Baron Iron & Equipment Co., Box 601.

Utah

Salt Lake City: Arnold Machinery Co., 153 W. Second South.

Virginia

Alexander: W. W. Livchak, 33 Chinquapin; Petersburg: Tom Norton, 202 N. Crater Road; Norfolk: R. T. Overstreet, 522 Wainwright Bldg.

Washington

Spokane: Tinling & Powell, 708 Sprague Ave.; Towne & Bremer, 520 Second Ave.; Hofus-Ferris Equipment Co., 728 Mallon Ave.; Walla Walla: Braden Tractor & Equipment Co., 102 E. Poplar; Inland Machine Works, 534 W. Main St.

West Virginia

Charleston: Midwest Steel Corp., Court & Dryden Sts.

Wisconsin

Milwaukee: Industrial Salvage Material Co., 718 E. Bay St.; Kearney & Trecker Corp., 6784 W. National Ave.

NOW... A BULLARD CUT MASTER V.T.L. PUTS SPEED CHANGES AT YOUR FINGERTIPS

New Pendant Control with Speed Dial and Clutch-Brake Lever Located Where You Want Them

The addition of this entirely new and different Pendant Control to all Bullard Cut Master Vertical Turret Lathes provides a high degree of control and operating efficiency not found in other machine tools.

This is how the Bullard Pendant Control works. With the machine operating and a speed change needed, you throw the switch lever to "BRAKE ON" ... rapidly dial the new speed (an exclusive Bullard Pendant Control feature)... throw the lever to "CLUTCH IN". That's all!... gears are quietly and almost instantaneously shifted through electricallycontrolled, hydraulically-operated mechanisms. When you want to jog the table any fraction of a revolution for positioning or indicating, you merely manipulate the single switch lever.

This new Pendant Control is suspended at the most convenient operating height. It swings in an arc to whatever position is required for ease of operation.

For facts about other features that make Bullard Cut Masters your best investment for cutting time on and between cuts, write for Bulletin CVTL-4-1, today. The Bullard Company, Bridgeport 2, Connecticut.

> This unique Pendant Control is now a standard specification on all Bullard Cut Master Vertical Turret Lathes which are available in 30" and 36" sizes with two heads . . . in 42", 54", 64" and 74" sizes with two or three heads.

0

0

-

18.0 217

SCUTCH ING

10



CREATES NEW METHODS TO MAKE MACHINES DO MORE Shortage of hard-drawn spring wire for springs in seats and seat backs latest cause for retrenchment in automaking schedules. Price ceilings forced some producers early this year to abandon manufacture of wire in favor of more profitable products

DETROIT

CRUMBLING automobile production was slated for further disintegration last week after a 20,000-unit collapse from the 70,000 level, highest yet attained in the postwar period. Aftermath of the coal strike and the accompanying restrictions on industrial power use, particularly in the Illinois area, crippled the flow of many key parts to automobile plants, and on top of this has come a critical shortage in harddrawn spring wire used for springs in seats and seat backs. This is probably the first time in history that shortage of upholstery spring wire has forced cuts in assembly schedules, but such is the case and unless some steel supplier comes forth with reinforcements in spring wire, further immediate retrenchment is inevitable.

The background on the spring wire drouth has some unusual ramifications. Early this year, around January, steel companies were finding it practically impossible to produce this type of wire economically under existing price ceilings. Some of them frankly told customers they were abandoning production and turning to other wire commodities which might conceivably be manufactured economically. There were many buyers wailing for the latter and wire mills made long-term commitments, leaving their spring wire customers high and dry. On Feb. 15 an increase of \$6 per ton on spring wire was authotized, easing the situation somewhat. However, with production rerouted on other types of wire it was not readily possible to switch back.

Then on Apr. 1 a further increase of \$7 a ton on spring wire was permitted, along with the cancellation of quantity discounts. Net effect, according to spring wire users, was to give mills the equivalent of \$19 per ton increase in price. Still the mills were unable to meet the demands of manufacturers of upholstery springs, principally because they were loaded down with business booked previously. Current published price of spring wire is \$4.10 per 100 lb, Worcester, Mass., base, or \$82 per ton. The steel strike and the coal strike served further to strangle the wire supply generally, and the market today is probably tighter than for any other type of finished steel. Relief appears far distant, and some wire mills reportedly are asking their employees to take their vacations this month and

| Automobile Production | | | | | |
|---|-------------|-----------|--|--|--|
| Passenger Cars and Trucks—U. S. and Canada | | | | | |
| Tabulated by Ward | s Automotic | e Reports | | | |
| | 1946 | 1941 | | | |
| January | 121,861 | 524,073 | | | |
| February | 83,841 | 509,332 | | | |
| March | 140,777 | 533,878 | | | |
| April | 249,181° | 489,856 | | | |
| Week ended: | | | | | |
| May 4 | 67,060° | 130,610 | | | |
| May 11 | 71,355° | 132,380 | | | |
| May 18 | 49,905° | 127,255 | | | |
| May 25 | 45,000° | 133,560 | | | |
| °Preliminary. | | | | | |

next in the hope that by late June or July the supply of rods may permit closer to full-scale production.

Fabricators of automotive upholstery springs have not made it a practice to keep very far ahead of assembly line requirements because of the complication of storing finished springs. Generally truck loads of springs from coilers' plants would be unloaded directly to automotive trim lines. The result is that any interruption to coiling operations is almost immediately reflected in exhaustion of supplies at assembly lines. The same situation is not true in respect to most materials and parts. General Motors divisions, of course, were able to warehouse some stocks of springs during their 113-day strike, but these are practically cleaned out, and Fisher Body units are closing as a result. Ford and Chrysler likewise have been forced to suspend and curtail production because of spring shortages. Admittedly if it were not springs it would be something else, but attention in recent weeks has been focused sharply on these elements.

mirrors of motornom

Valve spring wire is said to be in fairly good supply, as are coil springs for chassis suspensions. The leaf spring picture has been spotty but is not considered as serious as the current upholstery spring outlook. There are 12-15 different sizes of wire used in these cushion springs, and many makeshifts and expedients have been resorted to in the effort to spread what stock is available over the most urgent requirements. Now, however, wire inventories have dwindled to the point where fabricators are just about at the end of the rope, or should we say wire.

Progressive shutdown of Ford manufacturing and assembly operations was begun May 15, after a series of starts and stops which was d iving production chiefs at the Rouge plant slowly mad. This time it appears the closing will be in effect for some time, perhaps until June 15, when it is hoped inventories can be restored to the point where more orderly operations can be effected. A loss of 75-80,000 cars and trucks looks inevitable.

Breech Named to Ford Post

Considerable stir was caused in automotive circles by the selection of 49year-old Ernest R. Breech, erstwhile president of Bendix Aviation, former GM vice president and one-time head of North American Aviation, to become executive vice president of Fo:d, a post in which he should have virtually complete direction of the entire Ford manufacturing empire. Mr. Breech was thought by many to be a confirmed General Motors man whose principal devotion lay in the direction of aircraft manufacturing, but he said he accepted the Ford offer after weeks of careful consideration, and felt that he could contribute more to the future of industry in this capacity.

A real go-getter and tremendously liked throughout the automotive and aircraft industries, Mr. B.eech should bring a new spark to Ford's efforts to

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

MIRRORS of MOTORDOM



1947 MODELS: First of the industry's 1947 models start to roll from the Studebaker assembly lines in South Bend, Ind. Prior to the coal strike, the company had scheduled June production at 25,000 units

recapture the company's former No. 1 position as a builder of motor cars and trucks. His rapid rise to fame came by way of accounting channels and not through manufacturing, a familiar route which many top motor executives traveled — M. E. Coyle of Chevrolet and H. H. Curtice of Buick to name only two.

What is the consensus of representative engineering opinion with respect to immediate and long-termed trends in automotive power plants? That was the question to which Arch T. Colwell, vice president, Thompson Products Inc., Cleveland, sought the answer by addressing inquiries to 53 leading engineering authorities in the automotive, engine parts and fuels field. He presented his report to the Society of Automotive Engineers here last week. He found the engineers pretty cagey about revealing anything entirely new, but he noted general agreement on a trend toward smaller, lighter engines, with the qualifications that such reduction must not be accompanied by higher costs.

Slightly higher engine speeds seem likely in the near term, but lower again when the automatic transmission development gets into full swing. Describing the elimination of the gearshift as the "hottest" thing in the industry today, engineers prophesy steady progress through the automatic shift to the infinitely variable transmission — perhaps a complete hydraulic system. Here again, cost is the controlling factor.

Other conclusions reached by Colwell's contributors . . . Octane number of fuels will go up gradually, though not as fast as the public would like to think; lubricants will tend toward the heavy-duty type, a combination of natural and synthetic, perhaps eventually synthetic. Pressure cooling systems will be more widely used, as will light metals, but the latter not to the extent visualized by lay opinion. Fuel injection and supercharging appear too expensive at present. Manifold injection holds interest on small aircraft engines. Considerable improvement will be made in the entire induction and fuel system and in combustion chamber design. There will be trend away from the long straight-eight engine, and styling will be a less predominant factor.

For the extremely long trend, engineers say the gas turbine "may be developed for automobile use." The pure jet engine has no field in ground vehicles. Present engines have one great characteristic—flexibility—which the gas turbine lacks, but proper transmission might yield this property. Actually, the gas turbine development is too new to predict its reliability, cost and satisfaction in the smaller sizes, but its progress is being watched carefully.

As one engineer expressed it to Colwell: "The design of the turbine engine eliminates a great many things which we now have, such as pistons, piston rings, hardened bores, etc., and will replace them with other sources of trouble which will give us an entirely new field of development."

Stressing the importance of public acceptance as a prime determinant in any new idea or design, Colwell concluded with the story of a certain expert liquor taster to whom various manufacturers submitted their standard liquors which were promptly identified and criticized by the blindfolded taster. The taster took several sips and finally said: "You have me this time—I don't know what it is. But I'll tell you one thing—it won't sell."

This is the week Detroit takes down its civic hair and plans to go all out in a jubilee celebration the like of which it has never known. Three-hour parades, cavalcades of old automobiles, spectacular shows with imported stars of stage, screen and radio, community festivals, commemorative dinners and a score of other events will mark the fiftieth anniversary of the automobile industry. If the million-dollar jamboree can serve to snap the industry and its working people out of their postwar apathy and turn them down the road to hard work, good earnings and profits it will have well justified its slogan, "Hats off to the past, coats off to the future."

Develops New Testing Device

Supplementing engine dynamometer tests, Chrysler engineers have developed a new testing device in the form of 35-foot turntables, each with stands for 16 engines, and making one full rotation in 30 minutes. Engines run on their own power with gasoline the fuel. A crew of seven works on each turntable, testing engines at various speeds and making necessary adjustments, after which the power units are transferred to overhead conveyor and carried directly to the final assembly line or engine storage department.

Mounting fears are disclosed among some automobile company sales executives over the probable duration of the lush sellers' market which a year ago some observers were predicting as of five or six years' extent. Realization that people with money will buy what they can instead of waiting for what they really want, the draining of savings because of strikes and widespread interruptions to production, and the unfortunate fact that advance predictions seem to have a habit of failing to come true are revising earlier estimates. L. W. Slack of Packard, for example, told a dealer group recently that the present sellers' market could change overnight to a buyers' market-perhaps by January, 1947.









VI ÇKERS THE MOST COMPLETE LINE of HYDRAULIC PUMPS and CONTROLS

Constant delivery vane type pumps, variable delivery piston type pumps, power units, pressure controls, volume controls, directional controls, cycle control panels, fluid motors, variable speed transmissions . . . these are indicative of the great variety of Vickers hydraulic units. Having the most extensive line of hydraulic equipment, Vickers can meet all hydraulic requirements and provide the important benefits of undivided responsibility. Vickers Application Engineers will be glad to discuss with you how hydraulics can be used to your advantage.



ICKERS Incorporated 1480 OAKMAN BLVD. . DETROIT 32, MICHIGAN Application Engineering Offices: CHICAGO . CINCINNATI . CLEVELAND . DETROIT LOS ANGELES • NEWARK • PHILADELPHIA • ROCHESTER ROCKFORD • SEATTLE • TULSA • WORCESTER

There are more than 5000 Standardized Vickers Units that can be used in various combinations to exactly supply Every Hydraulic Power and Control Function ANY FEED RATE . ANY TRAVERSE RATE . ANY RPM ANY SEQUENCE OF MOTIONS . ANY ACCELERATION OR DECELERATION . ANY THRUST

ACTIVITIES

Patent Rights To New Steel Given to Public

U. S. Steel Corp. and Carnegie-Illinois Steel Corp. announce rights to "stabilized" steel available without royalty

ALL PATENT rights to the use of a "stabilized" steel composition designed to meet requirements of high temperatures in steam lines and in the chemical industry have been proclaimed available on a royalty-free basis to the public by United States Steel Corp. and Carnegie-Illinois Steel Corp., Chicago.

Use of the material, which emerged from the research laboratory and subsidiary companies of U. S. Steel since the end of the war, was patented by Dr. Marcus A. Grossmann, director of research for Carnegie-Illinois, and Dr. R. F. Miller, development engineer, stainless and alloy steels, of Carnegie-Illinois.

The patent relates to "the use of a grade of steel particularly resistant to graphitization when subjected to stress in the temperature range from 800 F to 1100 F."

Operations involving increasingly higher temperatures have focused attention of metallurgists and engineers on specific compositions best suited to give industrial equipment long life and more efficient performance. Oil refineries, chemical process plants and steam power generating plants are typical examples of industries concerned with the use of steel at high temperatures, R. E. Zimmerman, vice president, research and technology, U. S. Steel Corp., said, "in view of the importance of this invention to the power generating industry and the practical value of the teachings of the patent to many others, all rights under it have been proclaimed available to the public for use on a royalty-free basis."

The steel embraced in the patent is of the pearlitic, non-air-hardening type containing from 0.08 to 0.20 per cent carbon and from 0.45 to 0.65 per cent molybdenum in conjunction with from 0.15 to less than I per cent chromium, which is proportioned with respect to the carbon content to fix substantially all the carbon in the form of carbide, which is stable within the defined temperature range. The steel is said to be not only more stable from the standpoint of graphitization and spheroidization but is reported also to have a strength equivalent to that of the carbon-molybdenum previously used.



DRAWING AID: Known as a "Sun-Vu" apparatus, this equipment in use at the engineering department of Studebaker Corp., South Bend, Ind., makes possible an axonometric projection drawing of any object placed on the stage at the lower left. The machine can be used either to draw actual objects as in the case of the crankshaft shown here, or to convert blueprints to a single, three-dimensional scale drawing, or perspective illustration. In the latter practice, a part can be drawn as if viewed from any angle merely by tilting the blueprint to a specified plane and projecting the view. Mechanically, the apparatus consists of a hooded eyepiece and an electrically actuated pencil which is mounted inside an arm extending from the base of the eyepiece. The sighting instrument can be moved both horizontally and vertically above the object on the stage. Drawings are made by following contours of the object with cross hairs in the sighting instrument. Each time the operator centers on a salient point he presses a control button, whereupon the pencil makes a dot on the drawing board. Dots later are joined and hand shading applied if necessary

BRIEFS....

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

Mechanite Metal Corp., New Rochelle, N. Y., has contracted with Mars Machine Tool Mfg. Co. Pty. Ltd., Brisbane, Australia, to permit the latter company to manufacture mechanite castings.

Ohio Equipment Co. Inc., Cleveland, has opened a branch office at Akron, under management of E. J. Werner, P. O. Box 1207, Akron 9.

-0-

Westinghouse Electric Corp., Pittsburgh, has acquired the Curtiss-Wright plant at Buffalo from the government for \$10 million. The plant will employ 8000.

-0-

Latrobe Electric Steel Co., Latrobe, Pa., has appointed American Steel Export Co. Inc., New York, as sole export representative for its line of steels.

Thomas Steel Co., Warren, O., has offered for sale through a group of underwriters 16,428 shares of 4¼ per cent preferred stock at \$103 a share and 246,420 shares of common stock at \$18 per share. The offered shares are owned by C. G. Thomas, formerly president of the company.

Diamond Alkali Co., Pittsburgh, has plans to build a \$400,000 plant and warehouse in Chicago. Construction will begin in June.

Ferro-Bronze Corp., Moline, Ill., has been organized to produce bronze and gray iron castings.

-0-

Dow Chemical Consolidates, Plans Opening Texas Plant

A consolidation of magnesium operations of Dow Chemical Co., Midland, Mich., under a separate executive board and general manager and the immediate resumption of production at the company's sea water plant at Freeport, Tex., were announced recently by Dr. Willard H. Dow, president and general manager and chairman of the new executive board.

The move brings the company's magnesium sales, fabrication and technical division together under the general managership of Dr. J. D. Hanawalt, former director of metallurgical research, and is expected to facilitate maximum coordination of effort.

Production of magnesium ingots at the Texas plant, which has been closed since the end of the war, will be resumed as soon as possible, the president stated, and is expected to reach full capacity by midsummer.

Republic Steel Buys Stock Of Witherbee Sherman Corp.

Republic Steel Corp., Cleveland, has purchased from the National City Bank of New York all class A, B, and C stock of Witherbee Sherman Corp., Port Henry, N. Y., owned by the bank. Purchase price was \$2.75 a share. Witherbee Sherman is owner of iron ore properties near Port Henry and a concentrating plant there which Republic leased in 1938,

Fabricating Firm Starts Operations in Birmingham

The newly formed Ferro Fabricating Co. Inc., Birmingham, is producing light structural steel and ornamental iron products at the former Southern Engineering Co. plant in Birmingham. The company is headed by Clement S. Walker Jr. Charles S. Caldwell Jr. is vice president and treasurer, and Charles E. Denman is secretary and sales manager.

Officers Elected by 11 Chapters Of Steel Warehouse Association

ELEVEN additional chapters of the American Steel Warehouse Association Inc. have elected officers for the coming year, Walter S. Doxey, association president, Cleveland, has recently announced.

They are: Baltimore Chapter-President, Arthur M. Pfeiffer, Dietrich Bros. Inc., Baltimore; vice president, Harold Dell, John J. Greer & Co. Inc., Baltimore; secretary-treasurer, J. D. Boan, United States Steel Supply Co., Baltimore; and chapter director, George J. Parke, Eagleston-Parke Inc., Norfolk, Va.

Buffalo Chapter—President, A. Stanley Vedder, Brace-Mueller-Huntley Inc., Syracuse, N. Y.; vice president, L. N. Stetson, Peter A. Frasse & Co. Inc., Buffalo; secretary-treasurer, W. H. Kline Jr., Burke Steel Co., Rochester, N. Y.; and chapter director, J. Frederick Rogers, Beals McCarthy & Rogers Inc., Buffalo.

Kansas City Chapter—President, John A. Rudisill, George C. Christopher & Son Iron Works, Wichita, Kans.; vice president, K. P. Sexton, Consolidated Supply Co., Picher, Okla.; secretary, H. A. Hofflander, Tulsa Boiler & Machinery Co., Tulsa, Okla.; and chapter director, Fred L. Evans, Steel Mfg. & Warehouse Co., Kansas City, Mo.

New York Chapter — President, Charles Kramer, United States Steel Supply Co., Newark, N. J.; first vice president, William Carter, Faitoute Iron & Steel Co. Inc., Newark, N. J.; second vice president, Albert Bragg, Egleston Bros. & Co. Inc., Long Island City, N. Y.; secretary-treasurer, William C. Hughes, Bright Steel Corp., New York; and chapter director, P. O. Grammer, Grammer, Dempsey & Hudson Inc., Newark, N. J.

Northwest Chapter — President and chapter director, J. K. Rittenhouse, United States Steel Supply Co., St. Paul; vice president, R. H. Hobbs, W. H. Hobbs Supply Co., Eau Claire, Wis.; and secretary-treasurer, S. C. Brennom, Paper, Calmenson & Co., St. Paul.

Omaha Chapter—President, Ray Wilkinson, Paxton & Vierling Iron Works, Omaha, Nebr.; vice president, C. W. Helstrom, Globe Machinery & Supply Co., Des Moines, Iowa; secretary-treasurer, C. H. Hayes, Omaha Steel Works, Omaha; and chapter director, Henry Neef, Gate City Iron Works, Omaha.

Pittsburgh Chapter-President, H. E. Williams, Williams & Co. Inc., Pittsburgh; vice presidents, Bennett Oliver, McKee-Oliver Inc., Pittsburgh, and T. J. Gillespie, Lockhart Iron & Steel Co., Pittsburgh; secretary, Marcus Boyd, Boiler Tube Co. of America, Pittsburgh; treasurer, F. B. Lorenz, Edgar T. Ward's Sons Co., Pittsburgh; and chapter director, T. L. Lawry, Steel Products Co., McKees Rocks, Pa.

St. Louis Chapter — President and chapter director, W. Milner Donovan, Donovan Iron & Supply Co., St. Louis; vice president, George K. Conant, Sligo Iron Store Co., St. Louis; and secretarytreasurer, L. F. Niemann, United States Steel Supply Co., St. Louis.

Southern Chapter—President, W. W. Messersmith Jr., Woodward, Wight & Co. Ltd., New Orleans; vice president, J. J. Schmelzer, Arkansas Foundry Co., Little Rock, Ark.; secretary-treasurer, J. H. Arnold, Arnold-Brown Metals & Supply Co., Birmingham; and chapter director, Frank Pidgeon, Pidgeon-Thomas Iron Co., Memphis, Tenn.

Southern California Chapter—President and chapter director, E. Jungquist, Fercival Steel & Supply Co., Los Angeles; vice presidents, William L. Rawn, the R-J-M Co., Los Angeles, and Wayne Rising, Ducommun Metals & Supply Co., Los Angeles; and secretary-treasurer, W. H. Lindberg, Earle M. Jorgensen Co., Los Angeles.

Texas Chapter—President and chapter director, R. L. Philips, Peden Iron & Steel Co., Houston, Tex.; first vice president, W. C. Jaschob, Briggs-Weaver Machinery Co., Dallas, Tex.; second vice president, J. H. Maxwell, Maxwell Steel Co., Ft. Worth, Tex.; and secretarytreasurer, V. P. Williams, Markle Steel Co., Houston.

Work Begun on \$5 Million Warehouse in Chicago

Hibbard Spencer Bartlett & Co., Chicago, has started work on its new \$5 million warehouse and office building in Evanston, Ill. Completion is scheduled for July, 1947. The plant, one-story except for the office section, will provide about 1 million square feet of floor space. Meanwhile, the Army Air Forces is gradually vacating the company's 13story building at 211 East Water St., Chicago, which it leased early in the war, and the company is moving into that building until the Evanston plant is completed.

Kaiser Purchases Eagle Mountain Iron Mine in Southern California

Will begin intensive development of body estimated to contain enough ore to supply Fontana for 50 years at present rate of operations. Deposit is 130 miles from Kaiser's mill and ore is reportedly of high quality

SAN FRANCISCO

KAISER Co. Inc. has consolidated its source of iron ore for supplying the Fontana steel mill with completion of negotiations for purchase of the Eagle Mountain iron ore mine in southern California.

Kaiser is preparing to begin an intensive development of the ore property. It is estimated that the ore body is sufficient to provide 50 years' supply at the present rate of Fontana operations.

The Eagle Mountain mine is located in Riverside county, about 130 miles from the Fontana plant. The main body covers an area seven miles long. Up to now, the U. S. Bureau of Mines, which has been testing quality of the ore, has covered about two miles of the deposit. Bureau reports show the ore of high quality, the Kaiser firm says.

Kaiser's purchase of the property brings to a close a long series of title shifts and property ownership of the mine. Eagle Mountain originally was purchased from its locators by the Harriman railroad interests as protection against nineteenth century steel operators from whom the Harriman railroads were purchasing steel rails. Subsequently, the Harriman group sold the mine to Southern Pacific Land Co.

In 1940 the property was involved in a title problem under a sales-lease commitment between Southern Pacific and Bralove Corp., the latter being controlled by E. T. Foley & Associates of Pasadena, Calif. In 1944 Southern Pacific transferred the property and the saleslease arrangement to the Kaiser Co., which has now come to terms with the Foley interests. The terms of the purchase were not disclosed.

In 1945 all California ore mines produced a total of 240,917 tons of ore, most of which went to Fontana. In 1944 production was up to 905,981 tons, but a large part of that amount went into ship ballast in the form of high iron cement and magnetic sands.

Dutch East Indies Seek Goods on West Coast

A group of Netherlands private bankers has been making a survey of the West Coast preparatory to purchases of manufactured goods in this area for shipment to the Netherlands East Indies. In addition, the Dutch are looking for additional capital to finance purchases in the U. S. until such time as exports can build up credits in this country.

Among the greatest needs, and therefore the goods which will be purchased first, are such things as cargo planes, autos and trucks, machinery and cheap textiles.

Some buying already has been done. For example, ten C-3 cargo vessels are being constructed for the Dutch on the East Coast. Joshua Hendy, of San Francisco, also recently signed a contract for manufacture of hydraulic machinery which will be shipped to the Indies.

Low Bids Announced for Columbia Basin Project

SEATTLE

Recent bids taken by the government for proposed work on the Columbia Basin project cover three phases of the project: an irrigation canal; the Bacon Coulee reinforced concrete pipe siphon, 23.3 feet in diameter and 1000 feet long; and the Bacon tunnel, 23.3 feet diameter and 2 miles long. Lowest bidders on these projects were: C. C. Connally Inc., San Francisco, \$3,537,820 for the concrete pipe siphon; and J. A. Terteling & Sons, Boise, Idaho, \$971,990 for the irrigation canal and \$576,070 for the Bacon tunnel project.

Other low bids for the project which have been announced are: Seattle Bronze Co., Seattle, \$21,573, aluminum doors and window frames for the Coulee power house; Worthington Pump Co., Harrison, N. J., \$19,800, two pumps and motors; and Morgan Engineering Co., Alliance, O., \$264,234, two 350-ton traveling cranes.

New Industrial Relations Body Quartered at UCLA

The Institute of Industrial Relations, an agency created last year by the California Legislature, moved into new offices in Los Angeles recently. Quarters are at the University of California campus and the operation, aimed at protecting industrial peace, will get into full swing by July 1.

Dr. Paul Dodd, professor of economics at the Los Angeles campus of the University and an industrial relations expert, will head the southern California office. The state has appropriated \$100,000 for two years' operation of the industrial relations agency.



POWERHOUSE: Technicians watch as the combined power of more than 12,000 horses sends a hurricane across Northrop Field at Hawthorne, Calif., during first tests on the Northrop Flying Wing XB-35 bomber. The 4-bladed propellers are driven by 3000-plus-horsepower engines. NEA photo

WEST COAST

Wason Charges Administration Lacks Program

NAM president tells West Coast group government has adopted CIO economic platform as its own

LOS ANGELES

THREE "roadblocks" are retarding national prosperity, Robert R. Wason, president of the National Association of Manufacturers, told a meeting of southern California industrialists here last week. He named the blocks as:

Production-hindering OPA controls.

Continuing inflationary fiscal spiral based on deficit spending.

"Partisan labor program of the CIO, adopted by the administration as its own."

Mr. Wason warned of the possibility of a United States dictatorship and said, "freedom is as surely our goal now as it was in 1776. The danger is real and it is imminent."

"Never," he told his audience, "was the prospect for prosperity greater than on V-J Day. Now, almost nine months later, the nation, which ought to be creating a better living for all, suffers convulsions and multiple shortages because the administration has abandoned equity and justice for controls, partisanship and deficits.

"Washington administrators have no economic platform of their own. They have adopted that of the CIO in exchange for political support."

At the same meeting, delegates to the conference from 11 western states were told by Walter B. Weisenburger, NAM executive vice president, that they are "lousy salesmen" when it comes to selling free enterprise to the public.

"It is time to get your courage up and stick your chin out," Mr. Weisenburger said. "Businessmen are in a favorable light just now. The public knows the miraculous record made by industry in the war. Your speedy reconversion, while the government dallies, is impressive. You are being hailed as the job-makers of peace. Now is the time for public relations selling."

Gold Output Declines Due to High Labor Costs

SAN FRANCISCO California's gold industry, in prewar

the bulwark of its mining, continues



PREFER COMPENSATION TO JOBS: E. M. Nelson, Culver City, Calif., employer who has been unable to obtain sufficient labor, "pickets" the USES office in Los Angeles with a sign imploring collectors of unemployment compensation to take jobs offered by him and other employers co-operating in his free employment agency. Out of 150,000 jobless now collecting unemployment compensation in Los Angeles county, only four could be persuaded to take jobs

to show production declines because of the narrowing margin of profit. The price of gold is fixed at \$35 an ounce, but there is no ceiling on costs and operating expenses have been mounting sharply. Labor costs are the biggest factor in the increase, although the higher expense in providing materials and equipment to replace that which went into disuse during the wartime shutdown also has been a considerable factor.

As a result of the slump in gold mining, the production of nonmetallic minerals has been overshadowing gold in recent months. These include such materials as potash, pumice, limestone etc.

Commenting on this situation, Walter Bradley, chief of the California Division of Mines, said, "gold ultimately will come back into its own, but at present emphasis is on nonmetallics."

Mr. Bradley pointed out that produc-

tion of nonmetallics reached new highs in wartime and the expansion in California's manufacturing industries is creating new demands in postwar.

Barringer Predicts Further Industrialization of Coast

SEATTLE

Further industrialization of the West Coast area was predicted by E. C. Barringer, president, Institute of Scrap Iron & Steel Inc., during his recent tour to survey the scrap situation. Mr. Barringer said that the Pacific Coast is the lowest market in the country and added that the situation is decidedly firm. Large amounts of cheap power, plus the low local prices for scrap, he said, should be strong factors in further growth and development here.



John L. McCaffrey, first vice president, International Harvester Co., Chicago, has been elected president, succeeding Fowler McCormick who has been advanced to chairman. Judson F. Stone, former chairman, has resigned, but will continue as a director and a member of the executive committee. The office of chairman of the executive committee was discontinued, but Sydney G. McAllister, formerly chairman, will continue to serve as a member of the committee and as a director. The changes are part of the general streamlining of top executive positions begun two years ago when the company adopted the divisional form of organization. Under the new setup, Mr. McCormick will be chief executive officer and Mr. McCaffrey, chief operating officer. Offices of first and second vice presidents have been abolished, being replaced by two executive vice presidents to assist Mr. McCaffrey, and they are held by W. E. Worth, formerly second vice president, and P. V. Moulder, formerly vice president in charge of the Motor Truck Division. W. C. Schumacher, motor truck sales manager, succeeds Mr. Moulder and has the new title of general manager.

W. J. Adamson has been appointed general manager of sales, Allegheny Ludlum Steel Corp., Brackenridge, Pa. Mr. Adamson, with the company since 1936, has been serving as assistant sales manager in charge of carbon and magnetic steel sales.

E. J. Dalton has been named president, Yates-American Machine Co., Beloit, Wis., succeeding Alvin Haas, resigned. Wallace D. Johnson has been named vice president and works manager; F. J. Oberlander, vice president and general sales manager; and C. H. Kelly, vice president in charge of sales in the Southern Division. Mr. Dalton has been associated with the company for the past 17 years, and for the past five years he has served as chairman of the board of directors.

Ernest R. Breech has been elected a director and executive vice president, Ford Motor Co., Dearborn, Mich. His election to the board fills the vacancy created by the death of Frank Campsall.

-0.

Mr. Breech is resigning as president, Bendix Aviation Corp., Detroit, and will ioin Ford July 1. Mr. Breech has served as president of Bendix since February, 1942, and has been a director and a member of the executive committee since 1937. He will remain a director of Bendix for the balance of the year.

L. W. Graaskamp has been appointed general sales manager, American Can Co., New York. Mr. Graaskamp joined the company in March, 1920, and since 1944 has been assistant general sales manager.

-0-

Chester Hoist Co., Lisbon, O., previously the Chester Mfg. Co., announces the election of the following as officers: President, Hal F. Wright; vice president, Mary T. Wright; and secretarytreasurer, Harry E. Hill.

Malcolm P. Ferguson, South Bend, Ind., has been elected president, Bendix Aviation Corp., Detroit, to succeed Ernest R. Breech, who has resigned to become associated with Ford Motor Co. Mr. Ferguson has been a director and vice president of the company, and group executive in charge of its divisions producing automotive and aircraft equipment. Prior to purchase of the company by Bendix in 1929, Mr. Ferguson was president, Eclipse Machine Co., Elmira, N. Y.

Gordon E. Jones, for the past 27 years resident manager, Bessemer, Ala., plant, United States Pipe & Foundry Co., Burlington, N. J., will retire May 31. He has been associated with the company since its organization in 1899.

Bryant Glenny has been named general manager, Scientific Instrument Division, Buffalo, American Optical Co., Southbridge, Mass. Mr. Glenny succeeds Heywood Fox, who is returning to the company's headquarters in Southbridge. George A. Potter succeeds Mr. Glenny as manager, Finance & Accounts Division, Buffalo.

Thomas H. Fawcett has been named sales engineer for the Locomotive Division, Vulcan Iron Works, Wilkes-Barre, Pa. Mr. Fawcett previously had been



PAUL M. JOHNSON

associated with the Baldwin Locomotive Works, Eddystone, Pa., and during the 30 years with that company had served successively as draftsman, designer, engineer and sales engineer.

Paul M. Johnson, assistant superintendent of the open hearth department, Campbell plant, Youngstown Sheet & Tube Co., Youngstown, has been appointed superintendent of the company's Brier Hill open hearth department. Mr. Johnson succeeds William J. Reilly, who left the Youngstown Sheet & Tube company to join the Ford Motor Co., Dearborn, Mich. Charles E. Deterding has been named to succeed Mr. Johnson as assistant superintendent of open hearths at the Campbell plant.

Thomas B. Cunningham, recently released from the Navy, has rejoined the Luria Steel & Trading Corp., New York. Prior to his naval service, Mr. Cunningham had served four years as a purchasing officer of the carbon and steel departments, French Purchasing Mission, and later with the British Purchasing Mission.

-0-

Don L. Brenneman has been appointed plant manager, Pittsburgh Reflector Co., Pittsburgh, with headquarters in Irwin, Pa. Formerly he was affiliated with the Grove City, Pa., plant, Cooper-Bessemer Corp.

-0-

-0-

Douglas James has been appointed foundry superintendent of the Grove City, Pa., plant, Cooper-Bessemer Corp., Mt. Vernon, O. Mr. James was formerly assistant foundry superintendent, Erie City Iron Works, Erie, Pa.

Charles A. Marshall has been named general manager, Iron & Steel Products Inc., Chicago.

Robert Wardrop has been appointed assistant manager of glass advertising



IN FAVOR OF EVERLASTING FASTENINGS

Here's the score. 10 or more reasons for using everlasting fastenings . . . just 1 for common steel. An amazing combination of advantages in favor of non-ferrous and stainless bolt and nut products . . . only lower first cost in favor of common steel. Check the list against your own fastening requirements. Write us for details.





Harper maintains stocks of over 4360 different items . . . large quantities of each. Others being added constantly. Specials made to order from ample stocks of new metals. Write for 104 page 4-color catalog.

THE H. M. HARPER COMPANY 2646 Fletcher Street • Chicago 18, III.

Branch offices: New York City, Philadelphia, Los Angeles, Milwaukeo, Cincinnali, Houston, Representatives in principal cities



BRASS • BRONZES • COPPER • MONEL • STAINLESS

MEN of INDUSTRY



L. E. VAIL

and promotion, Pittsburgh Plate Glass Co., Pittsburgh. Mr. Wardrop, recently released from the Army, was manager of the firm's Duluth warehouse for more than three years. Clarence E. Ralston has retired as safety director of the company. Mr. Ralston was associated with the glass company's safety department for more than 23 years.

L. E. Vail has been named sales representative for northern Ohio, Titan Metal Mfg. Co., Bellefonte, Pa. Mr. Vail will have offices in the Carnegie Hall Bldg., Cleveland.

-0-

C. M. Mense, since 1931 president and general manager, Lchigh Safety Shoe Co., Allentown, Pa., has announced his retirement, effective June 1. He will continue in an advisory capacity with the company. Frank B. Griswold will replace Mr. Mense as general manager. Mr. Griswold, recently released from the Army, has been merchandise and sales manager of the organization.

Campbell Wood has been appointed works manager of the Pacific coast plant, El Segundo, Calif., Nash-Kelvinator Corp., Detroit. Until recently, Mr. Wood was general manager of the corporation's wartime aircraft Propeller Division.

-0-

-0-

Palmer W. Holmes has been named to the newly created post of manager, public relations department, Acme Steel Co., Chicago. Recently released from the Army, Mr. Holmes was with the company for ten years before being called to active duty in 1941.

Industrial Pneumatic Tool Division, Aro Equipment Corp., Bryan, O., announces the following appointments: D. Hamilton, Toronto, Ont., division manager for Ontario; Walter Fenn, Hartford, Conn., assistant to T. F. O'Malley, New

-0



STANLEY D. MEANS

England Division manager; M. K. Bryant, assistant division manager on tools to Messrs. Clarke and Osborn, Indiana Division managers; Albert L. Roth, Denver, division manager on industrial tools, Rocky Mountain area; Gene O'Bannon, Dallas, Tex., assistant to W. F. Vogel, division manager, Texas; William Carter, assistant to W. L. Etherton, division manager, Kansas and Nebraska; Thomas Hughes, Norfolk, Va., and Dan Powers, Nashville, Tenn., assistants to J. Mc-Ewen Cherry, Nashville, Tenn., covering the southeast; and Thomas P. Kenny, assistant to A. B. Schuyl, division manager, metropolitan New York.

Stanley D. Means has been named to the newly-created post of domestic sales manager, R. G. LeTourneau Inc., Peoria, Ill. Mr. Means has been affiliated with the sales department of the company for the past 10 years, being appointed manager of its Washington office in April, 1942, and returning to Peoria in 1945 as industrial sales manager.

Alfred L. Heller Sr., vice president and general manager, Heller Bros. Co., Newcomerstown, O., is retiring after an association with the company of nearly half a century. He is being replaced by Lloyd C. Smith.

-0-

Kenneth E. Greene and William T. Campbell have been appointed to the sales staff of Dampney Co. of America, Boston. Mr. Greene has been assigned to the company's Chicago office, Mr. Campbell to the Philadelphia office.

-0-

A. H. Allen, Detroit editor for STEEL, as well as the other Penton publications, has been elected chairman of the Detroit Chapter, American Foundrymen's Association. Other officers elected include: Vice chairman, C. E. Silver, Michigan Steel Casting Co.; treasurer,



B. A. EVANS

W. W. Bowring, Frederic B. Stevens Inc.; and secretary, R. E. Cleland, Eastern Clay Products Co.

-0-

B. A. Evans has been named manager of the wheel and brake manufacturing department, B. F. Goodrich Co., Akron. The company recently purchased the Airplane Wheel & Brake Division, Hayes Industries Inc., Jackson, Mich., where manufacturing operations are being conducted. R. J. Keller has been named technical manager.

Kenneth D. Demarest has been appointed district engineer, Fluor Corp. Ltd., Los Angeles, in the company's New York headquarters. Mr. Demarest was with Griscom-Russell Co., New York.

-0-

T. P. Sands has been appointed automotive engineer, research department, Organic Chemicals Division, Monsanto Chemical Company, St. Louis.

-0-

Walter H. Dautel has been appointed manager, Wholesale Division, Diebold Inc., Canton, O. Mr. Dautel was formerly connected with Remington Rand Inc., Buffalo, for 28 years, having been sales manager of that company's Loose Leaf Division.

Charles F. Munroe has been promoted to manager of railroad sales, Eastern Division, Hewitt Rubber Division, Hewitt-Robins Inc., Buffalo. He will have headquarters in New York.

-0-

-0-

Keen Johnson, vice president, has been named director of public relations, with headquarters in Washington, Reynolds Metals Co. Inc., Richmond, Va,

Arthur W. Johnson has been promoted to assistant manager of sales, Chi-

More Speed... LONGER DRILL LIFE LONGER DRILL LIFE WITH CONTINENTAL'S WITH CONTINENTAL'S CVew DRILL CHIP BREAKER

• Faster drilling action and prolonged tool life are but two of many advantages obtained with the Continental Drill Chip Breaker. By breaking chips into small, uniform pieces that are easily carried up the flutes of the drill, clogging is eliminated. The unit can be used vertically, horizontally, or at any angle as long as the housing can be kept stationary while the drill rotates. The arm prevents rotation of the housing. Where space permits, the Continental Drill Chip Breaker can be used in multiple spindle heads. Write for Continental Bulletin 28161 today for sizes and complete specifications.

YOU PROFIT 7 WAYS WITH CONTINENTAL'S DRILL CHIP BREAKER

- GREATER SPEED—Because there is no clogging, it is not necessary to withdraw the drill to clear chips from the hole.
- 2 . PROLONGED TOOL LIFE—The free cutting action results in more holes being drilled before sharpening is necessary.
- BETTER FINISH ON HOLES—Holes are round, straight, and smooth.
 The short chips travel up the drill flutes without scratching or clogging.
- DEEPER HOLES—It is possible to drill holes many diameters deeper, eliminating the necessity of withdrawing the drill from hole to relieve chips.
- 5 . . AUTOMATIC FEED—Automatic feed can be used without the danger of drill breakage that so often results from chip-clogged holes.
- GREATER SAFETY—There are no long, whirling, spiral chips to burn hands or cut fingers.
- CLEANER OPERATION—Coolant penetrates easily to the very point of the drill; the short chips do not splash it on machine or operator.

CONTINENTALTOOLWORKSDIVISIONOF EX-CELL-,OCORPOR,ATION1200OAKMAN BOULEVARDDETROIT 6, MICHIGAN

Above: With the Continental D Chip Breaker, the chip is brok at regular intervals. Small loo chips are easily carried up t flutes. Holes are straighter, roun er, and have better wall finis

Left: With conventional drillin solid chips pack the drill flute causing scratched, out-of-roun and crooked holes. The drill mu be withdrawn repeatedly to cle flutes and avoid drill breakag

ONTINENTAL TOOL

AT. CELL-O CORPORATION

cago district, United States Steel Supply Co., Chicago. Mr. Johnson has been a salesman for the past 19 years in the company's Chicago district.

S. H. Bivins has been appointed manager, western regional industrial sales, Detrex Corp., Detroit. Mr. Bivins was divisional manager in Ohio for the company.

Fred S. Price has been named manager of the new alloy iron department, Union Spring & Manufacturing Co., New Kensington, Pa. Mr. Price was formerly with Williams & Co., Pittsburgh.

-0-

Dr. E. T. Lessig has been named manager of textile control, Tire Division, B. F. Goodrich Co., Akron. He joined the company in 1931. Emory F. Smith has been appointed sales manager for plastics, International B. F. Goodrich Co., a division of the Goodrich company.

James Holan has resigned as a director and board chairman, American Coach & Body Co., Cleveland, but will continue to serve the company in an advisory capacity until October, 1947. Mr. Holan was founder of the company and served as its president 37 years.

-0-

E. B. Carpenter has been named district sales manager of the St. Louis office, American Car & Foundry Co., New York, succeeding L. W. Martin who has retired. Mr. Carpenter had been a sales agent at the company's St. Louis office since 1941.

David M. Ramsay has been appointed manager, Industrial Division, National Radiator Co., Johnstown, Pa. Mr. Ramsay has been with National Radiator for five years, having served as field engineer in the Boston office, assistant

-0-

manager, Industrial Division, and assistant to the manager of the Heating Division, in charge of specialty sales.

Thornton K. Stokes has resigned as executive vice president, Clyde Porcelain Steel Corp., Clyde, O., effective June 1. Mr. Stokes has been associated with the company since 1938.

| | | n |
|---|---|----------|
| - | - | |
| | | × |

Glenn F. Loud, general production superintendent, and Alexander W. Pound, purchasing agent, Harrison Radiator Division, Lockport, N. Y., General Motors Corp., have resigned. Mr. Loud, with the division for 28 years, is entering the manufacturing business in Middleport, N. Y., and Mr. Pound, with the company 18 years, is resigning because of poor health.

-0--

Edward C. Moore, chairman and treasurer, Erie City Iron Works, Erie, Pa., is resigning effective June 1. Mr. Moore has been with the company for more than 60 years.

-0--

Rose Miller has been appointed manager of the Pacific Coast factory in San Francisco, Gar Wood Industries Inc., Detroit.

-0-

George R. Wernisch, recently returned from the Navy, who has been serving as assistant manager, Concrete Engineering Division, Ceco Steel Products Corp., Chicago, has been appointed manager of the firm's Steel Joist & Roof Deck Division.

Carl S. Ablon recently released from the Army, has been named office manager, Cleveland office, Luria Bros. & Co. Inc., Philadelphia.

-0-

-0-

T. Hoyt Prater, purchasing agent, McWane Cast Iron Pipe Co., Birmingham, has been elected president, Purchasing Agents Association of Alabama.



DAVID M. RAMSAY



T. HOYT PRATER

Other officers elected include: C. T. Moates, first vice president; H. A. Wilson, second vice president; Newman M. Yeilding, treasurer; and Charles R. Cornic, secretary.

James L. Foster, metallurgical engineer, has joined the staff of Battelle. Memorial Institute, Columbus, O., where he will be engaged in research in welding technology. For five years Mr. Foster was a private consultant in metallurgical engineering, with offices at Berkeley, Calif.

-0-

Cleveland Chapter National Association of Cost Accountants elected the following officers at its recent annual meeting: President, II. B. Lawyer, comptroller, Forest City Products Inc., Cleveland; vice presidents, R. S. Frownfelter, Warner & Swasey Co., Cleveland, and R. J. Ferree, Lubri-Zol Corp., Wickliffe, O.; secretary, F. R. Wagner, National Screw & Mfg. Co., Cleveland; and treasurer, E. R. Ohl, Independent Explosives Co., Cleveland.

Alwin A. Gloetzner has been selected to head the new southeastern territory for New Departure Division, Bristol, Conn., General Motors Corp. Mr. Gloetzner had been in charge of New Departure's Washington office.

-0-

William L. Jenkins has been appointed manager of the recently created electronic applications development department, B. F. Goodrich Co., Akron.

-0-

0

Stanley E. Wolkenheim, recently released from the Navy, has been appointed sales manager, Water Heater Sales Division, Edison General Electric Appliance Co., Chicago.

-0-

Hood Worthington has been appointed assistant director of the recently organized engineering research section, Rayon Technical Division, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del. For the past three years, Mr. Worthington has been on assignment at the Hanford Engineer Works which the Du Pont company operates for the government.

Harry Monson has been appointed special adviser on trade relations, Chicago area, Ansco Division, General Aniline & Film Corp. Mr. Monson was district manager for Ansco in Chicago.

-0-

-0-

Columbus Chapter, American Society for Metals, elected the following officers at its annual meeting: Chairman, Charles Lucks, Battelle Memorial Institute, Columbus, O.; vice chairman, Walter Hobbs, Ranco Inc., Columbus;

MEN of INDUSTRY



M. G. SEDAM Wha is vice president in charge of research and production, Alloy Rods Co., Yark, Pa., noted in STEEL, May 20 issue, p. 104.

treasurer, Dr. Mars G. Fontana, Ohio State University, Columbus; and reelected secretary for his tenth term, R. Ernest Christin, Columbus Bolt Works Co., Columbus.

-0-

George P. Torrence will rejoin Link-Belt Co., Chicago, on July 1, as executive vice president. He will become president of the company on Nov. 1, when William C. Carter retires from . office. Mr. Torrence was with Link-Belt Co. from 1911 to 1936, at which time he resigned as president. Since 1936

OBITUARIES

R. F. Devine Jr., 58, president, Erie Forge Co., Erie, Pa., died May 21 at his home in that city. He became president and treasurer of the company and its subsidiary, Erie Forge & Steel Co., following his father's death in January, 1928.

Frederick J. Wilson, 69, retired secretary and director, Arma Corp., Brooklyn, N. Y., died May 20 in Bronxville, N. Y.

-0-

-0-

Ernest A. Houchin, 78, president, Houchin Machinery Co., Hawthorne, N. J., died May 20 at Ridgewood, N. J.

Rea T. McKee, 55, Chicago representative, Canton Stamping & Enameling Co., Canton, O., died May 15 in Chicago.

-0-

Roy Somers, 66, assistant secretary and assistant treasurer, Petroleum Equipment Co., Los Angeles, a subsidiary of Bethlehem Steel Co., died May 14 in Los Angeles. Mr. Somers had been as-



Who has been awarded the Bessemer Gold medal for 1946, British Iron & Steel Institute, noted in STEEL, Apr. 29 issue, p. 83.

he has been vice president and general manager, Rayon Machinery Co., Cleveland, a subsidiary of Industrial Rayon Corp., and president, Cleveland Pneumatic Tool Co., Cleveland. The board of Link-Belt created an executive committee consisting of directors Howard Coonley, Russell Livermore and W. C. Carter. Mr. Carter is chairman.

James M. Underwood has been elected president, Vulcan Mold & Iron Co., Latrobe, Pa. During the greater part of the 1930s, Mr. Underwood served as



E. J. HANLEY

Who recently was elected vice president, finance, Allegheny Ludlum Steel Corp., Brackenridge, Pa., noted in STEEL, May 13 issue, p. 82.

assistant secretary-treasurer and assistant to the president, Vulcan company. More recently he has been president, Halund Co., Latrobe. He succeeds Edward R. Williams, resigned.

-0-

L. W. Stolte has been elected secretary, Fairbanks, Morse & Co., Chicago, replacing Fred C. Dierks, who retired recently after 45 years' service. Mr. Stolte has been associated with the company since 1928, and since July, 1945, has been general credit manager, which position he holds in addition to his duties as secretary.

sociated with the Equipment company since 1923.

Leonard S. Webb, 69, vice president and treasurer, Webb Wire Works Inc., New Brunswick, N. J., died recently.

Elmer A. Gullberg, 57, director of industrial relations, Deere & Co., Moline, Ill., died May 17 in that city. He had been associated with the farm equipment industry 40 years.

Walter A. Bonitz, 71, president, Crescent Brick Co., Pittsburgh, and at one time president, Pressed Steel Car Co. Inc., Pittsburgh, died recently in that city.

Alfred C. Davis, 70, president and general manager, Marlin-Rockwell Corp., Jamestown, N. Y., died May 17 at his home in Stow, N. Y. Mr. Davis also was a member of the board, Erie Railroad. --0-

Arthur E. Frankel, 28, chemical engineer, who during the war was in charge of the laboratory of the National Bronze & Aluminum Foundry Co., Cleveland, died recently in a Chicago hospital.

James Eastwood, 78, president, Benjamin Eastwood Co., Paterson, N. J., died May 14. Mr. Eastwood became president of the company in 1899.

-0-

Charles Gordon, 76, retired mechanical engineer, inventor and president of the former Gordon Form Lathe Co., Milwaukee, died May 17 in that city.

Alfred J. Diescher, 70, president, Diescher Coating Corp., Bronxville, N. Y., died May 15 in that city.

-0-

William P. Shipman, 58, who resigned in 1945 as works månager, Blaw-Knox Co., Pittsburgh, died recently in that city.

John O. Hill, 66, manager of the Warehouse Division, American Brass Co., Chicago, died May 16 in Glencoe, Ill. Mr. Hill had been associated with the company more than 46 years.

Sumner A. Parker, 64, who retired as president in 1938, Armstrong & Parker, Baltimore, died in that city May 17.

-0-

ELECTRONIC MELTING FURNACE FACILITATES...

injection molding of s

Electromagnetic force released by high-frequency coil in melting chamber insures homogeneity of alloys. Simple, high-speed process for products weighing up to 15 pounds



Fig. 1-Schematic diagram shows location of essential parts of press

Fig. 2—This fore and aft view of Hisgen steel injection press shows stationary platen and injection nozzle in foreground, with hopper, tie bars and injection cylinder in the background

Fig. 3—Side view of the press. All working parts are enclosed for protection of operator By S. M. MILANOWSKI Consulling Engineer Los Angeles



WITH the aid of electronic heating apparatus, it is now possible for steel processors to take advantage of injection molding.

Injection molding may prove to be an economical method of fabricating many small parts because it necessitates the use of comparatively simple equipment, and because it is a high-speed process. But it never previously was suitable for the manufacture of steel products, because there were no entirely dependable means of controlling the temperatures of molten metals within the die cavity of the press.

When plastics are injection-molded, temperature control is comparatively unimportant because most plastics melt at less than 700° F. But steels melt at temperatures of thousands of degrees and, for this reason, it is impossible to prevent injection molding dies from being "burnt out" after only a few operations when there is no way to maintain the steel to be molded at its lowest possible flow temperature.

The essential mechanism which accomplishes the injection molding of steel is a press, Fig. 2, developed by Hisgen Machine Tool Works, Los Angeles, Calif., and Cincinnati, O. Its overall specifications are approximately as follows:

COIL

 i Ti jin

CRUCIBLE





May 27, 1946

| Height | 5 ft |
|--------------|---------------|
| Width | 4 ft |
| Weight | 7 tons |
| Construction | All-steel |

If it were not equipped with Ajax-Northrup high-frequency, or coreless, induction heating apparatus, it would be much the same as the presses used to injection-mold plastics. However, due to the nature of the materials it was designed to fabricate, it is much more expensive than the average plastic injection press.

Molten steel is fed into its injection tube hopper by means of a tilting furnace, in which the induction heating apparatus has been incorporated. Then it is forced from the injection tube into a closed mold by actuating a suitable ram with hydraulic pressure from an injection cylinder, Fig. 2.

The injection nozzle, through which the molten steel is forced into the mold, has a diameter of %-in. and the plunger or ram, to which hydraulic pressure is applied, has an 18-in. stroke and a face which conforms to very close tolerances with the inside dimensions of the nozzle in order to prevent clogging and a waste of materials. Because of the high temperatures (absolute minimum of 2800° F) that must be withstood by these units, the ram has a tungsten-carbide tipped face and the nozzle, Fig. 2, is made from Westinghouse high chromium heat (HCH) steel.

Molds or dies are made from drop-forged steel, and the respective parts are mounted on fore and aft platens in the press. The front platen, which contains the injection nozzle, is stationary; the rear platen, which supports the cavity block, is movable and equipped with an ejector bar which will throw finished pieces into a suitable chute.

The aft platen is moved so as to open the mold by means of a hydraulic clamping cylinder, which has a telescoping rim. Alignment of platens is maintained by the tie bars.

Except for the clamping and injection cylinders, all parts of the hydraulic apparatus are installed in the base of the press. These include a 120-gal hydraulic fluid tank (*Please turn to Page* 128)

TAP SWITCHES

Fig. 4—Diagram of magnetic field and stirring action on molten charge in furnace

Fig. 5—Cross-sectional sketch shows how Ajax-Northrup tilting furnace is lined

Fig. 6—Schematic diagram of electrical setup for Ajax-Northrup furnace

FIXED

CONDENSERS CONDENSE

87

CONTACTOR

VARIABLE

| | | COMPOSITION | OF HIGH TEMPERA | TURE ALLOYS | | | 1.1 |
|--|--|---|--|--|--|---|---|
| laynes Stellite Co. Name Commonly called - ID RC Reference | HS-21 Vitallium NR-10 | HS-23 61 NR-60 | HS-27 6059 NR-63 | HS-30 422-19 NR-12 | X - 40 | Multimet N-155 NR-21 | N-153 |
| | Cr- 28.0 Mo 6.0 Co bal. C 0.20-0.30 | Same as #21 except W instead of Mo C- 0.40-0.50 | Same as #21 except 1/2 of Co replaced with Ni C- 0.40-0.50 | Same as #21 except 1/4 of Co replaced with Ni C- 0.40-0.50 | Same as #23 except 7.5% W and 12% of Co replaced with Ni C- 0.40-0.50 | Cr- 20.0 Co 20.0 Mi 20.0 Mo 3.0 W 2.0 Cb 1.0 N 0.14 C 0.10-0.20 or C 0.25-0.35 | Cr- 16.0 Co 13.0 Ni 15.0 Mo 3.0 W 2.0 Cb 1.0 N 0.14 C 0.10-0.2 or C 0.25-0.3 |

TABLE T

Cobalt-Base

HIGH TEMPERATURE ALLOYS

 maintain high strength and hardness at red heat and maximum resistance to wear, heat, corrosion and erosion

PHYSICAL property data just made available for a number of high temperature alloys used in wartime applications such as gas turbines and superchargers indicate that a number of peacetime uses are in prospect. In fact, both gas turbine and supercharger applications are continuing since the close of the war.

Outstanding characteristics of these cobalt-nickel alloys, as will be noted by referring to the accompanying tables, are their resistance to wear, heat, corrosion and erosion. Four of these alloys are modifications of Vitallium of which 24,-000,000 turbo-supercharger bucket blades were precision cast during the war by Haynes Stellite Co., Kokomo, Ind. Millions of blades also were made by other companies. The I-40 jet engine of the transcontinental record-breaking plane used gas turbine blades cast of this 65 per cent cobalt alloy.

Optimum carbon lies at 1.00 up to 1.20 per cent, in cast Ni-Cr-Co-Fe alloy groups, depending on alloying elements and quantities added to base composition, Massachusetts Institute of Technology

| | the second s | | | |
|-------------------|--|-------|----|--------------------|
| | TABI | LE II | | 1.000 |
| | DENS | SITY | | |
| Materia | <u>al</u> | | | gm/cm ³ |
| Hastel Multime | loy B | | 4 | 9.24 8.1985 |
| Haynes | Stellite | No. | 21 | 8.2986 |
| Haynes | Stellite | No. | 23 | 8.5385 |
| Haynes | Stellite | No. | 27 | 8.2077 |
| X-40 | | | | 8.6078 |
| | | | | |

By L. E. BROWNE Associate Editor, STEEL

finds after tests on composition and treatment of alloys for use in gas turbines operating at 1500° F.

Report covers 3 years of research, testing both rupture and creep at 1500-1600° F the following materials: Thirtyseven low carbon forging grades of high temperature, high strength alloys of the nickel-chromium-iron and nickel-chromium-iron base types; 80 cast alloys of the same type with generally much higher carbon content; 37 cast alloys of the Vitallium type with small composition variations. Metallic and x-ray examinations of the alloys also were made for various treatments. Study was made of heat treating variables on the rupture life and ductility of the alloy systems. Optimum preheat temperatures for the best all around alloy performance were determined.

Besides citing the best alloys found among the materials tested, the report concludes:

- High temperature strength is increased by the addition of carbon in all systems investigated.
- The best Ni-Cr-Co-Fe base alloy showed less deterioration that the best cobalt-chromium-molybdenum alloy in going from 1500 to 1600° F.
- The best heat treatment for cast nickel-chromium-cobalt-iron base alloys is heating to 2260° F. followed by water quenching.

Aging may or may not help high temperature strength.

- Tantalum seems a better alloying element than columbium.
- Nitrogen improves the strength and ductility in certain of the alloys, especially when tested at creep stresses.
- Polishing the surface of test samples will improve the strength of Ni-Cr-Co-Fe base alloys.

These alloys are now available commercially in grades that possess high hardness and strength (Table IV) even at red heat; good resistance to creep, (Table V), high stress-rupture properties (Table VI), resistance to both atmospheric and chemical corrosion, and in addition have a low coefficient of friction. As a result of the metallurgy war-born for the rubber, petroleum, and chemical industries and for such critical items as the radar-carrying shell, supercharger, gas turbine, and the jet engine, the metalworking industry and design engineer have obtained new materials which should open the way to new applications and more satisfactory service in present methods, processes and equipment.

Several of these alloys can be forged or rolled; Vitallium can be rolled while Multimet can be both forged and rolled. However, the four modifications of Vitallium (HS-23, HS-27, HS-30 and X-40) are primarily pressure cast metals. Operating temperatures under high stress are approximately 1500° F, but the limit tends to climb as efficiency requirements mount. These Haynes Stellite cobalt-base metals are almost nonmagnetic, take and retain a high polish and offer a range of ductilities through the selection of grade. While maximum operating temperatures are now approxi-

88
| A | | 1000 | TABLE III | 11 | - | | Contract of | | |
|------------------------------|------------------------------|---|--------------------------------------|------------------------------|--------------------------------|------------------------------------|----------------------------|--------------------------------|--------------------------------|
| | Mean | THERN Thermal Expansion | MAL EXPANSION C n Coefficient - | OEFFICI | <u>ENTS</u> r in. pe | er ^o F x 10 | 0-6 | | |
| Material | <u>70-600°</u> | <u>F 70-800° F</u> | <u>70-1000° F</u> | 70- | -1200° F | 70 | 1500° F | 70-1600 | <u>0° F</u> |
| Multimet | 7.96 | 8.30 | 8.46 | | 8.58 | 9 | .01 | - | |
| Multimet (low C) | 8.70 | 8.89 | 9.10 | 9 | 9.40 | 9. | .77 | 9.90 | |
| H.S. No. 21 | 7.83 | 7.96 | 8.18 | 1 | 8.38 | . 8. | .68 | - | |
| H.S. No. 23 | 7.64 | 7.96 | 8.18 | 1 | 8.48 | 9. | .24 | - | |
| H.S. No. 27 | 7.53 | 7.79 | 8.04 | ŧ | 8.29 | 8. | .67 | 8.84 | |
| X-40 | - | | | | - | | - | - | |
| H.S. No. 30 | 7.70 | 7.86 | 7.91 | 8 | 8.07 | 8, | .42 | 8.54 | |
| | | "Further and the second | TABLE IV | | | | | | |
| | | AGE HAR | DENING DATA - H | a VALUE | <u>s</u> | | | | |
| Material | As Cast | Sol. Treated | Aging. Temp. ° F | <u>1 hr</u> | <u>2 hr</u> | <u>5 hr</u> | <u>24 hr</u> | <u>50 hr</u> | <u>100 hr</u> |
| Multimet (forged) | 61 61 | 60 (Not ht. tr.) | 1500 1500 | 64 65 | 63 65 | 63 64.5 | 62.5 64 | 62 63.5 | 62.5 63 |
| Multimet (low C) (forged) | 61 61 | 56 (Not ht. tr.) | 1500 1500 | 56 62 | 56.5 | 57 62 | 57.5 61.5 | 57.5 62 | 59 62 |
| H.S. No. 21 | 65 65 67 64.5 65 | (Not ht. tr.) """""""""""""""""""""""""""""""""""" | 1350 1500 1600 1600 1700 | 65 67 69 67.5 66 | 66 67 69 67.5 66.5 | 66.5 68 68.5 67.5 67.5 | 68.5 69 68.5 67.5 | 69.5 69 69 68.5 68 | 71.5 71 70 68.5 69 |
| H.S. No. 23 | 65 | (Not ht. tr.) "" " | 1350 1500 1600 1700 | 66 70 68 68 | 68 69.5 68 68 | 69.5 70 67.5 69 | 71 70 68.5 69 | 71.5 69.5 69 69 | 71.5 69 69.5 71 |
| H.S. No. 27 | 61 59 59.5 61 | (Not ht. tr.) "" " | 1350 1500 1600 1700 | 62 65 62.5 62 | 66 64.5 62.5 62.5 | 66.5 65 62.5 63 | 67 65 62.5 63.5 | 67.5 64.5 64 64 | 67.5 65 64.5 66 |
| I-40 | 64 64 64 | (Not ht. tr.) | 1500 1600 1700 | 66 66.5 67 | 69.5 67.5 68 | 70 67.5 69 | 69.5 67 68.5 | 70 68 69.5 | 70 70 71 |
| H.S. No. 30 | 65.5 65.5 65.5 | (Not ht. tr.) " | 1500 1600 1700 | 69 68 67.5 | 69.5 68.5 68.5 | 69.5 69 69 | 70.5. 69 70 | 71 70 70 | 73 72 72 |

1700 TABLE V

ENDURANCE PROPERTIES Specimens Stressed in Alternate Bending at Frequency of 120 cycles/sec. (Tests by Westinghouse Electric Corp.)

| 0 | Test | Heat Treatme | nt | Endurance Strength, PSI | | | |
|-------------------|--------------------|---|--------------------------------|---------------------------|---------------------------------|--|--|
| Cast Allovs | Temp. | Solution Treatment | Aging | At 10 ⁰ Cycles | At 2.5 x 10 ⁰ Cycles | | |
| H.S. No. 21 | Room 1200° F | None 11 | None " | 35 - 40,000 44,000 | | | |
| | 1500° F | " | n - | 33,000 | | | |
| H.S. No. 23 | 1200° F 1500° F | H H | 11 11 | 44,000 38,000 | 38,000 | | |
| H.S. No. 27 | 1200° F 1500° F | 11 11 | 11 11 | 41,000 31,000 | 30,000 | | |
| Forging Alloys | + | | | | | | |
| Hastelloy "B" | 1200° F 1500° F | 2000 ⁰ , H ₂ O Quenched 2050 ⁰ , Air Cooled | 4 hr-1200° F 24 hr-1900° F | 66,000 34,000 | 64,000 | | |
| Multimet (Low C) | 1200° F 1500° F | None # | 50 hr-1200° F 50 hr-1500° F | 66,000 33,000 | 32,000 | | |
| Multimet (High C) | 1500° F | 2200° F, 1 hr, H ₂ O Quenched | 50 hr-1500° F | 29,000 | 28,000 | | |

mately 1500°F, still higher temperatures and consequent high efficiencies would be desirable and probably will be used as designing engineers improve designs and better understand the potentialities of the new materials being made available.

Precision casting by pressure for intricate shapes with metals of melting points too high for die casting has gone far since techniques were first developed for turbo-supercharger buckets. They are cast so close to size that a minimum of machining or grinding is required. Physical properties of parts now being designed are improved by employment of the new high temperature alloys which were not formerly considered or available.

The group of alloys noted for tensile strength and hardness at high tempera-90 Data included in this presentation have been taken from (1) O.S. R.D. Reports for N.D.R.C. Project NRC-8 "Heat Resisting Metals For Gas Turbine Parts," from (2) N.A.C.A. Reports on Research on Heat Resisting Alloys, and (3) from the files of the Haynes Stellite Co. and the Union Carbide and Carbon Research Laboratories Inc.

tures is increased by the addition of several types in varying grades, most of which present problems in machining, grinding, forging and other fabricating practices. Development of Multimet (N-155), among the newest of these alloys, is the outgrowth of the need of a super alloy for parts of small size dimensionally capable of holding limits under high stress and temperature. Inasmuch as this alloy is forgeable, its application is increasing on a broadening scale for severe working requirements.

Specification ranges are expanding in cobalt, nickel, iron, stainless and other high temperature precision casting alloys. A soft metal die is used at Kokomo for the many intricate shapes. Castings up to $10 \times 12 \times 5$ in., with larger parts possible for simpler shapes, are being produced; maximum weight of the casting depends on how the metal must be poured. If the metal is gravity poured, weight is limited only by dimensional limits; if pressure casting is desirable, the maximum weight for the finished part

(Please turn to Page 132)

| | | | TABLE VI S | HORT TIME TE | NSILE PROPER | TIES | |
|-------------|--|---|---|---|---|---|---|
| Material | Test Temp. ^o F | Ultimate Tens. Str. | Yield Str. Offset 0.2% | % Elong. in 2" | % Red. | Modulus of Elasticity | Test Condition Material |
| H.S. No. 21 | Room 1000° 1200° 1200° 1350° 1500° 1500° 1600° 1700° 1700° 1800° 1800° | 101,300 69,100 86,200 74,200 89,300 79,300 59,000 41,600 42,500 | 82,300 39,100 74,400 38,000 71,300 61,500 49,000 32,800 - - - | 8.2 16.4 1.2 15.7 2.0 3.8 6.8 19.3 27. - 35. 49. | 9.0 25.3 4.3 36.9 6.0 9.0 19.7 23.6 52.4 - 52.4 63.1 | $\begin{array}{c} 33.3 \times 10^{6} \\ 35 \times 10^{9} \\ 33.7 \times 10^{9} \\ 23.9 \times 10^{9} \\ 24.2 \times 10^{9} \\ 16.8 \times 10^{9} \\ 15.4 \times 10^{6} \\ - \\ - \\ - \\ - \\ - \\ - \end{array}$ | As cast Aged 50 hr @ 1350° F As cast Aged 50 hr @ 1350° F " " As cast Aged 16 hr @ 1700° F As cast Aged 16 hr @ 1700° F |
| H.S. No. 23 | Room 1000° 1000° 1200° 1200° 1350° 1500° 1600° 1700° 1800° 1800° | 105,400 77,100 97,500 82,900 97,500 79,600 58,500 45,800 37,500 43,600 33,100 33,000 | 58,400 41,400 72,500 40,700 74,700 63,100 40,600 33,100 - - - | 7.0 14.8 1.7 15.6 1.8 2.0 7.8 9.8 7. 18. 32. 27. | 11.2 24.1 4.1 21.5 6.6 6.5 12.7 16.8 35.7 35.7 40.6 39.5 | - 27.9 x 106 27.6 x 106 33.5 x 106 25.0 x 106 27.0 x 106 23.5 x 106 21.9 x 106 - - | As cast As cast Aged 50 hr @ 1350° F As cast Aged 50 hr @ 1350° F " " As cast Aged 16 hr @ 1700° F As cast Aged 16 hr @ 1700° F |
| H.S. No. 27 | Room 1000° 1200° 1350° 1500° 1600° 1700° 1700° 1800° 1800° | 82,500 50,500 48,900 66,200 51,200 41,400 43,000 45,400 33,400 33,700 | 46,900 36,600 35,000 50,800 38,200 30,800 - - - - | 7. 4.3 3.8 3.2 10.1 11.5 23. 16. 24. 26. | 10.3 10.3 8.0 4.6 14.4 20.1 26.5 34.0 50.3 41.7 | 26.2 x 10 ⁶ 27.0 x 10 ⁶ 20.2 x 10 ⁶ 18.7 x 10 ⁶ 18.2 x 10 ⁶ - - | As cast As cast Aged 50 hr @ 1350° F " " As cast Aged 16 hr © 1700° F As cast Aged 16 hr @ 1700° F |
| X-40 | Room 1000° 1200° 1350° 1500° 1600° | 101,000 80,100 77,000 75,700 59,600 48,600 | 74,100 40,200 37,600 53,600 44,500 36,200 | 11.0 20.0 19.0 4.6 10.3 14.3 | 14.0 33.5 28.4 7.6 14.1 18.1 | $ \begin{array}{r} - \\ 33.5 \times 10^{6} \\ 22.8 \times 10^{6} \\ 23.9 \times 10^{6} \\ 19.3 \times 10^{6} \\ 19.0 \times 10^{6} \\ \end{array} $ | As cast As cast As cast Aged 50 hr @ 1350° F " |
| H.S. No. 30 | Room 1000° 1200° 1350° 1500° 1500° 1600° 1700° 1700° 1800° 1800° | 98,100 62,900 59,900 77,800 64,000 48,900 45,200 47,100 36,300 37,800 | 55,100 42,500 37,600 61,400 47,600 35,900 - - - | 5.0 6.2 6.3 1.8 3.0 9.6 17.0 18.0 24.0 21.0 | 11.9 9.2 10.7 2.7 3.4 17.8 26.6 33.3 33.7 38.7 | 25.6 x 10 ⁶ 27.5 x 10 ⁶ 24.8 x 10 ⁶ 25.6 x 10 ⁶ 17.3 x 10 ⁶ - | As cast As cast Aged 50 hr © 1350° F " " As cast Aged 16 hr © 1700° F As cast Aged 16 hr © 1700° F |

| Ten. Stress Under Alle Like Social Social <ths< th=""><th></th><th></th><th></th><th>Dura-</th><th>Deformation Upon</th><th>P</th><th>Creep er Cent Pe</th><th>o Rate er Hour At</th><th></th><th>Т</th><th>otal D Per</th><th>eformatic Cent At</th><th>n</th></ths<> | | | | Dura- | Deformation Upon | P | Creep er Cent Pe | o Rate er Hour At | | Т | otal D Per | eformatic Cent At | n |
|---|--|---|--|--|---|---|---|---|---|---|---|---|---|
| H.S. Ho. 21 1350 15:00 21:00 0.008 0.001 0.001 0.003 0.0001 0.003 0.0001 0.003 0.0001 0.003 0.0001 0.003 0.0001 0.003 0.0001 0.003 0.0001 0.003 0.0001 0.003 0.0001 0.0001 0.0001 0.0001 0.0000 0.000 0.000 0.000 0.000 0.0000 0.0000 0.000 0.0000 0.0000 0.000 0.0000 0.0000 0.0000 0.000 0.000 0.00 | Material | Temp. | Stress DS1 | tion <u>Hours</u> | Application of Load | 500 Hours | 1000 Hours | 1500 Hours | 2000 Nours | <u>500</u> Hours | 1000 Hours | 1500 Hours | 2000 Hours |
| LS. No. 21 1500 7,000 2020 0.004 .00015 .00005 .00015 .00005 .00015 .00005 .00015 .00005 .00015 .00005 .00015 .00005 .00015 .00005 .00015 .00005 .00015 .000015 .00005 .00005 | H.S. No. 21 H.S. No. 21 H.S. No. 23 H.S. No. 23 H.S. No. 27 H.S. No. 27 H.S. No. 27 H.S. No. 20 H.S. No. 30 (c) When c | 1350 1350 1350 1350 1350 1350 1350 1350 | 15,000 12,000 20,000 15,000 15,000 15,000 15,000 15,000 15,000 15,000 | 2106 1800 1300 1560 1536 1656 2348 2160 00 hr (| 0.068 0.069 0.068 0.050 0.070 0.076 0.042 0.075 0.062 1) Data for 1 Fractured | .0003 .00013 .00036 .00025 .00045 .00044 .000005 .00015 .000184 1300 hour after ov | .00019 .0001 .00042 .00016 .00047 .00008 .000002 .00007 .000119 s rerheating | .00007 .0008 .00063(1 .00014 .00004 .00007 .00008 .000002 .00004 .000073 to 1650° | .0001 .00008(c)) .00002 .00003 .000062 (c) W | .442 .220 .292 .234 .446 .405 .135 .262 .267 Then di | .540 .275 .518 .310 .690 .479 .137 .320 .363 scontin | .596 .318 .712(1) .379 .950 .519 .140 .342 .408 nued at 1 | .662 .338(c) .533(c) .140 .360 .438 .656 hr |
| H.S. No. 21 1600 10,000 265.5 0.126 0.0013 0.0014 0.00045 0.00025 < | H.S. No. 21 H.S. No. 21 H.S. No. 21 H.S. No. 23 H.S. No. 23 H.S. No. 27 H.S. No. 27 H.S. No. 30 (g) When c (1) When c | 1500 1500 1500 1500 1500 1500 1500 1500 | 7,000 7,000 12,000 12,000 12,000 12,000 12,000 12,000 12,000 12,000 add at 276 add at 177 | 2002 2086 2015 2780 2136 1778 2039 1997 2082 30 hours 78 hours | 0.036 0.046 0.039 0.080 0.035 0.078 0.075 0.069 0.060 , rate .00003 | .0001 .000224 .00027 .000285 .000022 .00019 .00041 .00021 .000191 23% per h | .000205 .0001 .00014 .00011 .000062 .00018 .000193 .000068 .000079 .000079 | .00011 .00006 .000135 .000085 .000024 .000080 .000132 .000035 .000061 | .00009 .000065 .0001 .000085(g) .000024 .000035 .000035 .000046 ion 0.70%. | .127 .285 .215 .506 .176 .305 .678 .430 .397 | .208 .354 .348 .608 .201 .500 .815 .487 .453 | .296 .405 .417 .657 .205 .575 .894 .507 .489 | .344 .439 .500 .682(g) .222 .600(1) .963 .523 .524 |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | H.S. No. 21 H.S. No. 21 H.S. No. 23 H.S. No. 23 H.S. No. 23 H.S. No. 23 H.S. No. 27 H.S. No. 27 H.S. No. 27 H.S. No. 30 H.S. No. 30 (a) Wh (d) Wh (d) Wh | 1600 1600 1600 1600 1600 1600 1600 1600 | 10,000 7,000 5,500 9,000 7,000 5,500 11,000 9,000 12,000 11,000 9,000 tinued at oken whil tinued at | 206.5 2184 1488 833 1536 2184 2059 2070 2187 2035 2250 2207 h 2250 2207 h 2250 2207 h | 0.120 0.089 0.053 0.024 0.035 0.060 0.050 0.045 0.045 0.051 0.044 0.051 0.044 0.051 0.044 | .00033 .000125 .000036 .0002 .00005 .000045 .00002 .00005 .000027 .000085 .000065 less than test unit | .00013 .000044 .000031 .0001(d) .000025 .00031 .000013 .000023 .00002 .000015 .000015 .because c | .00013 .000044 .000031 .000025 .00025 .00001 .00002 .000015 Elongati. f burn-ou | .00013 .000044 .00025(e) .00025 .00001 .00001 .000028 .00002 .00001(a) on 0.26%. t of heating | .790 .258 .122 .300 .173 .105 .627 .143 .141 .700 .284 .230 furna | .900 .308 .130 .32(.193 .127 .784 .153 .158 .158 .815 .301 .249 ce at { | .980 .330 .163 d) .207 .152 .922 .162 .162 .880 .313 .256 333 hours | 1.036 .353 1.05 .165 .171 .980 .325 .260 |
| TABLE VIII AVERAGE STRESS REPTORE DATA Hiss, No. 21 Test 12000 Stress, psi for Rupture in 12000 n 100 hr 500 hr 1000 hr 13000 54,000 43,000 - 27,000 13,000 14,200 13000 42,000 24,000 - 27,000 13,200 14,200 15000 - 12,500 13,400 13,200 14,200 1600 17,000 13,000 10,000 13,000 12,200 17000 17,000 14,000 12,200 13,600 16,000 12,200 17000 17,000 14,000 12,200 11,500 12,000 14,000 18.5. No. 23 1500 ^o - 16,000 12,200 11,500 17000 17,000 14,000 12,200 11,500 12,500 12,600 17000 16,000 12,200 13,000 12,000 14,600 12,000 17000 16,000 12,000 14,600 12, | Cond Multimet(Low C)11 Multimet(Low C)11 Multimet 3 Multimet 3 Multimet(Low C) 3 Condition - (c) When dis | ition 1350 1350 1350 1350 1500 1500 1500 3 - Water continued | 20,000 15,000 20,000 15,000 12,000 10,000 8,000 7,000 12,000 9,000 9,000 quenched at 1705 at 3400 | 2041 2016 2016 2016 2016 2016 2016 2016 2060 1750 3400 3400 3400 hr. Tot | 0.113 0.094 0.092 0.058 0.054 0.065 0.041 0.061 0.064 0.064 0.064 | .00031 .00032 .00062 .000116 .000042 .0002 .000063 .00005 .000122 .00020 L1 - Hot Lon 1.34% | .000165 .000268 .00062 .00025 .00025 .00025 .000043 .000035 .000107 .00027 worked and , rate inc | .000125 .000361 .000725 .000053 .000017 .00062 .000047 .000025 .000124 .0003 laged ereasing. | .0001 .000612 .000895 .000038 .000013 .000048 .00002 .000168(c) .00038(d) | .396 .366 .671 .254 .115 .308 .157 .137 .181 .184 | .510 .563 .975 .298 .130 .415 .180 .154 .238 .310 | .585 .651 1.318 .327 .141 .607 .206 .174 .292 .452 | .632 .893 1.724 .351 .148 .230 .182 .323(c) .627(d) |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | | I | ABLE VIII | AVERAGE : | STRESS RUP | TURE DATA | or Rupture ' | 'n | 1 | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | Alloy H.S. No. 21 | L | | | Temp. ° F 1200° 1300° 1400° 1500° 1600° 1600° 1700° 1800° | 10 k 70,0 54,0 42,0 17,0 12,5 | 117 1000 1000 1000 1000 1000 1000 1000 | <u>100 hr</u> 51,900 43,000 24,000 22,000 16,700 13,000 9,400 | 500 hr | | 1000 44,20 27,00 15,00 14,20 13,20 10,00 7,00 | hr 0 0 0 0 0 0 0 | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | H.S. No. 2 | 7 | | | 1500° 1600° 1700° 1800° 1500° 1600° 1600° | 17,0 12,5 29,2 16,0 | 000 000 000 000 | 27,200 16,000 14,000 8,600 23,400 16,000 12,000 | 22,500 13,000 12,200 6,200 19,700 12,900 9,700 | - | 21,80 12,00 11,50 5,40 18,40 12,00 8,60 | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | H.S. No. 30 |) | | | 1800° 1500° 1600° 1700° 1800° 2000° 1500° 1600° 1600° 1700° | 12.5 33,0 24,2 19,0 14,0 5.5 35,0 | 000 2000 2000 2000 2000 2000 2000 2000 | 9.300 28,600 18,800 16,000 10,000 3,000 28,400 21,000 17,000 | 7,500 24,100 15,500 12,300 7,900 | | 6.80 21,70 14,80 11,50 7,10 23,40 18,00 14,50 | | - |
| Modified (Low C) " $26,000$ $19,000$ $15,000$ $13,000$ Hot Worked & Aged - (Low C) " - $20,000$ $14,500$ $12,500$ Hot Worked & Aged - (Med (Low C) " $29,000$ $22,000$ $18,000$ $16,500$ Low C - solution heat-treated 1700° $12,500$ $7,600$ $5,600$ $4,800$ " " " 1800° $8,700$ $4,900$ $3,300$ $2,800$ | Multimet Regular Low C Modified Modified Hot Work Hot Work Low C - | d (Yed. C) d (Low C) ced & Agec solution " | l - (Low (l - (Med heat-trea | C) (Low C) ated | 1800° 2000° 1500° " " " " " " " " " " " " " " " " " " | 13,0 6,3 28,0 23,5 27,5 26,0 29,0 12,5 8,7 | | 11,300 4,000 21,500 18,800 20,500 19,000 20,000 22,000 22,000 7,600 4,900 | 10,200 17,500 15,000 16,800 15,000 14,500 18,000 5,600 3,300 | | 9,80 16,50 14,30 13,00 12,50 16,50 4,80 2,80 | | |

TABLE VII CREEP TEST DATA

Aircraft parts such as gears and pinions are hardened to an intermediate hardness, machined to final size, then induction hardened to the required hardness

1

(4)

ortin (

By ROBERT C. GIBBONS Metallurgical Engineer Eclipse-Pioneer Division Bendix Aviation Corp. Teterboro, N. J.

TICTION

HARLENING

of Previously Hardened Parts

Q UALITY demanded of an craft equipment requires parts such as gears and pinions must have both high hardness and smooth uniform finish. In addition, engineering requirements often call for a different hardness on different areas of a given part—a high-surface hardness for wear resistance, and a core area of lower hardness but maximum toughness.

The possibility of heat treating medium carbon alloy steel to an intermediate hardness, then finish machining to final size and finally induction hardening certain specified critical surface areas to the required hardness was considered for certain parts.

Experimental parts were made up of various types of steel and submitted to life tests for strength and wear resistance. Certain parts were found to be too difficult to heat treat properly by this method. Other types of steel gave comparatively unsatisfactory results. But many of the parts tried could be hardened to the physical properties required in service more satisfactorily by this method than by any other.

After considerable experimenting, the following general procedure was adopted:

First, parts are rough machined to approximate size, then quenched and tempered to the intermediate core hardness required. Next the parts are finished ground and machined before their specified critical areas are induction hardened. Following the latter step, the induction hardened areas are tempered to obtain both the required hardness and to relieve internal stresses. Finally the parts are polished or sand blasted lightly if the surface appearance is important.

The process of induction hardening has been published so frequently that it is not necessary to go too much into its details here. Briefly, it consists of placing a steel part in the

Fig. 1—Cross sections through two bevel pinions after induction hardening; about 1½ times natural size

Fig. 2—Two spur pinions induction hardened to just below base line; 1½ times natural size

Fig. 3—Induction hardened tips of starter jaw teeth; about ¾ natural size

Fig. 4—Hardened driving prongs at end of small drive shaft; about ¾ natural size

Fig. 5—Cross section of double gear, bevel gear teeth induction hardened to just below root of teeth; about 1½ times natural size

Fig. 6-Cross section through spline of drive shaft hardened to depth 1½ times depth of splines; about ½ natural size

Fig. 7—Cross section of planetary spider in which pinion was induction hardened completely through bore; about 1½ times natural size

1

proximity of a water-cooled copper coil in which a highfrequency alternating current is passing. Rapid reversal of the direction of the induced current heats the surface of the part nearest the coil to a red heat in a few seconds. Continued heating permits the heating of subsurface metal. When the surface is heated to the proper temperature and the heat penetrated to the proper depth below the surface, the part is quenched and thereby hardened. By regulating shape and size of coil in relation to the part to be hardened, the area to be heated can be controlled closely; and by regulating the power input and the time. the depth that is heated before quenching can be controlled. For a thin induction hardened case, a high power input and a short time of 1 or 2 sec is used; for a deeper case, a lower power input, to prevent overheating the surface metal, and a longer time give best results.

The equipment used for this work is of the spark gap type of 15 and 30 kw capacity, operating at 100 to 300 kilocycles. With the comparatively small parts generally used at our plant, a 1/32-in. case can be obtained in 1 or 2 sec and a 1/8-in. case in about 10 to 20 sec. Comparatively few parts were hardened in this plant to depths greater than 1/8-in.

Care is necessary in designing the proper coil. In general, a special coil is made up for each new job going into production. This is carefully adjusted so there is uniform heating throughout area to be hardened. Non-uniform heating results in non-uniform case depth, and sometimes results in distortion. About 100 coils of various sizes and shapes are kept available for use in the heat treating department for different parts.

Early tests indicated that water-hardeneing steels of 0.45 per cent carbon or higher, after being previously quenched and tempered to intermediate hardness, tended to crack on quenching in water from the induction hardcning heat. All subsequent work was done by oil quenching of oil hardening steels, and cracking of parts was practically eliminated when normal precautions were taken. Sharp internal corners must be avoided, and all stresses arising from any previous heat treatments must be removed by proper tempering.

Certain alloy steels are more easily induction hardened than others. This is very noticeable when induction hardening from the annealed condition, but is much less noticeable if the steel is previously quenched and tempered. In the preheat-treated condition, the grain structure is then very fine and the carbides go into solution readily; whereas in the annealed condition, the grain structure may be very coarse, and the coarse carbides are sluggish in going into solution on heat treating.

Certain alloy steels, having comparatively high quenching temperatures, such as chrome-vanadium steels and the straight chromium corrosion resistant steels, sometimes give the following trouble: The hardness of the induction hardened zone is not always uniform, and an annealed zone frequently develops below the induction hardened area. The annealed zone is due largely to the fact the difference between the Ac₁ point, about 1370° F, and the quenching temperature, 1575° F or higher, is a comparatively wide range. With a normal gradation of temperature from the surface toward the center, an appreciable portion of the metal is within this critical range at the time of quenching, and resulting hardness of this area may be (Please turn to Page 134)







94

In this concluding article, the authors discuss salient features and functions of other electronic instruments for maintaining quality in large-scale production

> By DOUGLAS M. CONSIDINE Application Engineer and DONALD P. ECKMAN Development Engineer Brown Instrument Co., Industrial Division Minneapolis-Honeywell Regulator Co. Philadelphia

Fig. 8-Schematic representation of the dropping mercury electrode, basis of the polarograph. Sample is subjected to slowly increasing voltage to the potential necessary to reduce a component of the solution; at this point the current, heretofore nearly constant, rises sharply to a new level

Fig. 9-Visible recording polarograph using a continuously balanced high speed potentiometer. Courtesy E H. Sargent & Co.



/TEEL



OTH a qualitative and quantitative analytical instru-ment, the recording polarograph is employed for determining the chemical constituents of either aqueous or non-aqueous solutions. Although extremely small quantities of material can be detected, it is not limited to micro analysis. Both in micro and macro analytical work it replaces tedious and slow wet chemical methods for determining metallic and organic constituents.

The principle of the dropping mercury electrode, the basis of the polarograph, dates back to 1873, when Lippman-using a capillary containing a stationary thread of mercury-first successfully measured the surface tension of mercury. Several years later, Kucera-in making further studies of the surface tension of mercury-employed a dropping mercury electrode quite similar to the one now used in polarographic analysis. Kucera's method produced anomalous results which he could not explain nor eliminate from his experiments. In 1918, Heyrovsky-

Fig. 10-Recording Pirani high vacuum gage can detect, in the range of one micron, a change in pressure as little as one-quarter micron. Courtesy Distillation Products Inc.

Fig. 11-Recording ultraviolet spectrophotometer is used for the identification and measurement of substances transparent for all wavelengths in the visible spectral regions but exhibiting absorption properties in ultraviolet region. Such substances as butadiene, xylene, benzene and toluene can be analyzed with this instrument. Courtesy National Technical Laboratories



May 27, 1946

in attempting to find an explanation of Kucera's resultscontinued the investigation of electro-capillarity. A galvanometer was employed to measure the currents flowing through the electrode system and it was discovered that the current-voltage curves of solutions which were electrolized with a dropping mercury electrode possessed several remarkable qualities, including:

- (1) Curves had a characteristic step formation
- (2) Curves were a function of the nature of the solution and were reproducible
- (3) Voltages at which the steps of the curves occured were characteristics of the components in the reducible substance, permitting qualitative analysis
- (4) Height of the steps was a function of the concentration of the components of the substance in solution, thereby making quantitative analysis possible. The method of analysis was named polarography; the

instrument developed by Heyrovsky was called the polaro-

Fig. 12-High speed recording infrared spectrometer is used for the analysis of saturated hydrocarbons such as butane and propane and such simple unsaturated compounds as butylenes. Courtesy The Perkin-Elmer Corp.

Fig. 13-McLeod type vacuum gage is the standard for vacuum measurement and is used in calibrating other vacuum gages. Courtesy F. J. Stokes Machine Co.

graph; and the current-voltage curve was termed polarogram.

The dropping mercury electrode, illustrated schematically in Fig. 8, comprises a very fine bore capillary tube connected by a neoprene tube to a mercury reservoir and placed in the soluton so that very fine drops of mercury are formed beneath the surface. The rate of mercury flow may be adjusted by varying the height of the inercury reservoir and normally amounts to a drop every 1-3 sec. The mercury reservoir is connected to one terminal of the polarograph; the other cell terminal is a pool of mercury in bottom of vessel.

In operation, a few drops of mercury



added to the sample act as one electrode of the cell. The dropping mercury electrode is next inserted. An inert gas, usually nitrogen, is then bubbled through the solution to remove atmospheric oxygen which is reducible and gives a polarographic wave not usually of interest to the analyst. As the voltage impressed on the cell is slowly raised the current remains nearly constant until a voltage is reached at which a component of the solution is reducible. The current then rises sharply to a new level, at which it remains constant until the voltage is reached at which a second component is reducible. Another sharp rise in current to a new constant value then occurs. These sharp rises in current are called polarographic steps or waves.

Since the polarographic steps for the various components in the sample occur at different voltages, several substances may be determined in one solution on a single polarogram, as illustrated in Fig. 15. Note the small percentages of copper, lead, and cadmium determined in a high purity zinc base die cast alloy.

By employing a continuously balanced high speed recording potentiometer the above limitations have been overcome. The new unit is illustrated in Fig. 9.

Output from polarographic cell is fed to recorder so that displacement of the pen from zero is determined by the amount of current flowing through the cell. The chart is driven by contant speed synchronous motor. The polarograhpic bridge which supplies voltage to cell is also driven by a synchronous motor so that chart displacement is a linear function of voltage applied to the cell, that is, the time ordinate of the chart becomes, in essence, the voltage ordinate. Record obtained, therefore, is current versus voltage.

Since the recorder pen is continuously visible, operator is in position to determine when a step is completed and to make immediate readjustments if the curve is too small or too large.

Examples of practical application of the

Fig. 14—Pirani circuit. Basis of operation is that there is considerable change in heat loss from the filament of gage tube due to a sharp change in the convection loss in the region between one millimeter and one micron of mercury, this causes its temperature to rise and, in turn, causes its resistance to change and unbalance the bridge. Courtesy Distillation Products Inc.

Fig. 15—Polarogram of copper, lead and cadmium in a high purity zinc base die cast alloy



Here's Your 3-step plan for **BETTER TOOLS TO** CUT PRODUCTION COSTS

Use this sure way to knock the props from under production costs. Let Carpenter help you put this three-step plan to work in your tool room and heat treating department. With it you can reduce machine down-time and actually lower unit costs.



Tool Engineers can now be sure of selecting the proper tool steel for each job when they use the Carpenter Matched Set Method. Many plants use this method of selection to lick production problems caused by premature tool and die failure. And it works! Now tool makers who have used it are relying on it to get every job done right. They know it cuts the cost of tooling-up and reduces machine shut-down time. And those savings are bound to show up in the cost of the

finished product.

Insurance That Each Tool Will Pay-Off On The Job!

As you know, proper heat treatment is the second step to seeing that each tool is made to do its job right. And the Carpenter Heat Treating Guide quickly gives you this important information about each Carpenter Matched Tool Steel: Type analysis, Forging heat, Normalizing heat, Annealing treatment, Hardening treatment and Recommended drawing range. And this slide chart gives you tips on quenching, oxidizing atmospheres, heating time and heating speed for drawing. For your free copy, drop us a note on your company letterhead.

Check On Tool Life And Output Per Grind !

Find out which tools and dies need too frequent regrinding or fail prematurely in service. Carpenter Matched Tool Steels can help you lick this condition, and reduce unit costs. And for personal help in your tool room or heat treating department, get in touch with your nearby Carpenter representative. He knows tool steel inside-out, and can often provide the kind of engineering help that licks tough production bugs.







How the Carpenter Matched Set Method Helps to Solve Your Tool Steel Problems...

These are really Matched Tool Steels, as one picks up its job where the other "leaves off."

The key steel is the one in the center, No. 11 Special, a straight carbon, tough timbre, waterhardening tool steel. When you have a tool to make, you first find out if it can be made from No. 11 Special. If the answer is "Yes", you go no lurther. But when the answer is "No", you use the diagram to point the way to the tool steel that will do the job. For greater wear resistance you go north. For greater hardening accuracy and safety, you move west, etc.

To learn more about the ways this method can be used in solving your special problems, ask for a copy of the 167-page Carpenter Matched Tool Steel Manual. It contains an 80-page tool index and steel selector that many tool engineers find extremely handy. For your copy, write us a note on your company letterhead, indicating your title. (Free in U. S. A.)

The Carpenter Steel Company 139 W. Bern St., Reading, Pa.

BRANCHES AT Buffalo, Chicago, Cincinnati, Cleveland, Dayton, Detroit, Hartford, Indianapolis, New York, Philadelphia, Providence, St. Louis

polarograph to process control include (1) determination of carryover of aluminum chloride catalyst in petroleum processing, and (2) to indicate residual oxides of nitrogen in high explosives.

Ultraviolet and Infrared Spectrophotometers

Spectrophotometry is based upon the fact that various chemical substances, in either the gas, liquid, or solid form, absorb light at certain wavelengths. When light of a single color or wavelength is passed through a layer of any substance, light may be transmitted completely through the substance, or it may be partially or completely absorbed, depending upon chemical identity of the substance and amount of the substance in path of the light.

If a plot is made of wavelength versus precentage of light absorbed under variious conditions an irregular curve of maxima and minima will result. The maxima correspond to wavelengths or colors for which the substance is relatively opaque; minima correspond to wavelengths for which the substance is relatively transparent. In some cases the maxima show sharp absorption peaks; in other cases the absorption maxima are broad.

The absorption curve for any substance is unique. No two chemical substances absorb light in exactly the same fashion. The absorption spectrum of a substance serves as a fingerprint to identify the substance when in pure form. When one substance is mixed with another, usually it will be found at at least some of the absorption peaks of the substance will not coincide with the absorption peaks of any of the other substances.

Substances which appear colored to the eye obviously absorb light in the visible region of the spectrum. Many chemical substances, particularly organic compounds, are colorless, that is, they are transparent for all wavelengths in the visible regions. Such substances will nevertheless absorb radiation in invisible spectral regions, depending upon the types of chemical bonds in the molecules. Thus molecules which include the benzene ring in their structure, such as benzene, toluene, and xylene, show distinctive absorption patterns in the ultraviolet region. Conjugated diolefins, of which butadiene is the most familiar example, also absorb in the ultraviolet region. Ordinary saturated hydrocarbons, such as propane and butane, and simple unsaturated compounds, such as butylenes, do not absorb extensively in the ultraviolet. For the analysis of such compounds the infrared region of the spectrum is utilized.

As illustrated in Fig. 11, this instrument comprises: (1) A source of ultra-



Fig. 16—Flow type pH electrode assembly which can be installed directly in process pipelines. Photo courtesy of the National Technical Laboratories



Fig. 17—Immersion type pII electrode assembly. This electrode is designed for permanent installation in tanks, vats, and other process vessels and is capable of operating under pressures of 30 psi and over. Courtesy National Technical Laboratories

violet radiation, usually a hydrogen lamp, (2) a monochromator to isolate radiation of any desired wavelengths, (3) an absorption cell through which a stream of fluid being measured is continuously passed, (4) a phototube and electronic amplifier for measuring the amount of radiation transmitted through the sample, and (5) an electronic potentiometer which records percentage of light transmitted by the sample. Chart readings of less than 100 per cent will be produced whenever the sample stream absorbs some of the radiation. By employing suitable calibration data, the per cent transmission can be correlated with the concentration of the measured substance in the fluid stream.

Infrared Spectrophotometer

In the infrared spectrophotometer, illustrated in Fig. 12, globar is used as source of infrared radiation. Radiation from the globar is focused through a sample cell. Radiation transmitted by the sample cell is dispersed by means of a prism, usually made of rocksalt. By rotating a Littrow mirror, upon which radiation from the dispersing prism strikes, it is possible to select the radiation of desired wavelength which will be focused upon the measuring thermocouple. The thermocouple is a high vacuum compensated type with a bismuth-bismuth tin hot junction. The emf generated by the thermocouple is on the order of one microvolt. Amount of energy for a given wavelength picked up by thermocouple is a function of the amount of radiation of that wavelength absorbed by the sample.

By carefully rotating the micrometer wavelength control, which rotates the Littrow mirror, the complete infrared spectrum of the sample—from about 2.5 to 15 microns—is obtained. For automatic scanning of the spectrum, where a high speed recording potentiometer is employed, shaft of wavelength micrometer is coupled to an electric motor drive. The thermocouple emf is amplified and recorded on a high speed strip chart electronic potentiometer.

Advantages of continuously and automatcally indicating and recording ultraviolet and infrared spectra include: (1) A substantial reduction in the time and skill required to perform analyses is effected, (2) a permanent record is obtained which may be consulted for reference at any time, and (3) unknown absorption in samples often can be identified at a later date in the light of subsequent work, providing a permanent record is at hand.

Measuring High Vacuums

Until recently an absolute pressure of 40 to 50 mm of mercury was considered a high vacuum. With exception of the manufacture of vacuum tubes, high vacuum techniques were generally confined to the laboratory. Today absolute pressures in the low millimeter and micron ranges are becoming commonplace and are making practical many processes formerly impossible to carry out and are improving the performance of many products.

Some processes in which high vacumns are now being applied include:

 Evaporation of metals and metallic salts, as in the manufacture of magnesium, surface plating of optical



Mesta Merchant Mill Rolls for Rolling I-Beams



MESTA MACHINE COMPANY ^{PITTŠBURGH, PA.}



lenses, and metallic plating of cellophane;

- (2) Drying blood plama, penicillin, and other biologicals by sublimation:
- (3) Distillation of vitamin oils, essent.al oils, and aromatics;
- (4) Extraction of foods and drugs and the recovery of volatile solvents;
- (5) Impregnation of coils, condensers, cables, armature windings, textiles, and wood;
- (6) Manufacture of sealed unit refrigeration systems. The efficiency of the unit with removal of the last traces of water vapor and noncondensable gases is greatly increased;
- (7) Low temperature dryng of foods and chemicals,

High vacuum measurement roughly falls into three broad ranges, namely: 0 to 5000 microns; 0 to 500 microns, and 0 to 50 microns. Two types of high vacuum recorders are discussed in this article, namely: (1) The Pirani gage, and (2) the McLeod gage.

Recording Pirani Gage

The Pirani gage, illustrated in Fig. 10, is essentially a coil of resistance wire mounted in an envelope which is connected to the system whose pressure is to be measured. The gage is connected into a Wheatstone bridge as one of the four arms. A second gage is usually sealed off at a pressure considerably lower than one micron of mercury and is connected to the bridge as a second arm and is so arranged that changes in its resistance will balance changes in the gage tube resistance due to temperature fluctuations, but not due to pressure changes; remaining two arms of the bridge are equal fixed resistances. The measuring circuit is illustrated in Fig. 14.

The balance point of the gage shown in Fig. 14, is taken as the pressure of the sealed-off comparison tube which means that the sensitivity is greatest at the low pressure end of the scale and least at the upper end of the scale. In the range of one micron a change in pressure as little as one-quarter micron may be observed, while at 500 microns a change of 10 to 25 microns may be the minimum change observable with accuracy. This change in sensitivity is due in part to the non-linearity of the scale. The accuracy of calibration is of the order of plus or minus 1 to 2 microns at the low pressure end, plus or minus 10 to 15 microns at the high pressure end of the scale.

The pen of the potentiometer travels across scale in about 41/2 sec so that even wide variations in pressure are almost instantly recorded. Contacts in the potentiometer recorder may be used for actuating alarm signals or even control circuits. Special sequence programs to

fit particular applications may also be worked out with the potentiometer.

Recording McLeod Gage

The McLeod gage after 70 years is still the ultimate standard for vacuum measurement and is used in the calibration of other vacuum gages. Non-condensable gases, such as hydrogen, cause no error in readings as with other types of vacuum gages. Condensable vapors, such as water or alcohol, can cause errors unless they are removed by a chemical trap or other means before they reach the measuring chamber of the gage.

The Stokes McLeod gage (Flosdorf-Hall) type, illustrated in Fig. 13, is now available for both measuring and recording high vacuums. Measurement is automatically made and recorded at regular intervals so that substantially a continuous record is obtained.

In Fig. 13, the gage is illustrated in its measuring position. The gage is turned periodically, as shown dotted, each cycle to permit the measuring chamber to again be exposed to the pressure of the process. The height to which mercury rises in the capillary of the measuring chamber is determined, of course, by the pressure in that chamber. The height is electrically indicated.

To reduce the sampling-measuring cycle of the gage, advantage of a high speed electronic recording potentiometer may be taken. The steplike action of a galvanometer type potentiometer limits somewhat the speed with which the complete cycle can be made, as sufficient time must be allowed for the galvanometer to come to balance on the measuring end of the cycle.

Refinements In pH Measurement

Hydrogen ion concentration has been measured successfully in the laboratory for many years. The adoption of early laboratory measuring means to continuous indication and automatic recording and controlling of pH in industrial processes was not so successful. The industrial limitations of the hydrogen electrode, which requires a platinum catalytic surface and a pure supply of hydrogen gas, included (1) susceptibility of the catalyst to poisoning, and (2) requirements for a continuous supply of pure hydrogen gas. Quinhydrone and antimony measuring electrodes offered some improvement for certain industrial applications, but these were (1) generally subject to errors in oxidizing and reducing solutions, and (2) susceptible to poisoning by certain ions and salts.

Development of the glass electrode several years ago was the first real step toward industrial pH measuring and concrolling applications.

As a result of research during the past

five years, the situation has been changed to the effect that (1) continuous pH measurements can be made in boiling aqueous solutions, (2) accurate measurement in highly alkaline solutions, containing sodium ion concentrations of two mols per liter and up to a pH of 12, is obtainable, (3) delicate handling of the electrodes is no longer required, and (4) by improving the electronic measuring circuit and shielding the electrode leads, the effects of stray currents have been practically eliminated. It is not claimed, of course, that the ultimate in pH measurement has been reached, but recent progress has made industrial pH measurement and control possible where heretofore practical considerations seriously limited the applications.

Sturdy construction of electrode assemblies has also been responsible for a wider industrial usage of pH measurement. The flow assembly, illustrated in Fig. 16, can be installed directly in process pipelines. Numerous materials of construction, including porcelain covered iron, rubber, stainless steel, Monel metal, and Pyrex glass, can be used to fabricate the chamber. The immersion assembly, illustrated in Fig. 17, is designed for permanent installation in tanks, vats, and other process vessels and is capable of operating under pressures of 30 psi and over. In this assembly, note the three major parts, namely, the glass electrode, the calomel reference electrode, and the resistance thermometer. The resistance thermometer automatically and continuously compensates for the effects of temperature upon the resistance of the glass in the electrode.

Numerous special electrodes have been developed to satisfy peculiar process conditions. For example, an electrode assembly has been designed which does not expose any metal parts to the process solution. The production of penicillin requires a special electrode which permits the convenient measurement of pH of two liquid layers, a water layer and chloroform layer; pH measurement is important, since it greatly affects the mutual solubilities of liquids involved.

While the saturated calomel cell is generally used as the reference electrode, special mercuryless electrodes are available for processes, such as photographic film manufacture, where mercury cannot be tolerated.

ACKNOWLEDGEMENTS

- The authors desire to acknowledge the valu-
- able assistance of the following individuals: J. S. Buhler, North American Philips Co., Inc. Maurice J. Prendergast, E. H. Sargent & Co. T. F. Herring, National Technical Labora-tories Laboration
- tories, Inc. Dr. E. D. Haller, National Technical Labora-
- tories, Inc. Dr. John V. White, Perkin-Elmer Corp. George Herbert Bancroft, Distillation Prod-
- ucts, Inc. T. B. Hetzel, T. J. Stokes Machine Co.

CHANDLER

RODUCT

ONE PRODUCT

Write for Brochure.

Chandler does only one type of work. Able management teamed with skilled personnel operating high speed equipment in an up-to-date plant produces cold wrought products second to none. Imperfections "haven't a chance" at Chandler.

CHANDLER PRODUCTS CORP. 1491 CHARDON RD. CLEVELAND 17, OHIO





Featuring adjustable bearing equipped horizontal and vertical spindles, the Armor Milling machine manufactured by Aircraft Machinery Corp., Burbank, Calif., has eight spindle speeds ranging from 98 to 1140 rpm. Suitable for bench mounting, it has a 12 in. longitudinal, 10 in. vertical, and 7 in. cross travel and a variable speed power feed

WELDED CAR JOURNALS: When usual parts were not available for fabrication of 32 car journals for four new railroad passenger coaches being built by Standard Fruit Co. in Honduras, desired shapes were cut from steel plate with an oxyacctylene cutting machine and weld fabricated. Both fillet and butt welds were used, and pieces were joined with a shielded-are electrode for mild steel, Lincoln Electric Co., Cleveland, revealed recently





ALUMINUM AXLE HOUSING: Latest truck axle development of Timken-Detroit Axle Co., Detroit, features aluminum housing, hubs and brake shoes, and is reported to save 200 lb in dead weight. It is intended for heavy-duty, on-the-road hauling in localities where loads over 18,000 lb at the tires are permitted. Developed with Aluminum Co. of America assistance, the new axle is being produced with two types of drives-hypoid-helical double reduction and 2-speed hypoidhelical double reduction-both of which are interchangeable

in same housing using same axle shaft

FENDERS WELDED AT 150 UNITS PER HOUR: Co-ordinated production of both right and left fenders is simplified by a duplex Ultra-Speed welding machine, built by Progressive Welder Co., Detroit. Composed of two units which can be separated for use in different locations, each may be operated individually or both simultaneously. Machine is shown welding dust shields to 18-gage steel fenders. Integral loading fixtures for accurately locating headlamp mounts for positioning before clamping are shown



SQUARE • RECTANGULAR Minimum dimension W Maximum dimension 2%

ALSO

Michigan C

14 to 20 gauge.

FORGED

UPSET

ROLLED

TAPERED

FLANGED

EXPANDED

CLOSED

BEADED

The "Production Parts Tubing"

Because it re-forms and machines so well, Michigan welded steel tubing is widely used in the fabrication of production parts such as automobile exhaust and muffler tail pipes, gas tank filler tubes, steering jackets,

UNIFORMITY

OF STRENGTH AND THICKNESS ACCOUNT FOR ITS

WORKABILITY

and wherever bent and shaped tubes may be required. True concentricity, uniform I. D. and O. D. make it particularly economical when long runs are involved.

4" to 4" O.D.

to 22 gauge

Prefabricated Parts or Tubing

Michigan will furnish the complete part fabricated from welded steel tubing, all re-formed and machined. If you have the equipment and capacity in your own plant to do this work,

consider Michigan as your source for tubing in the sizes listed above-commercial mill lengths or cut to special lengths.

Engineering advice and technical help in the selection of tubing best suited to your needs.

lichigan STEEL TUBE PRODUCTS CO. More Than 25 Years in the Business 9450 BUFFALO ST. • DETROIT 12, MICHIGAN

FACTORIES: DETROIT, MICHIGAN . SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee and Minneapolis-Miller Steel Co., Inc., Hillside, N. J.-C. L. Hyland, Dayton, Ohio-Dirks & Company, Portland, Oregon-James J. Shannon, Milton, Mass.—Service Steel Co.. Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—C. A. Russell, Inc., Houston, Texas—Drummond, McCall & Co., Itd. Toward, Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—C. A. Russell, Inc., Houston, Texas—Drummond, McCall & Co., Ltd., Toronto, Canada.

ENGINEERING NEWS at a glance

IN DETROIT, it was learned, Michigan Chrome & Chemical Co. is producing a new air-dry rack coating said to be unaffected by any solution commonly used in plating and anodizing cycles, including the electrolytic sulphuric acid strip used to dissolve bright nickel, and alkaline cleaners at boiling temperatures. Called Microtex, the coating is a thermoplastic insulating material that attains maximum adhesion without depending upon shrinkage. Also it can be applied by dipping, spraying or brushing.

MARLOW Pumps, Ridgewood, N. J., reports its facilities have been geared up for expanded production of its line of self-priming centrifugal pumps. Emphasis will be placed on the type E pump developed by the company just before the outbreak of war—the develoment is an electric and belt driven self primer being produced in sizes to handle 50 to 4000 gpm.

SURFACES of plastic molds can be polished to a mirror finish by a method based primarily on lapping and optical polishing—similar to processes used on quartz and optical flats, according to Acme Scientific Co., Chicago. The newly developed lapping operation is largely mechanical, removing imperfections and cleaning up the surface after deep tool marks and gross defects are removed, it is reported.

TEMPORARY or semi-permanent surface protection of ferrous parts, following such operations as grinding, machining, pickling, tumbling, brazing and sandblasting is provided by an improved protective oil produced by Oakite Products Inc. The product imparts a thin coating to the metal and, because of its water displacing properties, it can be applied to ferrous materials directly after cleaning or rinsing, according to the New York concern. In addition, it is said, finger prints or similar marks resulting from inspection or handling machined work in process can be removed readily by adding 5 per cent water to the product.

STARTING in June, American Car & Foundry Co., New York, is extending its production of ACF lubricated plug valves to include cast steel valves in series 100 and 300, in sizes ½ to 8 in., it was learned recently. The cast steel valves are particularly adapted for high pressures and temperatures, offering greater abrasion resistance and, in some services, greater corrosion resistance, the company reports.

RECENT development in tractor shovels, and currently produced by Trackson Co., Milwaukee, is a caterpillar model which features a bucket that is wider than the tractor tracks—one that can be dumped from any point of the lift and has a digging range from 14 in. below the track line to 56 in. above. According



BEARINGS OF this Star live center turn on an anti-scoring concentrated lubricant that withstands pressures greater than 50,000 lb psi, according to Samuel S. Gelber Co., Chicago. Development is said to have a life expectancy of 3000 hours. It embodies a spindle of alloy tool steel hardened to 64 rockwell, and both thrust type ball and radial roller bearings to the company, the model IT4 can be used to dig, stockpile, dump loads directly into trucks, ditch, spread, bulldoze or remove snow. Bucket is quickly removable for installing bulldozer blade.

IMPORTANT problems in connection with cathode emissivity are being studied by the technical committee B-4 on electrical-heating, electrical-resistance and electric-furnace alloys under the auspices of the American Society for Testing Materials, Philadelphia, the organization reported recently. The membership, which is representative of the radio tube industry, includes technical representatives from various receiving tube companies, as well as other interested industrial organizations, colleges and government laboratories.

LIQUIDS used to form protective films on castings can be applied in fine streams by use of a sprayer being produced by Lonn Mfg. Co. Inc., Indianapolis. Slight pressure on the flexible nozzle of the development opens its valve and permits liquid to emerge as spray, regulated by the operator's hand to conform to his requirements. Elimition of pressure causes the spray to stop instantly. The unit can be mounted in any position convenient to the operator's hand.

INCORPORATION of the inbuilt separate exciter of its electric drive welder into a synchronous motor welder by Hobart Bros Co., Troy, O., is expected to relieve many "headaches" for both customers and public utility companies so far as high horsepower demands are concerned. The Ohio company says the welder is proportioned so it can be started across the line, automatically synchronizing itself by the build up of the separate exciter. Starting current needed for the unit is about the same as a conventional induction motor of the same horsepower capacity, according to Hobart.

TWO newer models of sine-line lead comparators being produced by Michigan Tool Co., Detroit, are designed for use on the gear production floor alongside gear-cutting and gear-shaving machines. One of these checks helices up to 45° at several points around the periphery of internal or external helical gears. The other checks angles in excess of 45°, and leads on worms. Both handle work with a maximum swing of 10 in. and may be used as an aid in setting up gear-cutting and finishing machines, or to determine lead compensations for "unwinding" of gears during heat treating operations.



J&L STEEL Smart modern designs for garden furniture, lawn mowers, wheel barrows, bicycles and other home utilities can be enhanced by use of J&L Electricweld Tubing. Its smooth, uniform surface provides an ideal base for painting, enameling and electro-plating, and most important its inherent strength and quality permits you to build with a minimum of weight—to sell the public with ease. Also J&L Electricweld Tubing will work smoothly in your bending, fabricating and welding operations.

JONES & LAUGHLIN STEEL CORPORATION PITTSBURGH 30, PENNSYLVANIA



will last longer than an owner usually keeps a motor car, talk even of combining synthetic rubber with natural rubber to produce a tire or high temperat

that might run 100,000 miles. To the chemical, rubber and petroleum industries responsible for synthetic rubber, metallurgists of The Timken Roller Bearing Company have rendered many a valued service through many years.

Already, there's talk of a tire that

service through many years. As these industries developed new processes calling for higher temperatures, higher working pressures and greater resistance to corrosion, it was Timken that had the background of experience with steels for high temperature service that made commercial production possible. No less than eleven tough new alloy steels have been developed for high temperature processes. And more are on the way.

With this background, our engineers are looked upon everywhere as the final authority on problems involving the use of high temperature tubing. It is quite likely they could help with your high temperature problems. Write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio. Timken Bearings, Timken Alloy Steels and Seamless Tubes, Timken Removable Rock Bits. HOT PIPES! When chemical, rubber and petroleum engineers got the "go ahead" on wartime synthetic rubber, the process had been developed, in fact, plans for new plants were already drawn.

Fine Alloy, STEEL AND SEAMLESS TUBES

But the process required large quantities of butadiene. And plants for producing butadiene would need scores of miles of special tubing to transfer liquids and gases at temperatures as high as 1600[°] Fahrenheit.

Fortunately, the "know how" for producing such tubing was available. For 17 years, properties of metals at high temperatures had been under extensive study by the Steel and Tube Division of The Timken Roller Bearing Company. From its laboratories came top metallurgical talent to counsel the fledgeling industry.

Today, the men who pioneered synthetic rubber say their phenomenal wartime success could not have been achieved without the aid of The Timken Company.

— synthetic rubber faces a rosy future!



NOW THAT TIMKEN SEAMLESS TUBES HAVE WON ANOTHER BATTLE WITH HEAT... HALF-CENTURY

of FORGING

Erie Foundry Co.'s span of over 50 years covers the development of forging hammers from the original 600-lb single frame machine to 50,000-lb giants

TECHNOLOGICAL development of an industrial tool seldom is so clearly reflected by the progress of its manufacturer as in the case of the Erie Foundry Co., Erie, Pa., maker of forging hammers throughout 41 of its 50 years of existence.

This concern was founded in 1895 in what then was a small village on the shore of Lake Erie. Since that time, through a disastrous fire, through financial panics and depressions, it has remained an important source of the machines that form stubborn metal into the shapes called for by industry. Today, headed by D. A. Currie, president, Erie manufactures presses whose power and weight would be beyond the conception of its early personnel.

By 1900, the company was changing over from production of "skillets, pans, stoveplate and assorted light castings" to heavy castings, plus the machining and assembly of an underfed industrial stoker. Production of the stoker was discontinued in 1914, but in the meantime, a chain of events beginning with the acquisition of the Pittsburgh Shear, Knife & Machine Co. in 1903, started Erie on the road to specialization in the manufacture of forging hammers.

The Pittsburgh concern had developed for its own use a steam hammer incorporating castings made by Erie. J. S. Van Cleve, who succeeded to the presidency upon retirement of Charles M. Reed, one of Erie's founders, attempted to persuade this firm to make its hammers generally available in order to increase the market for Erie castings. Failing this, and foreseeing a future for forging hammers, he persuaded the Eric directors to buy out Pittsburgh Shear's business.

The first piece of machinery to be sold under the Eric name was a 100 x 4/s-in. shear sold to the Ward Dickey Steel Co. First forging hammer to carry the company name was a 600-lb single frame unit, shipped to the Rome Brass & Copper Co., June 2, 1904. During the rest of the year, 15 other flat die hammers were shipped, mostly of the single frame type, with rated weights ranging from 250 to 1500 lb. First and only steam drop hammer shipped that year was rated at 1200 lb and went to the Navy.

The bicycle boom which swept the country after the turn of the century gave a lift to impression die forging and was responsible for some increases in hammer sizes, as bicycle parts were necessarily larger than the wrenches, gun parts, plow points, and the like, which since the Civil War had been considered the chief field for drop forging. But even as late as 1904, drop forging was still an occasional thing.

At this point the company inaugurated its advertising campaign, taking space in the *Iron Trade Reciew* (predecessor of STEEL), along with several other business magazines. A 1000-lb hammer built by Erie and exhibited that year at the St. Louis Exposition evoked considerable interest. It is shown in Fig. 1.

By 1909, industry was calling for increasingly heavier hammers, and after a devastating fire which destroyed most of

Fig. 1—An early double-frame flat die hammer made in 1904 Fig. 2—One of the first four-roll presses which made possible larger drops

Fig. 3—A 50,000-lb steam drop hammer weighing close to a million and onequarter pounds



then he said to himself:

Tell the people what's cookin'

Master of the picturesque is Fiorello H. LaGuardia. Asked why he chose a radio spot after relinquishing the Mayor spot in New York . . . his simple answer:

"People ought to be told what's going on."

And, there's plenty going on in industry that people can be told about:

... new designs ... new techniques that give the people more value for less money. For example:



LOOK, MR. LA GUARDIA, how manufacturers are stepping out in front with the world's leading welding electrode:

"Cooking" with Fleetweld...



Going downgrade 33% faster. This fabricator was welding corner joints in 18 gauge galvanized steel at an arc speed of 30" per min. At the suggestion of the Lincoln Engineer, he started tilting the joint 45° and welding downhill with "Fleetweld 35". Increased speed to 40" per min...33% faster.



Using "arc force" to boost speed 20%. Fillet welds in flat and horizontal positions are being made with 1⁄4" "Fleetweld 11" and "Fleet-Fillet" Technique at arc speeds of 12" per min. where former method gave 10" per min. This mining machine transmission case is a typical application. Full details in Bul. 444.



Jigging up for 16% lower cost. Use of jigs to improve fit-up of parts and positioners to get downhand welding usually permits use of larger electrodes. In welding of this tapping machine frame, electrode size went from 5/32'' to 3/16'' "Fleetweld 7". Welding cost went down 16%.



The sign of good "cooking". When you see 3 DOTS on an electrode, you know you have genuine "Fleetweld" ... the world's leader for *low cost, speed* and *quality*. New, handy pocket manual giving procedures for all kinds of jobs free on request. Ask for Bul. 437.

New Lincoln sound-color movies available free for showing to groups. Write for information. THE LINCOLN ELECTRIC COMPANY • DEPT. 23 • CLEVELAND 1, OHIO





the plant equipment, larger cranes and machine tools were installed. While only 11 hammers had been made during the company's first 5 years in the hammer business, 18 were completed and shipped in that year. A trend toward even closer tolerances with the steam drops was noted. The Timken Detroit Axle Co. took delivery of a 5000 lb steam drop hammer that enjoyed, for a short time, the distinction of being the heaviest made by Eric. Galvanizing machines also were made by the company at this time. There were periods when sales of galvanizing machines provided much needed income.

The 12,000 and 15,000 lb hammers made in 1918 called for great ingenuity in assembly because of the limited plant handling facilities of that day. Anvil ratios had been increased from the 8 or 9 of earlier days to 20 to 1-in the case of the 12,000 lb hammers, the anvil weighed close to 120 tons. This weight, plus the 6-ton weight of the freely falling parts, plus the weight of the frame, obviously was not a hand-hoist proposition. However, H. E. Reed, for years head of the machine shop, and one of the company's directors today, managed to find a way to handle everything except the anvil in the shop, and devised a final assembly which may be a classic of shop history.

Anvils of open-hearth steel were purchased outside the plant in machined and ready-for-assembly condition, but the

Plastic Slide Rule Holds Dimension True

A new 10-in. plastic slide rule with precise graduations claimed to be unaffected by temperature changes is offered by Charles Bruning Co. Inc., 4754-10 Montrose avenue, Chicago.

The CI scale shows numerals and graduations in red to provide ease of reading. Beveled edges of the rule are graduated in inches and centimeters.

Tension on the slide is easily adjusted

Fig. 4-Custom-built extrusion press built at Erie Foundry

largest crane available at that time could not spot them for assembly. A simple solution would have been to wait for the car bearing the anvil, add the remaining parts, and send the hammer on its way. This, however, did not permit the work tests and "bug hunts" which are standard Erie practice. Therefore the anvil was left on the flat car and the car itself brought as far into the shop as the spur track would allow. There it was heavily timbered (as even flat cars have their limitations) and the hammer erected and tested without ever lifting the anvil.

A board drop hammer was added to the company's line in 1923, followed by a four-roll board drop in 1926, and shortly thereafter, an electric or self-contained board drop was perfected. Introduction of the four-roll board drop (Fig. 2), with an equalizer head that permitted uniform pressure by all four rolls despite variations in board thickness, eliminated the old 4000-lb limit of the board hammer. At this time, steam drops had been designed above 20,000 lb, and thus the board hammer maximum also was raised. The newly-formed Chrysler Corp., in reequipping the Maxwell Motors plant at Newcastle, Ind., used several 10,000 lb board drops. Early board drops were powered by belt drives from line shafts, electric motors being added later.

Extension of the company's work on

by four screws on the back of the rule. It is furnished with protective carrying case and simplified instruction book.

Molded Coil Forms Made of Bakelite

Inexpensive molded bakelite coil forms with anchored hairpin wire leads are offered by Electronic Components Division of Stackpole Carbon Co., St. Marys, Pa. Range of uses covers universal and tapped universal windings, hammers and presses led to development of other highly specialized tools. Hydraulic and mechanical presses are available for molding rubber and plastics and other applications. A large custom-built extrusion press is shown in Fig. 4. In 1934 the Lamac Process Co., manufacturning an extensive line of small presses adhesives, and accessories for shoe resoling was brought into the Erie fold

In 1936 the Navy called upon Erie for a steam drop that would forge 240-lb links of 4-in. dic-lock anchor chain at a single stroke. A special hammer with a falling weight of approximately 14,000 lb did the job. This was followed by construction of what is believed to be the world's largest planer, capable of peeling 10-lb chips from 130-ton steel slabs, with "watchmakers precision". Shortly before the outbreak of World War II, steam drops rated in the 50,000-lb class were purchased from Erie by England and Russia for forging aluminum alloys for aircraft. One of these, weighing in at close to a million and one-quarter pounds, is shown in Fig. 3.

During the war, Erie made many special hydraulic and mechanical molding, forming and forging presses. Some giant hydraulic presses had machined platens 32 ft long, 6 ft wide, and 4 in. thick. One mammoth extrusion press was designed to produce carbon electrodes 24 in. in diameter for a special project whose end result was the atomic blasting of Nagasaki and Hiroshima.

solenoid windings, antenna or coupled windings, iron-cored universal windings, iron-cored I-F transformer or coupled coils.

Standard types include forms with coaxial leads each end; single hairpin lead each end; single and double hairpin leads, and hairpin lead each end.

The forms being smooth, coils may be wound on separate tubes if desired and then slipped over forms, or winding may be done on forms direct, the company states.

Oakite Cleaning can help you when applying **Chemical Color Finishes to BRASS & COPPER ALLOYS**

Color Enhances Sales Appeal For Many Products ... But Finishes Applied Depend On THOROUGH **Preliminary CLEANING**

Sales appeal supplies a potent reason for applying coloring treatments to many products fabricated from copper and brass alloys. In doing this work TWO factors are of high importance:(1)THOROUGH preliminary CLEANING of parts; (2) Accurate control of the chemical or electro-chemical solutions so as to secure the desired color effects. And because CHEMICALLY CLEAN surfaces are so essential to good work, the results you expect are largely dependent on the efficiency with which the first operation is performed. On both wide experience is yours for the asking.

Specially Designed Oakite Materials Widely Used for Successful Surface Preparation

Depending on the deposits to be removed from copper or brass alloy parts, equipment available and production volume, different Oakite materials may be employed to secure the CHEMICALLY CLEAN surfaces necessary before applying a chemical or electro-chemical coloring treatment. Among these are Oakite Platers' Cleaner for tank method, with or without current; Oakite Composition No. 27 for tank method; Oakite Composition No. 30 for automatic washing machine or tank method; Oakite Test Q for tank method. Special conditions may indicate use of other Oakite materials.

Take Advantage of Practical Oakite Experience

Practical experience in the removal of contaminating deposits from copper and brass alloy parts is freely available to any plant through your nearby Oakite Technical Service Representative. Formulae for different color finishes supplied upon sequest. Your inquiries invited and promptly answered.

Oakite Products, Inc., 24 Thames Street, New York 6, N.Y. Technical Service Representatives Located in All Principal Cities of the United States and Canada



Color applied to latches, locks, cobinet hardware, metal trim, helps match decorative scheme.



Chemical coloring treatments provide attractive finishes on switch plates, light fixtures, reflectors.



Cigorette lighters, compacts, vanity cases and similar articles lend themselves to various color treatments.





Above—Mechanical engineering laboratory of Case School of Applied Science, Cleveland, valued at \$150,000

Below—X-ray diffraction unit for determining crystallographic structure of metals at Case. Equipment of this type, valued at \$5000, may not be within the budget of smaller companies, but often is available through participation of colleges in industrial research

A Research Program

For Smaller Concerns

... need not be a burden—will pay dividends in improved products



By DR. WALDEMAR DIETZ Executive Director, Research for Industry Inc. Cleveland

ONE of the fundamental lessons industry has learned or relearned from the war is that reasearch pays. Large corporations have been consistently spending large sums of money for research activitics over many years, because experience has proved that it is profitable to do so. But it is amazing how many smaller concerns have been going along from year to year with no research whatever, no planning or building for the future of any kind-some of them with surprising success. It is not the purpose of these comments to reiterate the advantages of research, but rather to point out how this modern tool can serve the small businessman or manufacturer.

Research frequently brings to mind a picture of an elaborate laboratory in which are carried out involved, expensive technical investigations. Actually, research covers a broad range of activities. It may take any number of forms and can be carried out on any scale desired. In fact, one large company executive has defined it simply as "an organized search for a better way."

Increased demands for improved material, and the stimulation of higher wages, have created an increased market for products of all types of business. Competition for these markets will call for greater efficiency on the part of both personnel and product. In order to keep pace with demands put upon it, industry will find it necessary to avail itself of every facility within its reach, and to bring together the best efforts of the academician and the realist, for it is in research alone that these divergent factors find a common level for harmonious and effective co-operation.

Able men with vision and experience have said many worthwhile things about research planning, but their remarks have been addressed chiefly to the larger concerns whose leaders already acknowledge the necessity of such activity. The



Block stripping is faster, easier and safer when served by Cleve-land Tramrail.

BLOCK STRIPPING



Stabilizing rollers under rail to minimize tilting of rigid arm when operating on crane. Machine grooved winding drum with plow steel wire rope.

Motor and controller especially designed for hoist service.

Entire gear train operates in oil bath which also lubricates all bearings and mechanical load brake.

All parts readily accessible and easily re-

HOIST CARRIERS placed. **Built for Long Time Smooth Performance**

Because Cleveland Tramrail Block Stripping Hoist Carriers are quality built and especially designed for the work, they are favored by many mills where they have been in long use and thoroughly proven.



uild with Wolff Steel Service

LFF

ICAG

Bar Shapes Structural

Plate

BENJAMIN WOLFF & COMPANY

General Office and Warehouse - 58th St. at Seeley Ave., Chicago 36, II. Wisconsin Office - 176 W. Wisconsin Ave., Milwaukee 3, Wisc

Sheets

Plates D

R

A new, greatly expanded warehouse is under construction at Benjamin Wolff and Company . . . planned for the active future that you, too, are looking toward. Certainly, these days of frustration in steel are limited, while unlimited are the opportunities that lie ahead. When this time comes, Wolff Steel Service will be ready to back-stop your requirements with alert, enlarged and positive action to bring you the right steel, in the right

place, at the right time.

smaller businessman still hesitates to include research in setting up his operating budget.

Money alone is not the prime requirement; rather it is careful analysis of needs, coupled with sound business judgment. A research program must be tailored to the particular needs of the business rather than directed to some far flung objective which might be unattainable within the financial limits of the sponsor.

Assuming that a research program is to be inaugurated what yardsticks are available with which to measure immediate needs?

Capable Direction

First, a qualified directing head must be chosen. Successful administration of a research program does not require academic proficiency so much as mature and realistic judgment, coupled with ability to evaluate academic requirements in personnel selection. The directing head should be thoroughly acquainted with company policy and should be in a position where freedom of thought and intellectual honesty can be freely exercised.

Such a status might best be preserved if the directing head be on a consultant or retainer basis rather than a direct employee. Moreover, diligent pursuit of research activity might not require his full-time attention, for in the development of research activities, much of detail work often can be carried out to better advantage at points away from the plant—in fellowship work at schools or colleges, for example. In some cases, outside laboratories specializing in certain specific lines may be more suitable.

The experienced research director will know how to segment and co-ordinate the overall activity to produce the most results for every dollar expended, reflecting good managerial capacity.

Basically, research may be divided into two fields of endeavor: Fundamental research and applied research. In general, the smaller business will be concerned with the latter, because it is primarily involved in activities where the time factor and the limitation of funds necessarily delineate the scope of operation.

Successful research programs must at their inception be resolved down to fundamentals of the three P's: Policy, procedure, and personnel. Policy concems itself with the overall program; procedure must concern itself with administrative know-how; personnel must concern itself with who does what.

In industry, particularly in many smaller plants, some effort has been made to establish a semblance of technical control. Such control work must not be confused with research; the two activities cannot be carried on successfully by the same personnel. Real research requires a high degree of concentrated effort which cannot be attained if the program is constantly interrupted. Once established, a research program must be free from interference by management.

A most important point of a successful research program concerns management of the activity. Too often the title of Research Director conferred upon the directing head is a poor morale factor, tending to subordinate personnel actually doing the work. The designation Technical Advisor has its advantages: It implies more correctly the true function of the directing head, inasmuch as it is his responsibility to act as consellor and coach to the rest of his staff.

Successful direction of research programs, unfortunately, is not something that can be gathered from books alone. Broad experience is needed, calling for administrative ability and — more important than anything else—a generous amount of good common sense. Results come through people, and proper direction of personnel is, in the final analysis, the difference between success and failure of any research program.

Budgeting

Our government has long recognized the value of research, and the expense of such an activity is a deductible tax item. Why not take advantage of this? Helping business to help itself is a profitable policy and thoroughly consistent with our democratic ideals; and it works for small as well as large business.

It has been estimated that there are more than 17,000 manufacturing firms in the United States doing \$500,000 or more business in annual gross sales, of which less than 2½ per cent are reported to have research and development facilities. Those reporting to the National Resources Planning Board spend annually an average of 2 per cent of their gross sales for research. Taking a typical research budget we find that in the case of a concern doing a million-dollar gross business, the breakdown of the budget is as follows:

| Directing head | .\$9.000° |
|----------------------------|-----------|
| Consultant services | 2,000 |
| Testing laboratory expense | . 4,500 • |
| Secretarial service | . 1,800 ° |
| Traveling expenses | . 800 |
| Subscription and books | . 200 |
| Incidentals | . 300 |
| Overhead charges | 1,350 |
| | |

* Staff

The total of \$19,950 is in close agreement with the \$20,000 a year which companies whose gross sales average \$1,000,000 can safely spend. It should be borne in mind, in connection with the above comments on research direction, that a full-time director may not be required. Moreover, a capable director will not require highly trained personnel. The \$9,000 item listed for direction might well be broken down to include salaries of technicians.



MIGHTY MIDGET GEAR: Power of gas turbine aircraft engine is transmitted to propeller at ratio of 10 to 1 by this reduction gear of special carburized and nitrided steel made by Nuttall Gearing Division of Westinghouse Electric Corp. Speed of 12,000 rpm is reduced to speed of 1200 rpm to avoid exceeding structural limitations of propeller. Gear, including propeller shaft support, weighs only about 1/30 as much per horsepower as an industrial gear



By O. K. GRAEF Mechanical Engineer Joseph T. Ryerson & Son Inc. Los Angeles

SOME years ago, Brown was granted a patent which covered the use of laminated phenolic plastics for heavy-duty bearing purposes. This has been held to mean for all bearings used for rolling, pressing, crushing or grinding materials. The phenolic used in his experiments showed some rather remarkable results from the standpoint of long life and economy of operation. Indications were that considerable power and lubricant savings, to say nothing of increased production, could be obtained. All plastic bearing makers in the United States now operate under Brown's patent.

The remarkable results induced many engineers and others to experiment with bearings of this type and almost without exception they followed the line of least resistance (and lowest first cost). It was apparent that something was wrong, because on some mills the plastics were successful and on others they were not.

Twelve principles underlying the operation of nonmetallic bearings and based on extended campaigns prevent many failures. Power savings on old mills are made possible by alleviating certain conditions. Change in impingement velocity and in distribution of coolant-lubricant afford saving in water requirement

Indeed, often one manufacturer's bearing was successful while anothers was not. The question was, why?

Some of the more intelligent began studying the difference in characteristics of phenol plastics, lignum vitae and white metal alloys: The lesser intelligences flooded the contemporary literature with long columns of misinformation, hearsay, wild guesses and silly suppositions, all offered in perfect seriousness as the "only way." When it is remembered that practice has long since outstripped theory on even the simplest white metal bearing, it is easy to realize the confused mental state within which

the plastic enthusiast groped blindly. Characteristics: Relative characteristics of the plastic bearing follow:

Characteristic Coefficient of friction Thermal conductivity Lubricant absorption, % Plasticity Elasticity Compressive strength Resistance to fatigue Tensile strength Type failure:

In compression, fracture Crystalline Above 300° F Incineration Rapidity of failure due to temperature Resistance to impact High Reclaimability None

It was noted that in heavily loaded bearings which were designed with large arcs of contact of plastic bearing to the neck, the necks always ran warm and the rate of bearing wear was rapid. It was rightly concluded that not enough area for the cooling water to contact the necks was provided. When decreased arcs were employed, which was possible because of the high compressive strength of the plastic, bearing life was greatly improved and wear was reduced, with correspondingly lower frictional coefficients and larger power savings.

> Fig. 1-A 44-in. blooming mill equipped with plastic bearings. Top chuck-is one piece. Bearing life was over 1,000,000 gross tons



Plastic bearings Low 1 to 3 Low Very high High High Moderate

Arc of Contact: Ingenious empirical mathematical formulae have been developed for the determination of the optimum are of contact. However, it has been found that in practice; a simple rule of thumb provides accurate answers for various bearing loads, as follows

4

1. On bearings loaded to more than 350 psi of developed bearing area, the total arc of contact of plastic to neck should not exceed 240° of arc, and no single piece of plastic should cover more than 135°.

2. For loads of less than 350 psi, the total arc of contact should not exceed 270° of arc, and no single piece should cover more than 150°

3. For lightly loaded bearings, up to 50 psi, the total arc may be increased to 500°, with no single piece exceeding 180°.

Alignment: The foregoing rule by no means solves all of the difficulties often experienced with plastic bearings. Sometimes a bearing operated in a satisfactory manner for months, fall, winter and spring only to fail after the first few hot days of summer, failure often occurring in only a few hours or a turn or two. Obviously temperature entered the problem. Bearings operated at close : to the breaking down point even in cold weather. Consequently an increase in

Fig. 2-Chucks and bearings for backup rolls of 130-in. broadside stand of 80-in. continuous hot strip mill

Fig. 3-View of 30-in. Steckel mill roll and chuck. Life of this plastic bearing was 25 weeks

Fig. 4-Plastic bearing which rolled 1,372,997 gross tons of finished product on a 44-in. blooming mill

water temperature of only a few degrees was sufficient to cause failure.

The earliest remedy was to use cold water. The cure was a bit more difficult as it involved tracing the cause. And the cause was invariably found to be a minor form of misalignment. The remedy then became obvious.

Squealing: In some types of mills the



Fig. 5—New 44-in. blooming mill for Russia on erection floor. Note one-piece top roll chucks

Fig. 6—Close-up of 72-in, reversing hot strip mill with cover removed to show plastic bearing operators were annoyed by a very high pitched squeal or howl. This was nerve shattering when it had to be endured for hours and many expedients were devised to eliminate it. None was completely successful until the moisture absorption and consequent swelling of the plastic was taken into consideration. Redesign of the bearing to provide adequate clearance for expected swelling and of the keeper plates to eliminate sloping buttresses stopped the noise. It is seldom experienced any more.

Principles Underlying Operation: From the many trials and errors coupled with considerable good constructive thinking certain principles have been slowly evolved for the successful use of plastic bearings.

- 1. Water is a coolant as well as a lubricant, the amount required for lubrication being less than 1 per cent of the whole amount applied.
- Viscosity of water decreases to so low a point at 100° F that it is not a satisfactory lubricant.
 The fit of the bearing liner to the
- The fit of the bearing liner to the neck is relatively unimportant provided that the crushing strength of the liner is not exceeded on the one hand; and that running clearances are large enough to permit swelling without totally destroying running clearance, on the other hand.
 The fit of the back of the liner into
- The fit of the back of the liner into the chuck is a controlling dimension and must be accurately done, no allowance for swelling being made here.
- 5. Provision must be made for the swelling of plastic bearings in all directions except toward the chuck.
- 6. Phenolic plastic bearings are sensitive to misalignment. Need for accuracy in their installation lies somewhere between that necessary for roller bearings and that for bronze bearings. It is much greater than that for babbit bearings.
- 7. Liner and thrust collar thicknesses are a critical dimension only as respects service of liners and clearance of roll neck fillet. Thickness is not a function of neck diameter.
- Liner length is a critical dimension only insofar as lead carrying capacity and speed of operation affect it.
- Arc of contact of liner to roll neck is a critical dimension and varies inversely with the load and speed, being greatest at light loads and least at heavy loads.
- 10. The chuck or bearing container must be sufficiently strong to contain the bearing loads over long periods without distortion (permanent set).
- 11. When grease or oil lubricated, phenolic plastics operate under exactly the same principles as bronze bushings.
- 12. The method and point of application of coolant and lubricant are important. Water should always be applied in such a manner that it will have the maximum length of time in contact with the neck.

Accuracy of Bearings: Need for accuracy in the use of phenolic plastic bearings centers in at least two points: (1) their fit into their chucks and (2) their general alignment in the rolling mill. A structural mill recently was equipped with phenolic plastic liners where bearing life was so short as to be ridiculous. The chucks were checked and it was found that the bores ranged from 1/32 to 3/16-in. off true centers. Coupled with 22-in. diameter roll necks and a short stiff roll, the tremendous crushing loads imposed laterally on the liners can be visualized. Remachining the chucks in dead center corrected the trouble.

the chucks Fit of the liners into must be accurately done. Phenolic plastics have low bending strengths and upon application of pressure they conform in every detail to the inaccuracies of their supporting units. If these loads are long continued, the plastic slowly cold flows to conform, ending up with a general mill misalignment and damage to the liners. This characteristic of "cold-flowing" exhibited by these plastics can be better understood if it is remembered that when manufactured, the polymerization of the resin is not carried to completion. At room temperatures and in the storeroom, this chemical action continues slowly. At high temperatures and pressures in the mill during a misalignment, the material becomes considerably softer, polymerization may be completed and the bearing assumes the exact contour of its mating chuck (exactly as the die in the mold in which the bearing was produced, except at a retarded rate).

Accuracy of Product: Where highly accurate sections are to be rolled in a mill as in the production of razor blade stock, cutlery steels, nonferrous and ferrous shim stocks, foils, etc., the phenolic plastic bearing stands pre-eminent but only if the fundamentals of its use and operation are carefully considered in the design.

Deflection of plastic bearings under bearing loads are of the order of 0.001 to 0.005-in. per in. thickness per thousand psi actual bearing load. Thickness of the bearing hence is important. Additionally important is the provision of a place into which the compressed material can expand temporarily. Granting good alignment, adequate lubrication and intelligent operation, with foregoing factors properly considered, plastic bearings are cold rolling to tolerances closer than can be achieved by any other type of bearing. In fact, rolling tolerances may be closer than those achieved by ordinary machining methods. A case in point is a small cold mill, rolling razor blade stock in 1000-ft coils with an overall tolerance in thickness from end to end of coil of 0.0001-in.

Rolls: With phenolic plastic bear-

UNDIVIDED RESPONSIBILITY

ONE ORGANIZATION

COMPLETE ENGINEERING SERVICES

100

E VERY service required in the design, engineering and construction of facilities for the Iron and Steel Industry is available in the McKee organization. McKee experience covers every step of iron and steel production from the

a fe

treating of raw materials to finished steel. All phases of engineering and construction are handled under a single contract by specialized technical experts and skilled construction personnel within our own organization.



| AVERAGE LIFE OF BEARINGS IN | STALLED ON 40-IN. BLO | DOMING MILL |
|-----------------------------|-----------------------|---------------------|
| Bearing position | Original design | Redesign |
| Top Rider: | | 1 |
| Pinion side | 200,000- 250,000 | 800,000- 900,000 |
| Working side | 230,000- 260,000 | 850,000- 900,000 |
| Bottom Carrier: | | |
| Pinion side | 900.000-1.100.000 | 900.000-1.100.000 |
| Working side | 1.000.000-1.250.000 | 1.000.000-1.250.000 |
| Children . | | |

ings heat conditions are reversed from metallic and roller bearing practice. Metallic bearings give off heat by conduction to the roll body which imparts it to the strip and hence from the machine. Accordingly, after deflection of the roll has been cared for, an additional amount of crown must be given the roll, else it will be hollow in the center, this additional crown taking care of the warmer roll edges.

With phenolic plastic bearings, the strip will be found to be 20 to 30° F cooler upon leaving the mill, because instead of extracting heat due to rolling plus bearing heat, the strip extracts only one-half the heat of rolling, the balance flowing from the roll to the bearing where the cooling water extracts it as well as the heat due to bearing friction.

This effect consequently requires some revision of roll grinding practice in sheet mills as well as a revision in operating practice. The need for careful design and effective engineering consultation is apparent.

In one case roll crown was reduced one-third of its former figure and on single turn operation, it was found that production was increased 25 per cent because no heating of the rolls was required to get section. In other words, the mill could be started up and flat sheets could be laid down from the first moment of operation.

Longevity: Factors which affect bearing life from the operational standpoint are better and more accurate product and reduction of operational costs through reduced maintenance. Unfortunately these gains are not always received. The reasons revert to inadequate design and inadequate engineering consultation with the operators. Both are necessary.

For example, in a structural mill bearing life was exceptionally short and rather erratic. Search of the mill logbook revealed most failures were sudden. Careful examination of design, lubrication and alignment revealed no flaws or errors. Examination of operations disclosed that the mill was noisy and that to eliminate coupling box rattle, it was the practice to tighten the thrust collars against the rolls to produce a drag effect and hold the mill tightly along the spindles to the motor, preventing over-running of the rolls when the bar left the pass and thus eliminating noise.

A phenol plastic can be made to operate either as a brake by applying it to the pods of the last mill in train and operating it as a drag. Or it can be operated as a bearing by slacking off the end-screws sufficiently to provide the necessary running clearance on the thrusts:

Bearing life increased remarkably, the product was improved and the rollers enjoyed the lack of noise. In this case consultative engineering effort was not made available to the operators.

Bearing longevity may be reduced by other things than misalignment or inadequate operation. Often the addition of a small amount of grease on mills cf certain types reduces power consumption considerably, while aiding production. Consequently a means of supplying the oil or grease to the bearing is installed. It is soon forgotten and when a difficult section is to be rolled, someone decides that more grease is required, and the system is stepped up. Possibly during a bout of bearing trouble it is stepped up again. Then someone forgets to order the recommended grease and a substitute is taken from the nearest barrel. Bearing life has in the meantime been much reduced.

Here is what happens: The surplus grease forms a thick coating on the neck, successfully interfering with the action of the coolant water. The bearing then operates as a grease lubricated bearing. Heat flow is reversed, and flows from neck to roll in larger amounts than when metallic bearings are used. To get section increase roll pressures are used; edges of rolls puff up from the heat and spall and roll barrels spall from overloads. Bearings burn out with frequency and often disastrously. Rolls break at the necks due to localized heating. This is a failure of supervision. Again the remedy is simple: Revert to the standard practice. Remember that all greases and oils do not adequately lubricate phenolic plastics, and none of them cool When used necks unless circulated. with water as a lubricant, only greases or oils with an animal base give satisfactory results. Indeed, greases containing graphite are known to cause checking of the bearing surfaces. The extent of this damage or its evaluation is unknown. The amount of grease which should be added is always the least amount which can be applied. A cold rolling strip mill operating at peak efficiency requires only 6 to 8 ounces per turn on each 20-in. neck. Avoid graphite contaning oils and greases.

Power-Saving: Factors influencing power saving are for the most part, those affecting bearing longevity. Of course the first thought that comes to mind is low frictional coefficient, and this again reverts to adequate design. With increasing speeds and bearing loads, coefficients of friction are reduced. It is not always practical or desirable to design a bearing to accomplish the minimum frictional coefficient and hence, power saving. Nothing is gained by reducing the frictional load to a small figure and then having to apply drags for practical purposes. The frictional load should be proportional to the type and condition of the mill, the drive and the product. Early in the manufacture of plastic bearings it was a race between makers to see who could boast the greatest power saving. Fantastic figures were presented with great gusto. The facts are these: Power savings up to 50 per cent are possible on old mills but only because in the use of plastic bearings, many of the old abuses of misalignment, improper bearing alloys, inadequate lubrication and dirty and scaly conditions had perforce to be eliminated. Power saving was 50 per cent, but only a part of this was due to the plastic bearing. Any mill operator should be happy with 20 to 25 per cent saving in power. Any excess over this amount probably is due to improved operation. The plastic bearing maintains its coefficient of friction throughout its life. A great deal of apparent life increase can be attributed to the relative insensitivity of the plastic Learing to dirt, water and mill scale.

Older Rolling Mills: When mills already in service are converted to the use of plastic bearings, the designer is always faced with decisions which seldem occur on new mills. In many older mills, changes have been made for the purpose of increasing their capacity or width or decreasing roll breakage or maintenance. Usually these "homemade" alterations have had the benefit of but little design experience and other factors have suffered. By this is meant, for example: The prevention of roll neck breakage by increasing neck diameters, which in turn, reduces the thickness of bearing chucks and accomplishes the substitution of an expensive breakage (roll-neck) for a less expensive one (bearing chucks).

When the plastic bearing designer faces this condition, he has a dangerous (Please turn to Page 138)



INDUSTRIAL OVENS and FURNACES



... has been our business

MAEHLER'S leadership in developing the recirculating air heat system for industrial ovens and furnaces has been recognized throughout industry for many years. The Paul Maehler Company has pioneered in this type of heating, the result of 53 years of experience which spans all of the methods from a coal stove in an oven serving bicycle refinishers to the complex systems of the present day.

Tests show that Maehler-engineered recirculating airheat furnaces maintain temperature uniformity that is *virtually perfect!* This kind of temperature control assures the user of lower operating costs, greater production and more satisfactory results.

Regardless of what your requirements are . . . heat treating, core baking, enameling, etc. . . . Maehler engineers can help you design an oven, furnace or complete system to meet your needs.



Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.



These two photos show typical Maehler installations. The one above is a Maehler air-draw furnace at Chambers, Bering Quinlan Co. It is used to anneal gray iron castings: The installation at the left is a Maehler continuous monoveyer core baking oven, with Palmer-Bee conveyor, at the Howard Foundry Company. The cores: are baked 2½ hours at 450° F.

57.33



Built to do centerless grinding better than ever before!

THE WHEELS OF INDUSTRY

Whether it be mass production operations or small runs, there is a centerless "Wheel of Industry" to do the job faster, better, and at less cost.

Throughfeed and infeed grinding demands superior wheels made to your particular specifications. This is possible when you order Sterling Centerless Grinding Wheels.

The wide range of problems that arise when grinding metallic and non-metallic parts can be readily solved by a consultation now with a Starling engineer. Skilled by years of experience in all types of grinding, he can quickly suggest the proper Starling Grinding Wheel for your use. No obligation . . . write today.

> • STERLING ABRASIVES • STERLING GRINDING WHEEL DIVISION

> > THE WHEELS OF INDUSTRY

N. OHIO

Scal for this important libber

o annois ut

OHIO

HE STERLING CRIMIN

Salute Ballipine White

HE



Diesel-Driven Welder

Lincoln Electric Co., Cleveland, is offering a new diesel driven 300-amp welder for use where electric power is not available. Engine features of the unit include simplified fuel arrangement with complete fuel filtering system. Current range for welding is 20 to 40 v, 60 to 375 amp.

Features of generator include separate excitation and laminated magnetic circuit



for a smoother arc at all current values. Generator control is adjusted in continuous sequence of fine steps by means of shunt field rheostat. Current is suitable for metallic arc welding in any position with bare or heavily-coated electrodes, also for carbon arc welding. Generator frame is attached to the diesel engine bell housing, and generator shaft is connected to the engine flywheel by a flexible coupling. Steel 5/27/46; Item No. 9175

Machining Feed Unit

A new motor-driven feed unit use of which increases production, reduces cost in drilling, reaming, counterboring and spotfacing is development of Hole En-



line. It can be easily serviced. Entire mechanism operates in a flood of oil. Steel 5/27/46; Item No. 9208

Snap Action Switch

A new three-pole open blade snap action switch to handle three circuits simultaneously is announced by Acro Electric Co., 1823 Superior avenue, Cleveland 14. Its overall size is $3 \times 1\% \times \%$ in. and it is



rated at 10 amp, 125 v ac, or 5 amp, 230 v. Operating pressure runs from 12 to 18 oz for the return type construction and 4 to 8 oz for the set type construction. The device is made for normally open or normally closed circuits, single or double throw and is of the company's patented beryllium rolling spring construction. Steel 5/27/46; Item No. 9478

Crankshaft Lathe

Wickes Brothers, Saginaw, Mich., is announcing a new combination model CH-4 automatic rough and finish turning center-drive crankshaft lathe for all turning prior to hardening or finish grinding on main line bearings and ends.

Machine is equipped with hydraulic

feed and is automatic in operation, rough turning bearings with divided tools both front and rear and then shifting to finishing tools. One operation of chucking, locating and handling of crankshaft is eliminated. It is equipped with synchronized variable speed and feed mechanism to maintain surface speed and tool feed at maximum during entire cycle. Poweroperated loading and unloading is incorporated.

Steel 5/27/46; Item No. 9297

Production Shaper

A new 20 in. shaper, incorporating a variable speed drive which gives an unlimited range of speeds to the ram, is announced by Simmons Machine Tool



Corp., Albany, N. Y. It is equally suited for demands of heavy production and toolroom work.

Extreme length of ram stroke is 20% in. Horizontal travel is 23 in., vertical travel



gineering Service, 13722 Linwood avenue, Detroit. Its long adjustable feedstroke provides positive feed rates.

Unit permits close grouping in multiple ins'allations for unison or sequence operations, and it can be mounted at any angle or plane. Quick advance and feed depth are adjustable from front. Hand control is provided for setting of tools and remote electric control is furnished through inbuilt limit switches.

Feed unit is available in two models, motor-driven with motor mounted above or belt-driven with motor arranged in-



(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 124.)

is 16½ in. and maximum distance, table to ram, is 16½ in.

The strong, ribbed column has bull gear bearing carried on a convex side wall for better resistance to thrust loads and equal stress distribution to frame. Clutch is of dry multiple-disk type, simple in adjustment. Machine provides a fine feed range of 0.006-in. for finishing cuts and 0.080-in. for roughing cuts. Steel 5/27/46; Item No, 9280

Plating Filter

A new automatic filter for plating room service, manufactured by Udylite Corp., 1651 East Grand boulevard, Detroit, may be used for continuous or intermittent filtering or for transferring of plating solutions

A positive plug type multiport valve which has one operating control lever



performs all operations. The filtering medium of activated carbon and fibrous material is mixed with water or plating solution in tank and transferred by pump to filtering tank. The filter structure consists of rigid porous ceramic elements. The filter aid is deposited on outside of these elements, which are permanent and need not be replaced. Entire unit is fully enclosed and is mounted on truck wheels to facilitate movement.

Steel 5/27/46; Item No. 9259

Numbering Machine

An improved light-weight numbering machine for metal is being offered by Acromark Co., 398 Morrell street, Elizabeth, N. J. Its wheel shaft, frame and



shank are of alloy tool steel and operating mechanisms are reduced in weight. The new small machine frame is said to be a particular advantage where small parts have to be numbered. *Steel* 5/27/46; *Item No.* 9142

Diecasting Machine

A new diecasting machine announced by Cleveland Automatic Machine Co., features improved hydraulic performance, automatic timing and adjustable bearings for the movable platen. Designated as universal high-pressure hydraulic model 400, the machine is capable of casting zinc, tin, lead, magnesium, aluminum, bronze or brass.

A double compartment furnace, on zinc, tin-lead machine, with separate automatic burners for each compartment, does away with cold metal in shot compartment. New metal is placed in second compartment, automatically causing overflow of readied molten metal into shot section. Steel 5/27/46; Item No. 9243

Die Heads

Landis Machine Co., Waynesboro, Pa., announces a new series of hardened and ground die heads, identified as type VV. The series includes 1, 1½, 2 and 2½-in. sizes for use on hand-operated threading machines. Heads are designed for threading alloy steels and other close tolerance work.

Chaser holders are clamped to slides of heavy cross section for maximum rigidity.



Removal of holders from face of head for interchange is possible without disassembling any part of head or removing head from spindle. The die head em-

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

| Circle num | bers below correspond- | NAME |
|----------------------------|---|---------------|
| ing to tho. you are int | se of items in which erested: | СОМРАНУ |
| 9175 9208 9478 | 9280 9291 9259 9160 9142 9238 | PRODUCTS MADE |
| 9297 | 9243 5-27-46 | STREET |
| | | CITY and ZONE |

Mail to: STEEL, Engineering Dept .- 12 13 West Third St., Cleveland 13, Ohio

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

Finer Screw Machine Products Are Made of Steel Shipped from the GENSCO Warehouse





Shown above are a few of the many products made of cold finished screw stock shipped from our warehouse to GENSCO customers.

For fast, smooth-flowing production use GENSCO cold finished Screw Stock.

Cold Rolled Strip Steel — Coils and Straight Lengths • Sheet Steel • Cold Finished Bars Shafting • Tempered and Annealed Spring Steel • Round Edge Flat Wire • Round Wires Shim Steel • Aircraft Strip Steel • Feeler Gauge • Drill Rod • Steel Balls

GENERAL STEEL WAREHOUSE CO., INC.

1830 N. Kostner Avenue, Chicago 39, Ill., Belmont 4266

New York 17 441 Lexington Ave. Venderbilt 6-2750

Cincinnati 2 1200 Times Star Bidg. Cherry 0691 Milwaukee 2 208 E. Wisconsin Ave. Broadway 7629 St. Louis 5 9301 Bonhomme Rd. Wydown 1368 Minneapolis 11 100 - 17th Ave., North Cherry 4457

ATLAS INTRAPLANT HAULAGE EQUIPMENT



20 Ton Capacity

STORAGE BATTERY FLAT CAR

For handling long bars. Powered by storage battery. Geared to travel at walking speed when controller is Id in operating position. Spring return to "off" when rel.ajed, at which point magnetic brake is set.

7-TON LOCOMOTIVE TYPE INGOT TRANSFER CAR

Operator station in elevated position at one end of cer with magnetic switch control located opposite end. Car is provided with hydraulic brake system with anti-friction roller bearing—spring mounted journals.

BUILDERS OF:

DIESEL ELECTRIC AND STORAGE BATTERY LOCOMOTIVES FOR INTRAPLANT HAULAGE SCALE CHARGING CARS AND ORE TRANSFERS FOR BLAST FURNACE STEEL PLANTS COAL CHARGING CARS, CLAY CARRIERS DOOR EXTRACTORS, COKE GUIDES AND COKE QUENCHING CARS FOR BY PRODUCT COKE PLANTS TURNTABLES

INDICATING AND RECORDING DIALS FOR WEIGHING SCALES

The ATLAS CAR & MFG. CO. ENGINEERS MANUFACTURERS 1100 IVANHOE .RD. CLEVELAND 10, OHIO, U. S. A.

-INDUSTRIAL EQUIPMENT-

ploys a new chaser and chaser holder combination employing a rack-tooth arrangement to quickly locate chaser in its approximate position after which an adjusting screw advances chaser to the correct gage setting position. Steel 5/27/46; Item No. 9291

Roller Lapping Machine

A new roller lapping machine announced by Spitfire Tools Inc., 2930 N. Pulaski road, Chicago performs pollshing and finishing operations quickly and accurately. It consists of two precision ground cast iron rollers which revolve in self-aligning adjustable bearings, one 3×12 in., the other 6×12 in. Both rollers rotate in the same direction at the same speed and may be adjusted to accommodate work up to 6 in. in diameter.

In using the machine, most economical procedure is to grind the plug or pin



within 0.0002 to 0.0004-in. of desired size and then lap to size. Abrasive compound is spread evenly over both surfaces and work is placed between the rollers. A notched fiber stick is pressed down on work and moved slowly and evenly from side to side across the plug or pin. Friction of rollers on the plug causes it to revolve, and the difference in the surface speed of the rollers brings about a lapping or polishing action. Work may be put in and taken out for checking without stopping machine as no chucks are used.

Steel 5/27/46; Item No. 9160

Portable Welder

A compact portable welding outfit weighing less than 30 lb is offered by Patent Specialties Inc., 4020 Teuth averue, New York. Built into a shockproof case with carrying handle, welder uses 110 v, 60 cycle ac current. The built-in transformer gives up to 60 amp and provides six heat ranges. Capable of both brazirg and welding, it also does work of b'ow torch, forge, and soldering iron. Welding helmet, flux, electrodes, asbestos plate and instruction book are included in the set. Steel 5/27/46; Item No. 9238 Modern weight lifter-

<u>lightened</u> for new efficiency!

The "lift" magnesium is giving many products today is reflected graphically in the Keen hand truck. Here another manufacturer has turned to the lightness and strength of "the metal of motion" to provide new efficiency of operation.

Especially designed for such heavy loads as refrigerators, stoves, and similar appliances, this hand truck was lightened more than one-half by the Keen Manufacturing Company through the use of extruded shape and sheet magnesium. Its weight was reduced from 58 to 27 pounds... with every pound removed adding to the ease and efficiency of doing its work. It is a basic demonstration of magnesium in use ... lightening the load for industry.

Today, in both consumer and industrial fields, magnesium is saving weight, increasing efficiency, without sacrifice of strength. For full information on its many advantages, contact the nearest Dow office.

Ready... MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS



Full stocks of magnesium in all common forms are now available from Dow, pioneer producer and today's foremost fabricator.



Fabrication techniques, backed by 30 years of Dow experience, are established in progressive plants throughout the country.



This lightweight baseball mask, in use in both major and minor leagues, was achieved through magnesium application.



MAGNESIUM DIVISION & THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN New York & Baston • Philadelphia • Washington • Cleveland • Detroit • Chicaga • St. Louis • Houston • San Francisco • Las Angeles • Seattle
Injection Molding of Steel

Niagara Aero After Cooler Protects Air Processes from Moisture Damage

Industries requiring dry compressed air need the Niagara Aero After Cooler. It provides cleaner, drier air for pneumatic tools, spray guns, sand and shot blast equipment, air cleaning nozzles and situations where air is introduced into materials in process.

The Niagara Aero After Cooler is based on the evaporative cooling principle. It does not consume cooling water and thus pays for itself duickly from savings in water bills. The patented "Balanced Wet Bulb" method assures the lowest air temperature, and controls exactly the jacket water temperature.

Write for Niagara Bulletins 96 and 98 for further information. Protection of air tools from moisture damages and saving in repairs makes the Niagara Aero After Cooler worth investigating.

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering DEPT. S-57, 6 E. 45th St., NEW YORK 17, N. Y: Field Engineering Offices in Principal Cities





(Continued from Page 87) in the rear of the base, appropriate tubing, a 5000-psi New York Airbrake pump, and a 20-gal accumulator in the front end of the base. The base is secured to a floor by bolting.

The Ajax-Northrup furnace is really an air-cored transformer whose primary is the furnace coil and whose secondary is the melt or other conducting body to be heated. The furnace coil is made of copper tubing and insulated between turns so that water can be used in cooling the copper.

When high-frequency current is applied to the terminals of the helix, all space inside the coil is subjected to a rapidly alternating electromagnetic field, Fig. 4. Any electrical conductor inside the coil, i.e., any furnace charge, therefore has currents induced in it. These induced currents cause rapid heating up to the melting point.

Uniform Composition Insured

The action of the electromagnetic force on a molten metal charge keeps the metal stirred up, quickly distributing the elements to all parts of the charge and insuring alloys of perfect homogeneity. Thus, uniformity of composition at high speeds is said to be insured.

The generator which supplies current for the furnace is a 175-kw device, and has a melting potentiality of approximately 500 lb per hour. It is operated by means of a compact, two-bearing motor.

The furnace is of the tilting type because its shell is movably mounted on double trunnions. Its pouring spout is aligned so that there will be no waste when it is tilted over the injection machine hopper, and it holds about 300 lb of steel.

A ruggedly-constructed, box-shaped unit with a heavy metal framework protects the furnace coils, and all exterior portions of the furnace are insulated from the high-frequency current so as to provide maximum safety for the operator. The framework is of a nonmagnetic metal, and is divided into insulated sections so that the induction effect of the high-frequency currents in the framework will be negligible. Virtually all heat goes into the melt.

Furnace controls are mounted on a single panel near the furnace. In addition to a main-line breaker for energizing the furnace, this control panel is equipped with ammeter, voltmeter, wattmeter, power-factor meter, field ammeter, capacitor voltmeter, and overload relay. A simple rheostat and voltage regulator provide full control of voltage-at all times. Other controls include tap switches and



Are YOUR Locomotives Out-moded?

Maybe good old 99 steamer is still puffing around your plant making a big noise about the little work she does. Good old 99 "she ain't what she used to be" but she's been around a long time—*maybe too long!* A check on the operating and maintenance figures of every locomotive on your track may reveal startling facts.

In today's highly competitive markets, low haulage costs made possible with new, modern tractive equipment, are all-important. Whitcomb Engineers will gladly propose locomotives that can and will meet your specific requirements. The operating and maintenance expense on these units will be surprisingly low. They will be dependable with near 100% availability and economical beyond your expectations.

> Diesel Electric Locomotives 25 tons to 95 tons. Diesel Mechanical Locomotives 3 tons to 40 tons.

> > Ε

LL

THE WHITCOMB LOCOMOTIVE CO.

н

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

С

E

THE BALDWIN

GROUP



 \star In many plants this type of jib mounted Euclid Hoist swings over a wide radius to serve assembly bays while Euclid Cranes travel above in handling heavier loads over the entire shop area.

This is but one of a host of uses for Euclid Hoists where speed, smooth operation, safety and low cost maintenance are essential.

The push button control with flexible cable permits free movement of operator during raising and lowering of load.

The full line of Euclid Hoists in various types and in capacities from 1000 to 30,000 pounds, with controls as desired, is illustrated and described in Bulletin 838. Write for it.

THE EUCLID CRANE & HOIST CO. 1365 CHARDON RD. • EUCLID, OHIO



an interlock box with push buttons for adding or removing capacitors from the circuit.

Static capacitors are used to balance the inductance of the furnace proper and to permit the generator to operate at unity power factor at all times. They are very efficient and, because of low internal temperatures, have an extremely long life.

The capacitors are usually assembled in groups or in banks, mounted on porcelain insulators with their connecting bus bar and contactors so arranged as to form a compact assembly, Fig. 6. Some of the units are permanently connected to the bus bars and some are tied in by means of contactors, so that the amount of corrective capacity can be varied from the control panel to meet the various furnace conditions. Ergo, the operator can maintain the unity power factor.

A protective pressure switch is incorporated in the water supply to insure water flow to the capacitors at all times. In addition, a visual warning is provided by discharging all cooling water into a small open trough located beside the control panel.

Furnace Lined With Crucible

The furnace is lined with a preformed refractory crucible, which is placed over a bed of granular refractory and centered in the induction coil. The space between the inductor coil and the crucible is filled with granular refractory and sealed at the top with an air-setting refractory cement.

Due to the simplicity of its installation, the furnace lining can be broken out readily and replaced when it becomes seriously worn or damaged.

The first steel injection press was made for Armstrong-Vickers at Birmingham, England, for use in making hypodermic needles. Prior to that time, the manufacture of hypodermic needles was accomplished by machining. With the new machine, Armstrong-Vickers can tu:n out flawless needles at a rate of six per minute.

Other articles that have been economically made by steel injection molding include carburetor cases, spark plug bases, wrenches, knobs, handles, and small automobile parts. None of these have a weight of more than 15 lb. However, it is said larger casts could be produced if larger machines were constructed.

Up to now, all of the Hisgen presses have been made at Los Angeles, but demand for the machines has been so great that Hisgen is now establishing a new press plant at Cincinnati to speed up deliveries to eastern and midwestern buyers of this equipment.



May 27, 1946

131



If you need a special rivet, nail or threaded part—and soon we can make it for you. Cold-forging offers you not only surprisingly quick delivery, but a substantial saving as well.

Steel, Stainless Steel, Monel, Brass, Copper, Bronze, Aluminum and Aluminum Alloys are everyday materials to us. A varied stock of sizes and metals is available to serve you.

Both economy of manufacture and strength of product are obtainable by using cold-headed parts. Send us a sketch or sample of your part. No obligation. Ask for free catalog.

JOHN HASSALL, INC.



OAKLAND & CLAY STREETS

BROOKLYN 22, N.Y.

Special nails, rivets, screws and threaded parts

High Temperature Alloys

(Concluded from Page 90)

is now approximately 5 lb. While thinner walls have been made, minimum practical wall thickness is about 1/16-in. Unless the casting otherwise permits thinner edges, about 0.012 to 0.015-in. is minimum. Gradual tapering is preferred to abrupt sectional changes, since it is difficult to produce a heavy section immediately adjacent to an extremely thin one.

Minimum size hole that can be cored naturally depends on the amount of surrounding metal, but in general a small-diameter, shallow opening, 1/4-in. diameter by 1/2-in. deep can be held to a tolerance of plus or minus 0.003-in., on both location and diameter. Best working minimum is 0.050-in. even in light sections for a small hole can be cored in a light section often impractical in a larger one. Holes of intricate shape can, however, be precision cast.

Actual tolerances to which castings can be held depend on contours and size of the part, but 0.005 to 0.010-in. per inch of dimension can be held on the part ascast; yield of satisfactory castings is directly proportional to tolerances allowed. If finishing by machining or grinding is required, allowance of 0.015 to 0.040-in. for the section as-cast is sufficient.

Appreciation of precision casting in the production of a growing number of quality designs for parts that can be engineered for working performance rather than convenience of fabrication. Mass production output also is a factor, Some of the typical parts being advantageously precision-cast are valves, multiple dies, turbine blades (solid and hollow), injector nozzles, impellers, supercharger buckets, sleeves, gages, scale pivots, compressor blades, bushings and nozzle diaphragm blades.

Vanes in the nozzle diaphragm of an aviation gas turbine, for instance, are cast of Vitallium; these vanes have changing airfoil sections, thin trailing edges and shrouds, and are subjected to corrosive gases at high temperatures. A steam turbine blade, for a turbine-generator set, must have sufficient strength when operating with steam at high temperatures and pressures, yet the intricate shape would make it difficult to forge or machine. It, too, is precision-cast of Vitallium.

Three new types of hand knobs for machines, fixtures and other uses are being manufactured by Machine Products Corp., Detroit. Of cast iron, handles are offered in rough castings or machined, with or without polished steel handles. Four-star design is made in six sizes, five-star in two, T handle in two sizes.



... ELIMINATES GUMMING

PROBLEM: Steel wire, drawn to proper size for use by wire rope makers, was coated at steel mill for protection during shipment and storage. Use of a rust preventive was necessary, but rope makers complained that it gummed and clogged their wire rope machines.

SOLUTION: When the Shell Lubrication Engineer surveyed the problem he recommended a change to a Shell Ensis product. This gave complete protection, and the gumming problem disappeared. Moreover, Shell Ensis Fluid is a petroleum product...dissolves harmlessly when the permanent lubricant is added to rope strands. * * *

CONCLUSION: It pays to consult the Shell Lubrication Engineer, regardless of the nature or size of your lubricating problem. Write for a copy of Shell's 40-page booklet on Rust Prevention. Shell Oil Company, Incorporated, 50 West 50th Street, New York 20, New York; or 100 Bush Street, San Francisco 6, California.





Day after day your loading platforms must stand up under pounding shocks, grinding truck wheels and the most punishing traffic conditions. They must do this without cracking, crumbling and becoming accident hazards. AW Super-Diamond Floor Plate not only meets these requirements but gives three extra advantages which make it first choice among architects, builders, product engineers and purchasing agents. The 30% reflects

The 30% raised area of the exclusive AW Super-Diamond pattern supplies the extra traction that gives men's feet a firm sure grip and guards against slipping. The sloping sides make it extra easy to clean with a hose, brush or mop. Water drains and dries quickly. The continuous Super-Diamond pattern reduces cutting waste to a minimum and allows plates to be matched quickly.

Get complete information about AW Super-Diamond Floor Plate by writing for your free copy of Booklet L29 Alan Wood Steel Company, Conshohocken, Pa.



Induction Hardening

(Continued from Page 93) lower than the core. This is true of thick induction hardened cases.

Thus, if a part made of SAE-6150 steel is core hardened to 38 rockwell C, and subsequently induction hardened to 50 to 54 rockwell C to a depth of $\frac{1}{2}$ -in., a narrow band below the induction hardened case may show hardness of only 34 rockwell C. Such a zone is not encountered with thin cases of less than 1/16-in. in any steel. It is almost nonexistent with steels hardened from below 1550° F, even with deeper case.

Proper core-hardening treatment prior to the induction hardening is necessary. For best results, all of the ferrite and carbides should be put into solid solution before quenching. When this is done in the core hardening treatment, there is excellent uniformity of results in the later induction hardening. Annealed steels containing appreciable quantities of chromium carbides are sometimes difficult to harden uniformly by induction.

Proper tempering after core hardening, preferably a 2-hour tempering treatment relieves quenching strains and reduces possibilities of cracking during induction hardening.

Depending on service applications, various core hardnesses from 28 to 46 rockwell are used with equal success. In general, the core hardness specified is calculated as adequate to carry the necessary load and the induction hardened surface is specified mainly for wear resistance.

The accompanying views show typical induction hardened parts. These parts were ground and etched to show the induction hardened zones darker than the core hardened areas. Fig. 2 shows two spur pinions induction hardened to just below the base line.

Fig. 1 shows cross sections through two bevel pinions after induction hardening. Both pinions, one of which has spiral teeth, were hardened below the tooth roots, the spiral pinion having been hardened completely through to the bore. The induction hardened areas appear dark and the core-hardened areas appear halftone.

Fig. 7 shows a cross section through a planetary spider in which the pinion was induction hardened completely through to the bore.

Fig. 5 shows a cross section through a double gear, with the bevel gear teeth induction hardened to just below the root of the teeth, while the spur pinion was hardened completely through, and for a considerable distance beyond the undercut section between the pinion and shaft.

Fig. 6 shows a cross section through



abor so in re-Light in weight, simple to operate, the Ridde Model 4 Hand Portable Was tion on armed Extinguisher is especially useful in fighting the small incipient business blazes that may break out in plant lair or laboratories, where flammable from liquids are frequently used. Those to 54

The simplicity of operation of the Kidde Model 4 is of special ling to advantage for laboratory personat the nel, who may not have had as ex-tensive fire-fighting training as status the plant workers. With a Kidde

Kidde



Do your employees

Kidde

fire, and pull the trigger. Full details on the Model 4 are available from Walter Kidde & 4. It is necessary only to raise the available from horn, aim the extinguisher at the Company, Inc

Research board 3 25 memening its e associnonvot-

ITCE

nwn

y. whose i whose ly com-manu-ich year ipanded will be

Henry of the

ns in the

ed next

hackag-

tion of

on the

e Brand ation to strument aditional

npetitive

0,

elf

ll mar-

d gov-goods, clency

other

Woolsturers factory

the ex-

Ifactur-

Aprove. of the depart-

Tore

ors

27-

were s at-s was

ifirmed Iperts, Dression

at the

1 11

asted

HARD-HITTING **FAST-STARTING EASY-TO-USE** EXTINGUISHER

15 pounds of carbon dioxide -controlled by simple, foolproof trigger grip valve-that's the unbeatable combination you get in the Kidde 15 Hand Portable!

Mail and Phone Orders Filled

Kidde

KIDDI

2.24

Firm Rebuked

ASHINGTON

FULL FIRE-FIGHTING RANGE ... INSTANTLY!

The stream from a Kidde Water Extinguisher reaches its full range as soon as the discharge starts-maintains its range till extinguisher is empty.

Mail and Phone Orders Filled

The word "Kidde" and the Kidde seal are Walter Kidde & Company, Inc.

628 Main Street, Belleville 9, New Jersey ked mines decreased 4 per cent in Oc-tober, while in the first half of Meat May Become stationed in a little town in Fran-for several months, wood

w th

stationed in a little town in France

Free in girl by telling her about

- inte

trade-marks of Waker Kidde & Campany, Inc.

Two-way protection

from one bank of cylinders

Put one bank of carbon dioxide

cylinders on guard over two fire

built-in system with directional valves.

hazards, by installing a Kidde

Automatic valves direct the car-

the threatened area as soon as

are operated by a simple three-

nal the start of a fire. Manual valves

quarter turn. Write for full details.

bon dioxide discharge to

Kidde Heat Detectors sig-

Sam. "Why "They'r they?" "Annie He wa and let g "Annie "Annue He sh ward al body sh "Gud loday," cdiy. Jersey took o across The water h Commu in the Jersey been for this 300 30 years barges. rain and cold. N quit. "Go says / two c three nicke noth Into ch gray Au softly ness. nowaday Hardly speaking. this era ator-pho tween 10 Mostly th road me But hou too, and the Cent York wh York

were operating in husiness ed with weapons particul

by

distributed

un-the Lenigh

rvice first trip Sam colle

pastenge

'You

But in first took his fathe was not made a ' ing ou' After for nc Mills / years when slend weigh around artifici an aut He adia Surp to close no occul even par when the Gap lift Only the "You"

mile ups

Major Army

Someth

was rep Board e City c monthl: a cent exampl ary is semimon \$1,041.66

Natura

2.3 ce

2



H & S HERRINGBONE SPEED REDUCERS have 10 points of superiority

★ The features shown in the above illustration of the double reduction Horsburgh & Scott Herringbone Speed Reducer are found also in the single and triple reduction herringbone units. Extreme accuracy, herringbone tooth design and the locking of gears between oversize Timken roller bearings insure quiet, smooth operation ... maintenance cost is close to the zero point and depreciation is exceedingly low, even under very heavy shock loads and other difficult conditions of service.

Send note on Company Letterhead for Speed Reducer Catalog 39

THE HORSBURGH & SCOTT CO. GEARS AND SPEED REDUCERS 5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A. the spline of a drive shaft that was induction hardened to a depth of about one and a half times the depth of the splines. The hardened driving prongs at the end of a small drive shaft are shown in Fig. 4, and Fig. 3 shows the induction hardened tips of the teeth of a starter jaw.

All parts shown in the illustrations were quenched and tempered to hardness of a least 28 rockwell C, and some to as high as 46 rockwell C, then finish machined and finally induction hardened and tempered. Change in shape or in dimension during induction hardening seldom exceeded 0.001-in., with the possible exception of the bore of the part shown in Fig. 7, which goes out 0.001-0.002-in. In most cases dimensional change is in the neighborhood of 0.0001in. during the induction hardening.

All parts shown were etched about 20 sec in a solution consisting of eight parts nitric acid, one part sulphuric acid, and ten parts water. The parts were then scrubbed with a soft brush to remove deposited graphite, dried and lacquered.

Where production of a hard wearresisting surface of close dimensional tolerance coupled with strength and toughness of the core areas is required, this method of core hardening, finish machining and then induction hardening is found to be a very satisfactory method of producing parts.

Steel Tubing Data Available On Slidecharts

A new slide chart which is said to simplify calculation of velocity flow and capacities of heat exchangers is issued by Carpenter Steel Co., Welding Alloy Tube Division, Kenilworth, N. J. The chart also contains information and data on areas of various diameters of tubes, a pressure table, and a table of weights for round stainless steel tubing.

Information is given on the physical properties of the principal grades of Carpenter stainless tubing as well as specifications on various sizes and gages in which the tubing is supplied.

Pyrene Renames Line

Eleven established extinguisher trade names are being changed in favor of only one trade name and more informative labeling by Pyrene Mfg. Co., Newark, N. J.

Nameplates have been completely redesigned for quicker identification and more legible instructions. Assorted trade names have been dropped and the type of unit has been added in conjunction with the Pyrene name.

Due to difficulties peculiar to foreign markets old trade names will be retained.

Advertisement

METAL-CUTTING LUBRICATION

Problem and Solution in Tapping Stainless Steel

TAPPED TO A DEPTH OF 3/4" CHIPS WOULD TEAR THREADS AS TAP WAS BACKED OUT

Knowledge of lubrication and your specific machining operation often combine to solve a stubborn and

costly metal-cutting lubrication problem...

Engineer's Report "White Rodgers Electric Company has been buying our Chillo 1000

and using it to blend their own cutting oils. Recently, they seemed to be having a difficult time in tapping 430 Stainless Steel.

"When I checked the job, they were using Chillo 1000 with the characteristic attitude that if 1 gallon of base to 5 gal. of mineral oil is good,



then 2 gal. of base should be twice as good. This was carried to the point where they were using a 50-50 mixture which was very viscous and obviously not cooling the work nor reaching the cutting end of the tap.

"The 430 Stainless Steel tore badly when tapped to a depth of $\frac{34}{4}$ inches with a 5/16 inch tap. It was a blind



hole and apparently the threads were being torn by the chips when the tap

| Blending |
|----------|
| Problem |
| Avoided |

was backed out. Since the blind hole had plenty of chip clearance in the bottom below the threaded section, we

changed from a 3 fluted tap to a 2 fluted tap with a "Gun Groove" ground in the end to throw all the chips forward and thus not interfere with backing out the tap.

"This seemed to help quite a bit. However, the oil was still not reaching the cutting end of the tap.

"We recommended Cities Service Grade A-90 for this job, because we felt that it had the necessary additives



and would avoid the blending problems encountered with Chillo 1000.

"Grade A-90 has proved so satisfactory that White Rodgers are using it on all stainless steel. In addition, the Engineering Department is specifying Grade A-90 on all prints of stainless steel jobs along with recommended cutting speeds."

Through continual contact with the lubrication problems encountered by industry over the years, Cities Service Lubrication Engineers have accumulated considerable information on ways and means for reducing costs and improving the performance of lubri-

| xpert | |
|-----------|--|
| Counsel | |
| Available | |

cants. See for yourself how they can help you. Contact your nearest Cities Service branch office or write to Cities

Service Oil Company, 60 Wall Tower, New York 5, New York.



FOR EVERY LUBRICATION PROBLEM CALL Cities Service FIRST!



FIGURE YOUR OWN HANDICAP

Production has Black Market on the run. No question about that-a little more time will prove it.

Next, Production will catch up with Accumulated Demand. That will take a little longer, but it's coming.

Then for the finals, when Competition gets hot! Competition means prices and values-strong contestants.

Anybody who has something to sell will do well to think twice before raising his prices too high, regardless of what OPA says.

Remember, OPA is never a customer. It doesn't buy anything.

Customers, in the long run, determine price policies. If customers think prices are too high, they stop buying.

The best strategy is to set prices that attract business in competition. If costs are too high, get them down, by improved design, improved methods, better machines, more efficient distribution and better organization throughout your business.

That's the only program that will yield sustained profits.

Munu President



This organization of over a hundred trained engineers has twentyseven years of consulting management engineering experience. We invite you to write for more information, or to request a personal interview in your office.

THE TRUNDLE ENGINEERING COMPANY Cleveland, Ohio, Bulkley Building CHICAGO, City National Bank Building, NEW YORK, Graybar Building, 208 S. La Salle Street

420 Lexington Avenue

Plastic Mill Bearings

(Continued from Page 120) decision to make. From the commercial angle, he must take a chance, for if he doesn't, his competitor will, and all he will have succeeded in accomplishing, is the loss of a customer. From the engineering viewpoint, he has a material which is low in bending strength and which will surely fail due to extreme pressures if the chuck is not strong enough to support it properly. With a fair degree of success, this problem has been partially solved by the substitution of high-strength alloy steel chucks, cast or even machined from billets.

Again on a 110-in. plate mill, much breakage of necks having a 11/2-in. fillet was experienced. New rolls were supplied having a 51/2-in. tapered fillet. The plastic bearings which operated satisfactorily with the original necks, now had to be shortened from 30 to 22 in. to avoid the tapered fillet, and the liner readjusted to the screwdown center line. Instead of the original length-diameter ration of 1:1, the liners now have a ratio of 1:0.75. Bearing loads have been increased 30 to 35 per cent and bearing life has suffered. Additionally, due to the liner extending up onto the taper of the neck, the 1-in, thickness of liner which could previously be worn away before allowing the neck to contact the chuck, has been reduced to 1/2-in. So in addition to greater pressures, only half the bearing maximum life can be utilized. Bearing costs have more than doubled as a result. The remedy probably will never be applied, as it consists of returning to a straight neck and increasing neck diameters sufficiently to approximate the strength of the smaller neck with tapered fillet. This would be costly as it involves the replacement of 10 or 12 sets of rolls.

In adapting plastic bearings to housings originally designed for another type bearing, the correct length is cften difficult or impossible to achieve. A compromise of some sort is required, usually to the plastic bearings' disadvantage. In all such cases, the bearing life, the power requirements or the production schedules must suffer. The cheapest point is the plastic bearing or the power requirement or both.

Lubrication: In these conversion jobs, small and apparently inconsequential items can and do cause apparently disproportionate ill-effects. Most operators, for example, insist that the cooling water sprays be directed at the point where the neck is turning into the liner. Such procedures advertise a distressing ignorance of the fundamentals of lubrication of this type of bearing. By adsorption, the neck will carry sufficient lubriA FULL CREW, on full pay ought to mean full production. But the most conscientious workers can't maintain schedules on powerstarved machines.

And plant surveys show that obsolete, overtaxed wiring can reduce machine and man power efficiency from 25 to 50 per cent.

By all means make certain your

a head for Full Production

wiring will support your production plans. Check the problem with your plant power engineer, your consulting engineer, electrical contractor or power salesman.

Low-cost electric power, all you want of it, is on the other side of the meter. Make sure it gets where it's needed, to safeguard highpriced man power.

"ABSENTEE WIRING"-INADEQUATE WIRING



Wire



High temperatures, heavy hearth loads, batch or indexing operation will not result in "CR_{AN}KS_{HA}FT_{IN}G." A tough refractory shell insulated against high heat loss around a water cooled shaft insures minimum flexure at all operating temperatures. A heavy load can remain in the furnace for long periods without roller rotation.

THAT'S A GOOD FURNACE ROLLER

PLUS

Refractory Radiant Combustion Tubes of high heat conductivity material (CARBOFRAX)* with patented joint seal, insures against atmosphere contamination. Investigate the following features of these tubes:

SILICON CARBIDE BURNER TUBE

Pure Furnace Atmosphere

Long Life of Tubes

Substantial Fuel Economy

Adaptability to Special Atmospheres

Higher Temperatures

More Efficient Heat Transfer (6)

*NOTE: "Carbofrax" is a registered Trade Mark which indicates manu-

factured by The Carborundum Company. Refractory tubes and rollers are engineered into "GASMACO"

furnace equipment to suit your heating requirements.



cant into the bearing for lubrication and this can be neglected completely from the design standpoint. However, because the major portion of the water is for cooling purposes, it should be applied as high up on the neck as possible, so that it will remain in contact and extract heat for the longest possible time. Gravity will carry it down rapidly enough without help.

Considerable comment has been made that it is immaterial whether the coolant-lubricant is applied by holes drilled in pipes, slots in pipes, water boxes or high-pressure sprays. Both experimentally and practically, it has been found that increasing the velocity of impingement of the coolant-lubricant, coupled with better distribution of the water at the point of contact, decreases the water requirement as much as 50 per cent. Definitely the finely divided conical type of jet as provided by an adequately designed spray nozzle is superior to any other type of application tested.

Many operators complain that this type of nozzle is subject to more plugging than drilled holes, under conditions of dirty water. By practical experimentation, this was also found to be a matter of opinioin rather than of fact. It was found that under identical conditions of operation, drilled unreamed holes and drilled deburred holes in pipes, drilled holes carefully rounded inside and out, and properly designed spray nozzles all of the same nominal diameter, had operating times before plugging in the ratio of 1, 1½, 2 and 3, respectively.

Blooming Mills: On old types blooming mills, it is usual to find that the top roll rider chucks and the top roll carrier chucks are discontinuous. That is, the screw acts vertically downward on the rider and the stilliards act upward against the carrier, the two parts being kept separated by the neck itself. It is contended that this condition is an outright violation of the principles of design of a good bearing inasmuch as the two opposed forces destroy the clearance necessary for successful bearing operation. In support of this, the cases of several mills could be cited. A 40in. blooming mill experience is presented in the accompanying table shown on p. 120.

Prior to the redesign, bearing life was erratic on the top roll. Sometimes a plastic bearing would operate for 600,-000 tons and when replaced, its successor would be totally destroyed in 50,000 tons. Occasionally a bearing would operate for 100,000 tons with but little wear and then fail in only one or two turns.

After redesign, bearing life became normal on both top bearings, no further instances of erratic wear being observed



HOT METALS TRAVEL SAFER with LIGHT-WEIGHT CONE-DRIVES

> *MORGAN-ENGINEERED CONE-DRIVE EQUIPPED CRANES AND HOISTS RANGE UP TO 275 TONS CAPACITY.

To operate the hoist and propel this 60-ton^{*} ladle car over long pits—pouring molten metal into molds—MORGAN ENGINEERING COMPANY used five CONE-DRIVE gear sets, three in the drive to the two drums, one to drive each wheel of the trolley. In installations such as this, CONE-DRIVE gearing not only provides a higher load safety factor but permits important reductions in size and in gear weight—sometimes as high as 50 to 67 per cent of the weight required for other gears. This is due to the vastly greater contact—tooth for tooth and larger number of teeth in contact which doubleenveloping CONE-DRIVES automatically provide.

CONE-DRIVE gear sets are available from stock in up to 18.000 inch center distances (capacities up to 800 hp. at 2400 rpm.) Tooling also available for CONE-DRIVES ranging up to 48 inch C.D. (Capacities up to 7500 hp. at 1800 rpm.)

> For Standard Stock Gear Sets ask for Bulletin #700. For data on Cone-Drive in Materials Handling ask for Booklet #742.



CONE-DRIVE DIVISION MICHIGAN TOOL COMPANY 7171 E. McNichols Road, Detroit 12, U.S.A.



HIS EC&M TYPE WB BRAKE

replaced an a-c brake on this 40 HP wound-rotor crane-hoist motor. The rectifier-unit for operation of this shunt-wound WB Brake from a-c power is shown at the right in its compact, ventilated enclosure.

The previous brake required renewal of brake linings as often as twice a week and frequent inspection to keep the brake in adjustment. In nearly six months service, the WB Brake Blocks have shown very little wear and the Brake has operated with minimum attention.

These Type WB Brakes not only eliminate the laminated members required in a-c brake design, but give quick response. High initial current insures fast release; automatic reduction in holding current results in fast setting.

Many users of a-c motor-driven cranes, hoists and machines are switching to the EC&M Type WB Brake with rectifier unit for improved performance and lower maintenance. Write today for your copy of Bulletin 1006 describing the many advantages of this better brake for a-c circuits.

THE ELECTRIC CONTROLLER & MFG. CO.

in the last six years. The variation in bearing life shown in the table between pinion and working sides is accounted for by the fact that the bullhead pass on this mill is located nearer the pinion side and consequently more work is done by these bearings under adverse conditions (reversing, slow speed and scale). Variation in life between top and bottom rolls is accounted for by the fact that the movable top bearing is less rigidly restrained, and hence more liable to minor inequities of alignment.

New Mills: Properly and strongly designed chucks wherein plastic bearings can be simply and rapidly replaced, adequate roll necks and fillets, all are easily possible and pay well in operation. Water distribution systems which are quickly detachable at roll changing time without the use of tools or wrenches, provisions for the automatic entrance of a small amount of liquid grease upon shutdowns for the prevention of neck rusting and reduction of motor starting loads, and easily operated and accessible thrust and carrier bearing adjustments are readily built in at little or no extra cost.

Phenolic plastic bearings operate under considerably different design conditions than metallic bearings. These conditions must be understandingly met and coped with by the designer. However, this alone is insufficient to insure best and most economical operation, Additionally, consultative engineering is required for the purpose of advising and instructing operating personnel in the best methods of accomplishing their work. Finally, understanding operation is a necessity. The operator must learn the "feel" of the mill with plastic bearings. He must be alert to check reasons for sudden variations in operations.

It is difficult to say which is most important of these three necessities. Probably they are of equal importance. Suffice it to say that when they are all given equal consideration, water-lubricated plastic bearings will give efficient performance in steel mills.

Aluminum Foil Laminant Data Sheet Available

Suggested uses of a new synthetic thermo-plastic resin emulsion adhesive designed for foil lamination are covered in a laboratory report from Paisley Products Inc., 1770 Canalport avenue, Chicago.

Recommended primarily for roll applicator machines, this new adhesive will adhere all grades of aluminum foil to cellophane, acetate, glassine, bond, kraft, sulphite, chip-board and other materials, according to the manufacturer.

May 27, 1946

For extra

built-in

flexibility

specify

Macuhyte

ATLAS

Braided Slings

C

Fast, safe handling of your difficult loads is easy with Macwhyte ATLAS Braided Slings. Special left-and-right lay brailled construction gives these slings a flexibility that enables them to grip uneven or oddsheped objects securely. They resist kinking and spinning. To assure long life, we use our top-grade wire rope: Skilled craftsmen braid it into strong. lightweight, easy-to-use ATLAS Slings in the size, length and style you need.

Your handling problems are our chief concern. The complete line of Macwhyte Wire Rops Slings is available to fill your requirements.



Manher Mathemat Sofeta Council

Help for your handling Problems ... Do you have these sling books? Picture many safe ways of rigging up loads. List Macwhyte's complete up toaus, List Macwuyte's complete line, Offer helpful suggestions, Call your Inc. Oner neipitui suggessionis, Caulonis nearest Macwhyte representative, or mail request to Macwhyte Company. Ask for Catalogs S-7 and 44-1.

MACWHYTE COMPANY 2912 Fourteenth Avenue

Kenosha, Wisconsin Manufacturers of the CORRECT wire rope for your equipment Left-&-Right Lay Braided Slings Aircraft Tie-Rodg · Aircraft Cable "Safe-Lock" Swaged Terminals Mill Depots: New York . Pitteburgh Mill Depots: New York + Pittsburg Chicago - Minneapolis - Pittsburg Portland - Santia - San Kranning Chicago · Minneapolis · Pi. Work Portland · Seattle · San Francisco Los Angeles · Distributors throughout the U. S. A. and other countries

the BUSINESS TREND

TRUCES in the bituminous coal miners' strike and the railroad engineers' and trainmen's strike imparted some support to industrial activity and while not halting the decline in production did modify the rate of fall.

In the week ended May 18, first week of the miners' truce, STEFL's industrial production index dropped to 110 per cent (preliminary) but had there been no railroad car loadings of bituminous coal the decline in the index would have been much sharper. Principal factors in the decline were lowered output of steel ingots and automobiles. The auto industry, incidentally, produced only 49,905 units in the week ended May 18, compared with 71,355 in the preceding week. Until that drop, auto output had risen for ten consecutive weeks.

Industrial production in the week ended May 25, for which figures will be available soon, will have benefited not only from the miners' truce but also from the railroad engineers' and trainmen's truce.

At 110 per cent, and 6 points lower than in the week ended May 11, STEEL's index for the week ended May 18 was at a new low for the coal strike period.

CONSTRUCTION—Building permit values continued at a high level in April, although they were off quite sharply from the unprecedented volume recorded in March when builders rushed to file permits in anticipation of government restrictions. Value of April permits in 215 cities totaled \$240,722,327, and, with the exception of the March sum of \$426,951,606, was the highest for any month since July, 1929. With an aggregate value of \$1,070,412,558, permits issued in the 215 cities during the first four months of 1946 were up sharply from last years' comparative sum of \$246,130,270.

PRICES—Average prices for all commodities other than farm products and foods rose 0.1 per cent in the week ended May 11 to a level 4.1 per cent above a year ago, the U. S. Bureau of Labor Statistics reports. In the four weeks ended May 11, prices of these commodities have risen an average of 0.9 per cent.

FOUNDRY EQUIPMENT—Orders closed in April for new foundry equipment reached the highest total since July, 1942. The high level of April probably means that equipment worn out during the war period is being replaced and that foundries are seeking to increase efficiency to help offset rising costs of labor and materials. April index of new equipment orders closed was 779.8 per cent of the monthly average of 1937-38-39. Since December, 1945, the new equipment index has risen consistently. Index of orders closed in April for repairs was 427.7 per cent, a rise over the March index of 351.8 per cent, but considerably below indexes of the war period when shortage of new equipment made it necessary to repair existing equipment.



THE BUSINESS TREND

| | | Iron, | Steel | Produc | tion | | | | |
|------------------------|------|-------|----------|--------|-------|--------|--|--|--|
| (Net Tons-000 omitted) | | | | | | | | | |
| | | | Steel In | gots | -Pig | Iron- | | | |
| | | 1946 | 1945 | 1944 | 1946 | 1945 | | | |
| Jan. | | 3,872 | 7,206 | 7,593 | 2,645 | 4,945 | | | |
| Feb. | S | 1,393 | 6,655 | 7,194 | 1,148 | 4,563 | | | |
| Mar, | 1.5 | 6,535 | 7,708 | 7,826 | 4,424 | 5,228 | | | |
| Apr. | | 5,877 | 7,292 | 7,594 | | 4,786 | | | |
| May | | Sec. | 7,452 | 7,703 | | 5,016 | | | |
| June | | | 6,842 | 7,234 | | 4,605 | | | |
| July | | | 6,987 | 7,498 | | 4,812 | | | |
| Aug. | | | 5,736 | 7,499 | | 4,249 | | | |
| Sept. | | | 5,983 | 7,235 | | 4,227 | | | |
| Oct. | | | 5,598 | 7,621 | | 3,388 | | | |
| Nov. | | | 6,201 | 7,279 | | 4,026 | | | |
| Dec. | - 46 | | 6,059 | 7,366 | | 4,323 | | | |
| Total | | | 79,719 | 89,642 | | 54,167 | | | |

Foreign Trade Bureau of Foreign and Domestic Commerce (Unit Value-\$1,000,000) Exports-

1946

800

671

816

901 882

1,030

1,002 1,133 866

893

737 515 455

639

736

9,789 14,141

Jan. Feb. Mar.

Apr. May June

July

Aug. Sept. Oct.

Nov.

Dec.

Total





-Import-

334

324 365 366

372 386 330 293 302

360 356

360

335

344 322 327 322

297

.... 4,135 3,907

300

313 359 359

280

336

1945 1944 1946 1945 1944

398

318

384

1,124

1,124 1,086 1,197 1,182 1,419 1,271 1,198

1,207

1,207 1,199 1,140 1,184 934

| | Col | ce Outpu | t | |
|-------|--------------------|-------------------------|---------|--------|
| | Bure (Daily Ave | au of Mine crage—Net | t Tons) | |
| | By-I | Product | Bee | hive |
| | 1946 | 1945 | 1946 | 1945 |
| Jan. | 122,570 | 179,879 | 13,069 | 14,745 |
| Feb. | 93,985 | 180,727 | 13,064 | 16,210 |
| Mar. | . 161.290 | 182,120 | 14,902 | 17.115 |
| Apr. | | 174.239 | | 12,554 |
| May | | 178.338 | | 17,963 |
| Iune | i Terret | 172.201 | | 18,616 |
| July | | 175,163 | | 17,682 |
| Aug. | | 163.567 | | 14,669 |
| Sept. | | 166.559 | | 9.924 |
| Oct. | | 127,173 | | 6.407 |
| Nov. | | 159.646 | | 12.218 |
| Dec. | | 166,648 | | 12,659 |
| Ave. | | 168,855 | | 14,230 |
| | | | | |

| 1800 | 1.5.4 | oreign | Trade | | 18 |
|--------|-------|----------------|-------------------|--------|-----|
| 1200 | ~ | | EXPORTS | | 12 |
| SH 900 | | | ~ | | - 9 |
| 8 600 | | | | ~ | 6 |
| o 300 | | | | | 3 |
| | | | | | 0 |
| ₹ 400 | ~ | IMPORTS | | A. | |
| . 300 | ~~~ | | | Y Y | |
| 100 | /TEEL | (SOURCE. U. S. | DEPARTMENT OF COM | MERCE) | 10 |

| | 1 2 - 1- | | | | 31 |
|---|--|--|--|---|----|
| FINANCE | Latest Pariod [®] | Prior | Month | Year | |
| Bank Clearings (Dun & Bradstreet—millions) Federal Gross Debt (billions) Bond Volume, NYSE (millions) Stocks Sales, NYSE (thousands) Loans and Investments (billions)† United States Gov't. Obligations Held (millions)† †Member banks, Federal Reserve System. | \$11,296 \$273.0 \$18.7 5,947 \$64.1 \$45,777 | \$12,266 \$262.9 \$22.3 7,426 \$64.4 \$45,993 | \$12,300 \$274.3 \$19.6 6,430 \$65.3 \$46,689 | xg3 \$11,010 \$237.3 \$52.2 6,724 \$57.0 \$42,748 | |
| PRICES | | | | | |
| STEEL's composite finished steel price average All Commodities† Industrial Raw Materials† Manufactured Products† †Bureau of Labor Statistics Index, 1926 = 100. | \$63.54 110.1 123.2 105.6 | \$63.54 109.9 123.1 105.5 | \$63.54 109.3 122.8 104.8 | \$57.55 105.7 117.9 102.0 | |

"-but there's no work to punching a typewriter"

Swinging an air hammer spells l-a-b-o-r to its operator. The typist's job looks like child's play to him. But try pushing a heavy typewriter carriage back all day long, and you'll know you've been at work.

American Magnesium products have helped ease both tasks. Air hammers, and many other hand tools, have been lightened considerably with magnesium parts. The typewriter roll pictured here has a featherweight magnesium core.

Manufacturers interested in lightening their products with magnesium will find our engineers and production men ready to help. Get in touch with the nearby Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 1721 Gulf Bldg., Pittsburgh 19, Pa.



COMPAN

AMERICAN MAGNESIUM

ALUMINUM

OF

AMERICA

HELPFUL LITERATURE

1. Stainless Steel Bellows

Chicago Metal Hose Corp.—12-page illus-trated booklet entitled "C.M.H. Stainless Steel Bellows" contains diagrammatical cross section views and pertinent data on use of stainless steel bellows as equalizers, compensators, expansion joints, flexible connectors, for flow control, vapor and steam traps, and similar applications.

2. Board Drop Hammer

Chambersburg Engineering Co.-10-page illustrated bulletin No. 252-2 deals with model J-2 board drop hammer for production of precise parts requiring minimum of metal removal. Details such as frames and anvil, motor driven head and front rod are covered thoroughly.

3. Tool Steel

Carpenter Steel Co.---8 page pamphlet deals with Vega air-hardening tool steel which hardens uniformly in heavy sections, hardens at low temperatures, resists decarburization, has good machinability, minimum distortion and size change, and other favorable features.

4. Wiring System

BullDog Electric Products Co.—Four illus-trated bulletins Nos. 425, 427-1, 427-2, 3, and 427-4 present information on universal type Trol-E-Duct prefabricated busway wiring sys-tem for flexible lighting, ventilated LO-X bus duct system for feeder circuits, plug-in duct for branch circuits, and bus duct engineering, respectively

5. Black & White Printing

Charles Bruning Co.-4-page illustrated folder discusses black and white direct printing process which quickly produces positive copies of drawings and tracings. Various advantages are explained.

6. Small Tools

Geo. F. Marchant Co .- 48-page illustrated catalog No. 46 contains data on punches, dics, couplings, rivet sets and other tools. Over 200 sketches with full dimensional details illustrate various types of tools. Ordering instructions are given

7. Drill Chip Breaker

Continental Tool Works-6-page illustrated bulletin and insert No. 28161 describe method by which chips are broken into substantially uniform small cuttings that are carried easily up flutes of drill. Drilling speeds, economy, depth of holes and safe operational characteristics are discussed.

8. Worm Gear Speed Reducers

Cleveland Worm & Gear Co.-4-page illus-trated bulletin "Cleveland in the Modern Pro-duction Flow" describes applications of worm gear speed reducers to various types of mixing and grinding equipment. Each application is discussed briefly and is accompanied by photograph and facsimile blueprint detailing drive.

9. Thread Grinder

American Car & Foundry Co.—12-page illus-trated folder "A. C. F. High Speed Wheel Thread Grinder Operating Manual" describes unit as specifically designed production tool accommodate shop-tool arrangements where rinder is in line of operations between wheel pres and truck assembly track. Operational data installation suggestions are listed. Large diagrams and cutaway photos show specific features of units.

10. Industrial Photography

Eastman Kodak Co.-2-page illustrated vestpocket size folder "Functional Photography" covers photography in research and developmest, in production, in administration and appli-cations giving stepped-up processes. Radiography, spectroscopy, photomicrography, elec-tronaic rography, microradiography, X-ray dif-fraction any many other phases are discussed.

11. Mold & Hob Steels

Henry Disston & Sons, Inc.—6-page illus-trated folder discusses Plastiron, Plastalloy and Plastikut mold steels and Nicroman and Croloy hob steels for use in plastic industry. Working instructions and type analyses are given and comparison table is included,

12. Diamond Tools

Diamonds & Tools, Inc.—4-page illustrated folder "Diamond Tools for all Industrial Pur-poses" shows general purpose dressing, radii dressing, chisel, diamond profile dressing, dia-mond cluster, thread grinder and other diamond tools.

13. Chain Link Fence

Continental Steel Corp.—46-page illustrated booklet "Planned Protection" contains many photographs showing actual installations of chain link fence and points out advantages of use. Various types are shown, specifications are given, manufacturing operations and erection service are covered.

14. Control Instruments

Foxboro Co.-16-page illustrated catalog No. 370 presents details of full line of recording and indicating instruments for measurement and control. Sections deal with instruments for temperature applications, pressure, humidity, flow, liquid level, density and other process variables. Valves, planimeters, instrument ac-cessories and supplies are described.

15. Liquid Plastic Coating

1213

В

2

3

4

5

6 16 26 36 46

7 17 27 37 47

12 28 38 -42

9 19

10

29 39 49

20 30 40 50

Federal Electric Co.-4-page illustrated folder "Fedelco Liquid Plastic Coating" covers surfacing material FE-70 made of inert plastic resins. Resistance to mineral acids and alkalies or their salts, its dielectric qualities and its opposition to vapor permeability are discussed.

16. Infrared Equipment Fostoria Pressed Steel Corp.—12-page illus-trated brochure "Infrared Parade" explains how infrared can be applied in baking, drying, dehydrating or preheating operations in industrial organizations. Included are tips on reconversion and methods used by other manufacturers. Locations of company's industrial service centers aro listed.

17. Rotary Files & Burs M. A. Ford Mfg. Co.—4-page illustrated folder "Ford Rotary Files & Burs" includes specifications, sizes and photos of spherical, elliptical, tree shape, conical, cylindrical, flat and radius end files and deburring tools. List prices are included. Files and cutters are high speed steel.

18. Metal Marking Equipment

Wm. A. Force & Co.—16-page illustrated catalog "Metal Marking Equipment for In-dustry" shows complete line of metal indenting, marking and numbering machines as well as steel type and holders, stamps, detail presses and other marking equipment for wide industrial application.

19. Worm Hobs

Brad Foote Gear Works—12-page illustrated catalog No. 125 Section 9 lists hobs in stock of manufacturers. Dimensions of hobs in diam-eter of worms to be generated are given. Single, double, quadruple and higher threads are shown for all ordinary requirements.

20. Process Equipment Duriron Co.—20-page illustrated catalog No. G describes company's line of corrosion resist-ing alloys. Also discussed are Durimet T, Durimet 20 and wide variety of austenitic stainless steels, straight chrome alloys and carbon steel.



| W | est | Thir | d St. | , Cleveland 13, Ohio |
|----|------|------|-------|--|
| | 1000 | | | Please have literature circled at left s |
| 11 | 21 | 31 | 41 | NA A SATUR |
| 12 | 22 | 32 | 42 | NAME |
| 13 | 23 | 33 | 43 | COMPANY |
| 14 | 24 | 34 | 44 | |
| 15 | 25 | 35 | 45 | |

MANUFACTURED

ADDRESS

CITY AND STATE

This and MUST be completely filled out. Please TYPE or PRINT

ent to me.

STATE AR

21. Bearing Alloys

American Smelting & Refining Co., Federated Metals Div.—34-page illustrated booklet "Bearing Alloys Technical Manual" presents information to assist engineers and consumers of bearing alloys in design, construction and maintenance of friction type bearings for all kinds of machinery. Melting, bonding and casting of bearing alloys are discussed.

22. Safety & Relief Valves

Farris Engineering Co.—38-page illustrated catalog No. 45 presents line drawings of all basic valves and shows their applications and specifications. Proper selection of valves from catalog is rapid. Supplement No. 45-A presents prices of valves in easy guide so that discount computations are eliminated.

23. Metal Cutting Fluids

Citics Service Oil Co.—28-page illustrated booklet on metal machining fluids covers theoretical and experimental studies of metal cutting, fundamental processes, metal cutting fluids in practice, selecting right fluid, storing and handling, and occupational dermatitis. Fluid recommondation and machinability rating charts are included.

24. Heavy Duty Cylinders

Engineering Products Co.—8-page illustrated bulletin No. 453 describes heavy duty cylinders operated by air, oil or water as used in engines, pumps, compressors, brakes and actuators. Styles, sizes, types, lengths and forms are discussed in full. Applications hased on actual installations are included and features, capacities and dimensions are listed.

25. Business Trends

Barnes & Reinecke—Graph measuring 21¼ x 16¼ inches entitled "Trends in American Business" shows variations in business failures, cost of living, national income, Dow Jones stock averages and industrial production since 1914. Also covered is civilian employment in four separate groups: construction, manufacturing, trade, finance and service; and others.

26. Electric Fans

Emerson Electric Mfg. Co.—26-page illustrated catalog "Tans For 1946" gives design and construction specifications with complete performance data on various types of desk fans, air circulators, ceiling fans, kitchen ventilators, exhaust and cooler fans.

27. Industrial Lift Trucks

Elwell-Parker Electric Co.—8-page illustrated folder "The Logistics of Barrels" gives detailed description of materials handling of products that are packaged in barrels. Discussion of handling costs, time involved and benefits derived from packaging and handling of barreled products is included.

28. Power Plant Equipment

Elliot Co.—18-page illustrated bulletin No. Q-12 describes equipment for power plants and industrial processes ranging from steam turbines, motors, generators and feedwater heaters to turbochargers, steam jet ejectors and centrifugal blowers.

29. Alloy Electrodes

Arcos Corp.—Large data sheet lists every well known stainless steel with proper Arcos alloy electrode for welding each. AISI type numbers and analyses of trade named stainless steels are given as well as weld metal chemical analysis of corresponding electrodes.

30. Heat Treating Equipment

Boder Scientific Co.—4-page illustrated folder No. H4509 is descriptive of Hoskins furnace for Jominy hardenability test, combustion tube furnaces, crucible and muffle furnaces and hot plates. Complete specifications, dimensions and price lists are given.

31. Power Track Drill

Buda Co.—4-page illustrated bulletin No. 1233 describes power track drill which drills easily through all weights and types of rail. Construction features and advantages are covered. Manual type track drill, track jacks, track liner and rail bender are described briefly.



32. Steam Boilers

John Phillips Badenhausen Inc.—4-page illustrated bulletin No. 110 describes Perfect Balance boiler in detail. Cutaway photos and diagrams show advantages of radiant heat in minimum area. Circulatory system is explained. Included are charts giving pounds of steam per hour and equivalent in horsepower for all models of boiler.

33. Pumps & Stirrers

Eastern Engineering Co.—20-page illustrated folder No. SP 107 contains information on pumps and laboratory stirrers in models for regular industrial use and in special types. Applications and specifications are included.

34. Synchronous Motors

Electric Machinery Mfg. Co.—4-page illustrated folder No. FF-11 describes eight economies and operating advantages gained by use of synchronous motors engineered to large, constant-speed industrial applications. Examples of motors direct-connected to various types of drives are included.

35. High Speed Tool Bits

Crucible Steel Co.—8-page illustrated folder "Dependable Cutting Performance" covers Rex brands of high speed tool bits. Five types are described and stock list is included. Suggestions and applications are given.

36. Wire Rope

Wickwire Spencer Steel Div.—80-page illustrated handbook entitled "Wickwire Rope" describes transmission; galvanized, standard and special holsting ropes; wire rope fittings and sash cords. Information covers various constructions of wire rope. Instructions for seizing and handling and ordering wire rope are included.

37. Brakes

Victor R. Browning & Co.--8-page illustrated booklet is descriptive of type SW brakes for cranes, hoists and machines used in mills. Diagrams show essential parts and dimensions of brakes. Overhead traveling cranes and hoists for inside and outside use in steel mills and other industries are described briefly.

38. Air Travel

Aeronautical Chamber of Commerce of America Inc.-20-page illustrated catalog "Put Your Town on the Air Map" lists projects that should be started now if America is to take full advantage of air travel. Photographs of metropolitan, suburban and comprehensive landing facilities are given. Information on air harbors, flight stops and resort airparks are included.

39. Expansion Boring Tools

Giddings & Lewis Machine Tool Co., Davis Boring Tool Div.—80-page illustrated folder "Expansion Boring Tools" is composite of five bulletins as published by company. Folder is indexed and price listings are given.

40. Sheet Steels

American Rolling Mill Co.—24-page illustrated booklet "Armco Aluminized Steel" describes special purpose steel for resistance to heat and corrosion. Charts, tables and sections on heat reflectivity, mechanical properties, forming properties, painting and finishing, electrical conductivity, welding, brazing and soldering are included.

41. Wire Rope Clips

American Hoist & Derrick Co.—pocket sized information card No. CCB21 covers use and application of Crosby wire rope clips. Instruction chart gives exact number of units to be used in relation to rope size. Illustration shows application of clips and information concerning aafety is included. Clips are galvanized drop forged steel.

42. Pneumatic Conveyors

Brady Conveyors Corp.—24-page illustrated booklet contains data on company's line of uction, pressure and combination systems; boat, coal and chemical unloaders; pneumatic leas and dust collectors; portable conveyors; presure system for grain and electrical panelband.

MARKET SUMMARY

Steelmaking Shows Signs Of Slowing Its Decline

Some mills resume production as fuel supply gains ... Most emphasis is on flat-rolled products ... Structural demand active

STEEL production shows a further tendency to level off, following the sharp decline which marked the early weeks of the coal strike. Operations at some mills continue to sag while at others output is holding or in a few cases actually increasing. Resumption of plate production at an eastern mill after two weeks of idleness is one of the hopeful signs following the truce in the fuel industry.

The trend this week depends mainly on actions of miners and railroad workers, whether soft coal mining and transportation are interrupted or continued. If the latter, steelmaking seems likely to start a slow upward swing.

In the meantime sheet and tin plate production maintains its relatively higher basis, every effort being made to produce tin plate in particular on as large scale as possible to meet requirements of food canning during the summer. Sustained output of light flat products has been achieved at the expense of most other steel products.

In spite of various uncertainties sellers allocating production on a quarterly basis are beginning to announce quotas for third quarter. Indications are that sheet producers will be six to eight weeks behind schedule on an average, with a result that new allocations will be relatively small. Allocations of other than light flat products, with few exceptions, will be even less, as production during the coal strike has not been as well sustained.

While sheet demand continues far in excess of production, consumers in many instances are revising their programs downward because of inability not only to get sheets in quantity desired but other materials and components as well. Perhaps greatest and most consistent pressure is for narrow strip, with producers reporting especially active shopping for this material.

Excessive pressure is also noted in small carbon bars and



| DIST | RICT ST | EEL RA | 115 | 100 |
|-----------------|-----------|------------|---------|--------|
| (Percentage | of Ingo | Capacity | y Engag | ged |
| In | Leading | Districts) | | |
| | Week | | | |
| | Ended | C1 | Same | week |
| | May 25 | Change | 1945 | 1944 |
| Pittsburgh | . 29 | -11 | 92 | 93 |
| Chicago | . 56 | +10.5 | 98.5 | 101.5 |
| Eastern Pa | 37 | +1 | 92 | 94 |
| Youngstown | . 13 | 30 | 89 | 96 |
| Wheeling | 68.5 | -3.5 | 92.5 | 102 |
| Cleveland | 79 | +1.5 | 94 | 93 |
| Buffalo | 35 | 14 | 83.5 | 90.5 |
| Birmingham | . 44 | None | 90 | 95 |
| New England. | . 67 | 8 | 92 | 90 |
| Cincinnati | 84 | None | 84 | 86 |
| St. Louis | . 49.5 | +5 | 75 | 57 |
| Detroit | . 83 | -1 | 88 | 88 |
| Estimated natur | al | | | |
| rate | . 45 | 4 | 93.5 | 98.5 |
| | | | | |
| Based on w | eekly ste | elmaking | capacil | ies of |

flats, applying to both hot-rolled and cold-drawn. Virtually nothing is available in small sizes for this year and all indications point to a heavy carryover at the end. Even in larger sizes of hot-rolled carbon bars not much tonnage is to be had before November or December, although in larger sizes of cold-drawn some promises are being made for late third quarter and in hot-rolled alloy bars, all sizes, promises fall mainly in July and August.

Steelworks operations last week declined 4 points to 45 per cent of capacity, the smallest recession for any week since late April. Largest factor in the decline was a drop of 30 points at Youngstown, to the low level of 13 per cent of capacity. Buffalo also contributed materially to the drop by receding 14 points to 35 per cent. Other losses were: Detroit 1 point to 83, Wheeling 3½ points to 68½, Pittsburgh 11 points to 29, New England 8 points to 67. Chicago made a gain of 10½ points to 49½, eastern Pennsylvania 1 point to 37, Clevcland 1½ points to 79, St. Louis 5 points to 49½. Birmingham was unchanged at 44 per cent and Cincinnati at 84. West Coast mills continue unchanged at 84 per cent,

Construction demand is active, in spite of CPA regulations, and heavy inquiry is received, in face of declining plain material production. Public projects, not under regulation, are coming out in volume, but many bids are far above appropriations, in many cases resulting in postponement of awards. Fabricators are slow to bid in some instances, except where they are assured of deliveries. Reinforcing material is in short supply as available steel for this purpose is usually only off-heat steel and discards. Demand is heavy.

Effect of the coal strike on blast furnaces is exemplified in the reduced tonnage of iron ore consumed in April. The Lake Superior Iron Ore Association reports April consumption of that ore at 4,768,718 gross tons, compared with 6,021,018 tons in March. For four months total ore consumed totaled 16,257,163 tons, against 27,076,751 tons used in the comparable period in 1945. Stocks at furnaces and on Lake Erie docks May 1 were 23,078,989 tons, compared with 16,428,765 tons at the same date last year.

____ MARKET PRICES ___

COMPOSITE MARKET AVERAGES

| | | | | One | Three | One | Five |
|----------------------|---------|---------|---------|------------|------------|-----------|-----------|
| | | | | Month Ago | Months Ago | Year Ago | Years Ago |
| | May 25 | May 18 | May 11 | Apr., 1946 | Feb., 1946 | May, 1945 | May, 1941 |
| Finished Steel | \$63.54 | \$63.54 | \$63.54 | \$63.54 | \$60.91 | \$57.73 | \$56.73 |
| Semifinished Steel | 40.60 | 40.60 | 40.60 | 40.60 | 37.80 | 36.00 | 36.00 |
| Steelmaking Pig Iron | 25.50 | 25.50 | 25.50 | 25.50 | 24.75 | 24.00 | 23.00 |
| Steelmaking Scrap | 19.17 | 19.17 | 19.17 | 19.17 | 19.17 | 19.13 | 19.17 |

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:— Average of basic pig iron prices at Betblehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Sorap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; other, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago Finished Material and Wire Rods, cents per ib; coke, dollars per net ton; others dollars per gross ton,

Finished Material

| | May 25. | Apr., | Feb. | May, |
|--|---------|--------|---------|--------|
| | 1946 | 1946 | 1946 | 1945 |
| Steel bars, Plttsburgh | 2.50c | 2.50c | 2.375c | 2.17c |
| Steel bars, Philadelphia | 2.82 | 2.82 | 2.695 | 2.495 |
| Steel bars, Chicago | 2.50 | 2.50 | 2.375 | 2.17 |
| Shapes, Pittsburgh | 2.35 | 2.35 | 2.225 | 2.10 |
| Shapes, Philadelphia | 2.465 | 2.465 | 2.340 | 2.215 |
| Shapes, Chicago | 2.35 | 2.35 | 2.225 | 2.10 |
| Plates, Pittsburgh | 2.50 | 2.50 | 2.375 | 2.212 |
| Plates, Philadelphia | 2.55 | 2.55 | 2.425 | 2.263 |
| Plates, Chicago | 2.50 | 2.50 | 2.375 | 2,22 |
| Sheets, hot-rolled, Pittsburgh | 2.425 | 2.425 | 2.3125 | 2.20 |
| Sheets, cold-rolled, Pittsburgh | 3.275 | 3.275 | 3.165 | 3.05 |
| Sheets, No. 24 galv., Pittsburgh | 4.05 | 4.05 | 3.875 | 3,65 |
| Sheets, hot-rolled, Gary | 2.425 | 2.425 | 2.3125 | 2.20 |
| Sheets, cold-rolled, Gary | 3.275 | 3.275 | 3.1625 | 3.05 |
| Sheets, No. 24 galv., Gary | 4.05 | 4.05 | 3.875 | 3.662 |
| Hot-rolled strip, over 6 to 12-in., Pitts. | 2.35 | 2.35 | 2.225 | 2.10 |
| Cold-rolled strip, Pittsburgh | 3.05 | 3.05 | 2.925 | 2.80 |
| Bright basic, bess. wire, Pittsburgh | 3.05 | 3.05 | 2.90 | 2.64 |
| Wire nails, Pittsburgh | 3.25 | 3.25 | 3.075 | 2.82 |
| Tin plate, per base box, Pittsburgh | \$5.25 | \$5.25 | \$5,125 | \$5.00 |

Semifinished Material

| Sheet bars, Pittsburgh, Chicago\$38.00 | \$38.00 | \$37.00 | \$34.50 |
|---|---------|---------|---------|
| Slabs, Pittsburgh, Chicago 39.00 | 39.00 | 37.50 | 34.50 |
| Rerolling billets, Pittsburgh 39.00 | 39.00 | 37.50 | 34.50 |
| Wire rods, No. 5 to R-Inch, Pitts 2.30c | 2.30c | 2.225c | 2.05c |

Pig Iron

| | May 20, | Apr., | reo., | may, |
|--|---------|---------|---------|---------|
| | 1946 | 1946 | 1946 | 1945 |
| Bessemer, del. Pittsburgh | \$27.69 | \$27.69 | \$26.94 | \$26.19 |
| Basic Valley | 26.00 | 26.00 | 25 25 | 24.50 |
| Basia eastern del Philadelphia | 20.00 | 07.04 | 27.00 | 26 34 |
| No 9 fdm del Deb M 6 9 alder | 21.09 | 21.04 | 21.05 | DK C0 |
| No. 2 Iury., del. Pgn. N. & S. sides | 27.19 | 27.19 | 26.44 | 43.05 |
| No. 2 foundry, Chicago | 26.50 | 26.50 | 25.75 | 25.00 |
| Southern No. 2, Birmingham | 22.88 | 22.88 | 22.13 | 21.35 |
| Southern No. 2 del. Cincinnati | 26,94 | 26.94 | 26.19 | 25.44 |
| No. 2 fdry., del. Philadelphia | 28.34 | 28.34 | 27.59 | 26.34 |
| Malleable, Valley | 26.50 | 26.50 | 25.75 | 25.00 |
| Malleable, Chicago | 26.50 | 26.50 | 25.75 | 25.00 |
| Charcoal low phos fob Lyles Tenn | 33.00 | 33.00 | 33.00 | 33.00 |
| Cray forge del Dittshurgh | 26.60 | 26.60 | 05.00 | 25.19 |
| Cray lorge, del. I ittsourgi | 20.05 | 20.03 | 140.00 | 140 93 |
| Ferromanganese, del. Philsburgh | 140.00 | 140.00 | 140.00 | 140,00 |
| | | | | |
| Canon | | | | |
| Scrap | | | | |
| Heavy melting steel. No. 1. Pittsburgh | \$20.00 | \$20.00 | \$20.00 | \$20.00 |
| Heavy melt, steel, No. 2, E. Pa. | 18.75 | 18.75 | 18.75 | 18.56 |
| Heavy melting steel Chicago | 18 75 | 18 75 | 18 75 | 18,75 |
| Rails for rolling Chicago | 20.15 | 22.25 | 22.25 | 22.25 |
| No 1 cast Chicago | 20.00 | 20.00 | 20.00 | 20.00 |
| Ho. I cast, Cincago | 20.00 | 20.00 | 20.00 | |
| | | | | |
| Coke | | | | |
| Connelleuille furmees ouers | | | 87 80 | \$7.00 |
| Connensvine, furnace ovens | \$1.50 | \$1.50 | 91.00 | 7 75 |
| Connensvine, Toundry ovens | 8.25 | 8.25 | 3.20 | 10.95 |
| Crucago, by-product fdry., del | 13.75 | 13.75 | 13.75 | 10.00 |

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA schedules, except those for stainless steels which are now exempt from price control. Price schedule No. 6 covers semifinished and finished iron and steel products; by-product foundry coke, No. 29; relaying ralls, No. 46; beehve oven coke, No. 77; boils, nuts and rivets, No. 147; coke by-products, GMPR, except sulphate of ammonda, No. 205. Finished steel quoted in cents per pound and semifinished steel in dollars per gross ton, except as otherwise noted. Pricing on rails was changed to net ton basis as of Feb. 15, 1946.

Semifinished Steel

Oarbon Steel Ingots: Fob mill base, rerolling quality, standard analysis, \$33.

Alloy Steel Ingots: Pittsburgh, Chicago, Buf-falo, Bethlehem, Canton, Massillon; uncrop, \$46.80.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, \$39; Detroit, del., \$41; Duluth (billets), \$41; Pac. ports (bil-lets), \$51. (Andrews Steel Co., carbon slabs, \$41; Northwestern Steel & Wire Co., \$41. Ster-ling, III.; Granite City Steel Co. \$47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co. \$58 64 Pac. ports.) \$58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pitts-burgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, \$47; Detrolt, del., \$49; Duluth, billets, \$49; forging billets fob Pac. ports, \$59.

(Andrews Steel Co. may quote carbon forging billets \$50 gross ton at established basing points; Follansbee Steel Corp., \$49.50 fob To-ronto, O.; Geneva Steel Co. \$64.64, Pacific ports.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chi-cago, Buffalo, Bethlehem, Canton, Massillon, \$56.16; del. Detroit \$58.16; eastern Mich. burgh, Chi-Massillon,

Sheet Bars: Pittsburgh, Chicago, Cleveland Buffalo, Canton, Sparrows Point, Youngstown, 538. (Empire Sheet & Tin Plate Co., Mans-field, O., carbon sheet bars, \$39, fob mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb, 2.05c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5— $\frac{3}{2}$, in. inclusive, per 100 lb, \$2.30. Do., over $\frac{3}{2}$ — $\frac{3}{2}$ -in., incl., \$2.45; Gaiveston, base, \$2.40 and \$2.55, respectively. Worcester add \$0.10; Pacific ports \$0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Plitsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.50c; Duluth, base, 2.60c; De-trolt, del., 2.60c; eastern Mich., 2.65c; New York, del., 2.84c; Phila., del., 2.82c; Guif ports, dock, 2.85c; Pac. ports, dock, 3.15c. (Sheffield Steel Corp., 2.75c, fob St. Louis; Joslyn Mfg. & Supply Co., may quote 2.55c, fob Chicago.) Bail Steel Bars: Same nrices as for hot-nolled Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngs-town, Chicago, Canton, Massilion, Buffalo, Bethlehem, base 20 tons one size, 2.81c; De-troit, del., 2.91c. (Texas Steel Co. may use Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma). Oklahoma.)

| AISI | (*Basic | AISI | (*Basic |
|-------------|-----------|------------|------------|
| Series | O-H) | Series | O-H) |
| 1300 | \$0.104 | 4300 | \$1.768 |
| 2300 | 1.768 | 4600 | 1.248 |
| 2500 | 2.652 | 4800 | 2.236 |
| 3000 | 0.52 | 5100 | 0.364 |
| 3100 | 0.884 | 5130 or 51 | 52 0.468 |
| 3200 | 1.404 | 6120 or 61 | 52. 0.988 |
| 3400 | 3.328 | 6145 or 6 | 150. 1.248 |
| 4000 | 0.468 | 8612 | 0.676 |
| 4100 (.1525 | Mo) 0.728 | 8720 | 0.728 |
| (.2030 | Mo) 0.78 | 9830 | 1.352 |

•Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh. Chlcago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c. Cold-Finished Alloy Bars: Pittsburgh, Chicago,

Cold-Finished Anloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.48c; Detroit, del., 3.58c; eastern Mich., 3.63c. Reinforcing Bars (New Billiet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Spar-rows Point, Buffalo, Youngstown, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo,

2.50c; Gulf ports, dock, 2.70c; Pacific ports, dock, 2.75c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chi-cago, Gary, Cleveland, Birmingham, Young-town, Buffalo, base, 2.35c; Detrolt, del., 2.55c; eastern Mich, and Toledo, del., 2.50c; Guif ports, dock, 2.70c. Guif

4.76c; double Iron Bars: Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Terre Haute, single ref., 5.42c; double ref., 6.76c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base, 2,425c; Gran-ite City, base, 2,525c; Detrolt, del., 2,525c; New York, del., 2,555c; Phila., del., 2,555c; New York, del., 2,655c; Pacific ports, 2,975c. (Andrews Steel Co. may quote hot-rolled sheets for shipment to the Detroit area on the Middle-town, O., base; Alan Wood Steel Co., Coaho hocken, Pa., may quote 2,60c on hot earbon sheets, nearest eastern basing point.) Cold Beiled Sheet: Pittsburgh, Chicago, Cleve

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleve-Cold-Kolled Sheets: Pittsburgh, Chicago, Cieve-land, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite City, base, 3.375c; De-troit, del., 3.375c; eastern Mich., del., 3.435c; New York, del., 3.615c; Phila., del., 3.595c; Pacific ports, 3.925c.

Facilic ports, 3.925c. Galvanized Sheets, No. 24: Pittsburgh, Chi-cago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 406c; Granite City, base, 4.15c; New York, 4de, 4.29c; Phila, del, 4.22c; Pacific ports, 460c. Corrugated Galv, Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29-gage, per square, 3.73c. Gary, Birmingham, 29-gage, per square, 3.73c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corrugated, coper alloy, 4.15c; Granite City, 4.25c; Pacific ports, 4.60c; copper iron, 4.50c; pure iron, 4.50c; zinc-coated, hot-dipped, heat-treated, No. 24, Pitts-burgh, 4.60c.

Aluminized Sheets, 20 gare: Pittshurgh, hot-dipped, coils or cut to lengths, 9.00c.

Enameling Sheets: 10-gage; Pittsburgh, Chi-cago, Gary, Cleveland, Youngstown, Middle-town, base 3.20c; Granite City, base 3.30c; Detroit, del., 3.30c; eastern Mich., 3.35c; Pa-cific ports, 3.85c. 20-gage: Pittsburgh, Chicago, Gary, Cleve-land, Youngstown, Middletown, base, 3.80c; Detroit, del., 3.90c; eastern Mich., 3.95c; Pa-cific ports, 4.45c.

Electrical Sheets No. 24:

| | Pittsburgh | Pacific | Granite |
|-------------|------------|---------|---------|
| | Base | Ports | City |
| Field grade | 3.90c | 4.65c | 4.00c |
| Armature | 4.25c | 5.00c | 4.35c |
| Electrical | 4.75c | 5.50c | 4.85c |
| Motor | 5.425c | 6.175c | 5.525c |
| Dynamo | 6.125c | 6.875c | 6.225c |
| Transformer | | | |
| 72 | 6.625c | 7.375c | |
| 65 | | 8.375c | |
| EO | 0.100- | 0.077. | |

52 8.125c 8.875c

(Superior Steel Corp. may quote 3.20c, Pitts.) Cold-Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less, 3.05c; Chi-cago, base, 3.15c; Detrolt, del., 3.15c; eastern Mich., del., 3.20c; Worcester, base, 3.25c. (Su-perior Steel Corp. may quote 4.70c, Pitts.) Cold-Finished Spring Steel: Pittsburgh, Cleve-land base, 0.26-0.50 carbon, 3.05c. Add 0.20c for Worcester land base, 0.2 for Worcester.

Tin, Terne Plate

(OPA celling prices announced March 1, 1946.) Tin Plate: Pittsburgh, Chicago, Gary, 100-lb base box, \$5.25; Granite City, Birmingham, Sparrows Point, \$5.35. Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb base box, 0.25 lb tin, \$4.60; 0.50 lb tin, \$4.75; 0.75 lb tin, \$4.90; Granite City, Birm-ingham, Sparrows Point, \$4.70, \$4.85, \$5.00, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pa-cific ports, boxed, 4.30c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted, 4.05c; Pacific ports, 4.80c. Manufacturing Ternes (Special Coated): Pitts-burgh, Chicago, Gary, 100-base box, \$4.55; Granite City, Birmingham, Sparrows Point, \$4.65.

64.65. Roofing Ternes: Pittsburgh base per pack-age 112 sheets: 20 x 28 in., conting I. C. 8-lb \$12.50; 20-lb \$15.50 (nom.); 40-lb \$20.00 (nom.).

Plates

Plates Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.50c; New York, del., 2.69c; Phila., del., 2.55c; St. Louis, 2.74c; Boston, del., 2.82-3.07c; Pa-clife ports, 3.05c; Gulf ports, 2.85c. Granite City Steel Co. may guote carbon hates 2.65c fob D.P.C. mill; Geneva Steel Co., Provo, Utah, 3.20c fob Pac. ports; Central Iron & Steel Co., Harrisburg, Pa., 2.80c, bas-ma Steel Co., Harrisburg, Pa., 2.80c, bas-ing points; Lukens Steel Co., Coatesville, Pa., 2.7c, base; Worth Steel Co., Claymont, Del., 2.60c, base; Alan Wood Steel Co., Consho-hocken, Pa., 2.75c, base] Pioor Plates: Pittsburgh, Chicago, 3.75c; Pa-cille ports, 4.40c; Gulf ports, 4.10c. Open-Hearth Alloy Plates: Pittsburgh, Chi-cago, Coatesville, 3.75c; Gulf ports, 4.20c; Pacific ports, 4.40c. Cad Steel Plates: Coatesville, 10% cladding: mikel-ciad, 38.72c; inconel-clad, 26.000; monel-ciad, 24.66c.

Shapes

Shapes structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.35c; New York, del., 2.52c; Phila., del., 2.465c; Pacific ports, 3.00c; Gulf ports, 2.70c. (Pheneix from Co., Phoenixville, Pa., may structure the equivalent of 2.60c, Bethlehem, Pa., on the general range and 2.70c on beams and channels from 4 to 10 Inches.) Steel Filmer: Pittsburgh, Chicago, Buffalo, 2.65c; Pacific ports, 3.20c. Wire, and Wire, Brandwaff

Wire and Wire Products

(Pob Pittsburgh, Chicago, Cleveland and Birm-Ingham, per 100 pounds) Wire to Manufacturers in carloads

| Spring Ducic or bessemer | •\$3.05 |
|---------------------------|---------|
| Wing (except Birmingham) | •\$4.00 |
| Nation Products to Trade | |
| citatis and staples | |
| Caluard and cement-coated | 1\$3 25 |
| Buyanized | 1452.90 |
| Merchant Quality | Lingung |
| Annealed | 482 50 |
| uaivanized | 182.95 |

•Add \$0.10 for Worcester, \$0.05 for Duluth and \$0.50 for Pacific ports. †Add \$0.30 for Worcester, \$0.50 for Pacific ports.

Add \$0.50 for Pacific ports. Add \$0.10 for Worcester, \$0.70 for Pacific ports.

Tubular Goods

weided 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 weid, 1 point less on but weid. Pittsburgh base only on wrought iron pipe. Butt Weld

| | | Butt | Avera . | | |
|-----------|-------|-------|---------|-------|-------|
| | Ste | eel | | L | ron |
| In. | Blk. | Galv. | In. | Blk. | Galv. |
| 1/8 | 53 | 30 | 1/2 | 21 | 01% |
| 1/4 & 3/4 | 56 | 3714 | 2/4 | 27 | 7 " |
| 1/2 | 601/2 | 48 | 1.1.4 | 31 | 13 |
| % | 6314 | 52 | 11/2 | 35 | 1516 |
| 1-3 | 654 | 5416 | 2 | 3416 | 15 |
| | " | Lap | Weld | | |
| | Ste | eel | | L | ron |
| In. | Elk. | Galv. | In. | Blk. | Galv. |
| 2 | . 58 | 461/2 | 114 | 20 | 014 |
| 24/2-3 | 61 | 4916 | 11/2 | 251/2 | 7 " |
| 31/2-6 | 63 | 5114 | 2 | 271/2 | 9 |
| 7-8 | . 62 | 494 | 214-316 | 2814 | 1114 |
| 9-10 | 611/2 | 49 | 4 | 3014 | 15 |
| 11-12 | 6016 | 48 | 416-8 . | 2916 | 14 |

9-12 251/2 9

| | | -0.0 | 1111030 | -Lice. | W CIG- |
|-------|------|-----------|---------|--------|--------|
| 0.D. | | Hot | Cold | Hot | Cold |
| slzes | B.W. | G. Rolled | Drawn | Rolled | Rolled |
| 1" | . 13 | | \$9.90 | \$9.36 | \$9,65 |
| 114" | . 13 | | 11.73 | 9.63 | 11.43 |
| 11/2" | . 13 | \$10.91 | 12.96 | 10.63 | 12.64 |
| 1%" | . 13 | 12,41 | 14.75 | 12.10 | 14.37 |
| 2" | . 13 | 13.90 | 16.52 | 13.53 | 16.19 |
| 21/4" | . 13 | 15.50 | 18.42 | 15.06 | 18.03 |
| 24" | . 12 | 17.07 | 20,28 | 16,57 | 19.83 |
| 21/2" | . 12 | 18.70 | 22.21 | 18.11 | 21.68 |
| 2%" | . 12 | 19.82 | 23.54 | 19,17 | 22.95 |
| 3" | . 12 | 20.79 | 24,71 | 20.05 | 24.02 |
| 31/2" | . 11 | 26.24 | 31.18 | 25.30 | 30.29 |
| 4" | . 10 | 32.56 | 38.68 | 31.32 | 37.52 |
| 41/2" | . 9 | 43.16 | 51.29 | | |
| 5" | . 9 | 49,96 | 59.36 | | |
| 6" | . 7 | 76.71 | 91.14 | | |
| | | | | | |

Pipe, Cast Iron: Class B, 6-in. and over, \$54 per net ton, Birmingham; \$59, Burlington, N. J.; \$62.80, del., Chicago; 4-in, pipe, \$5 higher, Class A pipe, \$3 a ton over class B.

Rails, Supplies

Standard ralls, over 60-lb, fob mill, net ton, \$43.40. Light ralls, over 60-lb, fob mill, net ton, \$43.40. Light ralls (billet). Pittsburgh, Chicago, Birmingham, net ton, \$49.18. "Relaying rails, 35 lb and over, fob rallroad and basing points, \$31-\$33. Supplies: Track bolts. 4.75c; heat treated, 5.00c. Tie plates \$51 net ton, base, Standard spikes, 3.65c.

• Fixed by OPA Schedule 46, Dec. 15, 1941. **Tool Steels**

Tool Steels: Pittsburgh. Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; Reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oll-hardening 25.97c; high carbon-chromium 46.53c.

| | | | | Dase, |
|-------|------|------|------|---------|
| W. | Cr. | V. | Mo. | per lb. |
| 18.00 | 4 | 1 | | 72.49c |
| 1.5 | 4 | 1 | 8.5 | 58.43c |
| | 4 | 2 | 3 | 58,43c |
| 6.40 | 4.15 | 1.90 | 5 | 62.22c |
| 5.50 | 4.50 | 4 | 4.50 | 75.74c |
| | | | | |

Rivets

Fob Pittsburgh, Cleveland, Chicago,

Washers, Wrought

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chi-cago. Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow bolts

| | laiger, | an leng | uns | | 29 ОЦ | | | |
|--|--|---|--|---|---|--|--|--|
| All diam | eters, o | ver 6-in. | long | | 59 off | | | |
| Tire bol | ts | | | | 50 off | | | |
| Step bol | ts | | | | 56 off | | | |
| Plow bo | lts | | | | 65 off | | | |
| | | Stove | Bolts | | | | | |
| In pack | ages n | life cens | arate' 7 | 7-10 00 | mute | | | |
| attech | ad 71 / | off bulk | - 80 of | f on 15 | 000 of | | | |
| 3.In | and show | ter or | 5000 01 | 1 011 10 | wite | | | |
| J-111. 2 | | iter, or | 5000 01 | er a m | ., nuta | | | |
| separa | ie. | | | | | | | |
| | | Nu | ta | | | | | |
| Semifinis | hed hex | | U | .S.S. | S.A.E. | | | |
| √a-in. an | d small | er | | | 64 | | | |
| 1/2-in. an | d smalle | er | | 62 | | | | |
| 1/2-in1-i | n | | | | 60 | | | |
| Pin1-i | n | | | 59 | | | | |
| 114-In -1 | 14-in. | | | 57 | 58 | | | |
| 146-In a | nd large | 27 | | 56 | | | | |
| Addition | al discou | int of 10 | for ful | 1 kogo | | | | |
| Addition | ai discot | | - 101 101 | i ACBS. | | | | |
| | He | xagon Ca | ap Screv | 78 | | | | |
| Upset 1- | in., sma | ller | | | 64 off | | | |
| Milled 1- | in., sma | iller | | | 60 off | | | |
| | Squa | re Head | Set Scr | ews | | | | |
| Upset 1- | in, and | smaller | | | 71 off | | | |
| Headless | . ¼-ln. | and lar | ger | | 60 off | | | |
| No. 10 a | nd smal | ler | | | 70 off | | | |
| | | | | | | | | |
| Stainl | ess S | teels | | | | | | |
| (One) | (Open market prices OPA price control | | | | | | | |
| (Open market prices. OPA price control | | | | | | | | |
| (Ope. | SUSDA | nded Oct | 11 10 | 45) | roi | | | |
| (ope. | suspe | nded Oct | 11, 19 | 45.) | IFOI | | | |
| (Open | suspe Ba | nded Octase, Cen | ts per lb | 45.) | lloi | | | |
| CHROM | suspe Ba | nded Octase, Ceni | ts per lb | 45.) | .101 | | | |
| CHROM | | nded Octase, Cent | ts per lb | 45.) H. R. | C. R. | | | |
| CHROM | suspe Bars Bars | nded Oct ase, Cen CKEL S' Plates | 11, 19 ts per lb TEELS Sheets | H. R. Strip | C. R. Strip | | | |
| CHROM | suspe Bars 25.96c | nded Oct ase, Cen CREL S' Plates 29.21c | Sheets 36.79c | H. R. Strip 23.93c | C. R. Strip 30.30c | | | |
| CHROM 302 | suspe Bars 10M NI Bars 25.96c 28.13 | Plates 29.21c 31.38 | Sheets 36.79c 38.95 | H. R. Strip 23.93c 29.21 | C. R. Strip 30.30c 35.71 | | | |
| CHROM 302 303 304 | Susper Bars 25.96c 28.13 27.05 | nded Oct ase, Ceni CREL S' Plates 29.21c 31.38 31.38 | . 11, 19 ts per lb TEELS 36.79c 38.95 38.95 | H. R. Strip 23.93c 29.21 25.45 | C. R. Strip 30.30c 35.71 32.46 | | | |
| CHROM 302 303 304 308 | Bars 25.96c 28.13 27.05 31.38 | Plates 29.21c 31.38 36.79 | Sheets 36.79c 38.95 34.36 | H. R. Strip 23.93c 29.21 25.45 30.84 | C. R. Strip 30.30c 35.71 32.46 37.87 | | | |
| CHROMI 302 303 304 308 | suspe B: Bars 25.96c 28.13 27.05 31.38 38.95 | nded Oct ase, Ceni CKEL S' Plates 29.21c 31.38 31.38 36.79 43.28 | Sheets 36.79c 38.95 38.95 44.36 50.85 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 | | | |
| CHROM 303 304 309 309 | suspe Bi IUM NI Bars 25.96c 28.13 27.05 31.38 38.95 53.02 | nded Oci ase, Ceni CKEL S' Plates 29.21c 31.38 36.79 43.28 56.26 | 11, 19 ts per lb TEELS Sheets 36.79c 38.95 38.95 44.36 50.85 57.35 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 | | | |
| CHROMI 303 304 308 309 310 312 | suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 | nded Oci ase, Ceni CREL S' Plates 29.21c 31.38 31.38 36.79 43.28 56.26 43.28 | 57.35 57.35 57.35 57.35 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 | | | |
| CHROMI 303 304 308 309 310 312 | suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 | nded Oct ase, Cen CKEL S' Plates 29.21c 31.38 36.79 43.28 56.26 43.28 47.61 | Sheets 36.79c 38.95 38.95 38.95 44.36 50.85 57.35 53.02 51.94 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 51.94 | | | |
| CHROMI 302 303 304 309 310 312 •316 •316 | suspe B: IUM NIC Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 31.38 | Plates 29.21c 31.38 36.79 43.28 56.26 43.28 47.61 36.79 | 5. 11, 19 ts per lb TEELS Sheets 36.79c 38.95 38.95 44.36 50.85 57.35 53.02 51.94 44.36 | H. R. Strlp 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 51.94 41 12 | | | |
| CHROMI 303 304 309 310 312 *316 1321 | Suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 31.38 25.71 | Plates 29.21c 31.38 36.79 43.28 56.26 43.28 47.61 36.79 | Sheets 36.79c 38.95 38.95 38.95 44.36 50.85 57.35 57.35 53.02 51.94 44.36 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 95 71 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 51.94 41.12 | | | |
| CHROMI 302 303 304 309 310 312 *316 \$321 \$347 \$421 | Suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 31.38 35.71 90 5c | nded Octase, Ceni CKEL S' Plates 29.21c 31.38 36.79 43.28 56.26 43.28 47.61 36.79 41.12 22.20 | 5. 11, 19 ts per lb TEELS Sheets 36.79c 38.95 38.95 44.36 50.85 57.35 53.02 51.94 44.36 48.69 21 29 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 51.94 41.12 45.44 24.25 | | | |
| CHROMI 302 303 304 308 310 312 *316 ;321 ;347 431 | suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 31.38 35.71 20.56 | nded Octase, Ceni CREL S' Plates 29.21c 31.38 36.79 43.28 56.26 43.28 47.61 36.79 41.12 23.80 | Chapter 10 TEELS Sheets 36.79c 38.95 38.95 38.95 50.85 57.35 53.02 51.94 44.36 48.69 31.38 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 51.94 41.12 45.44 24.35 | | | |
| CHROMI 302 303 304 309 310 310 310 312 \$310 \$321 | suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 31.38 35.71 20.56 HT CHI | nded Oct ase, Cen CHEL S' Plates 29.21c 31.38 31.38 31.38 56.26 43.28 56.26 43.28 47.61 36.79 41.12 23.80 COMIUM | 11, 19 ts per lb TEELS Sheets 38.95 38.95 38.95 50.85 57.35 53.02 51.94 44.36 48.69 31.38 STEE | H. R. Strlp 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 51.94 41.12 45.44 24.35 | | | |
| CHROMI 902 303 304 309 309 312 •316 •316 •312 •316 •312 •313 •314 •314 •315 •316 •314 •315 •316 •316 •343 •316 •343 •343 •343 •343 •343 •343 •343 •345 • | Suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 31.38 35.71 20.56 HT CHI 23.93 | nded Octa ase, Ceni CKEL S' Plates 29.21c 31.38 36.79 43.28 47.61 36.79 41.12 23.80 COMIUM 26.51 | 11, 19 ts per lb TEELS Sheets 36,79c 38,95 38,95 38,95 57,35 57,35 57,35 57,35 57,35 51,94 44,36 48,69 31,38 I STEEI 31,92 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 | | | |
| CHROMD \$02 \$03 \$03 \$03 \$04 \$09 \$09 \$09 \$09 \$09 \$09 \$09 \$01 \$03 \$03 \$03 \$03 \$03 \$03 \$03 \$04 \$03 \$04 \$04 \$09 \$10 \$112 \$12 \$12 \$131 \$12 \$131 \$132 \$131 \$132 \$132 \$131 \$132 \$133 \$132 \$133 \$133 \$133 \$133 \$143 \$145 | Suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 31.38 35.71 20.56 HT CHI 23.93 20.02 | nded Octa ase, Ceni CKEL S' Plates 29.21c 31.38 36.79 43.28 43.29 43.28 43.28 43.29 43.28 43.29 | 51, 11, 19 ts per lb TEELS Sheets 38,95 38,95 38,95 57,35 57,35 57,35 57,35 53,02 51,94 44,36 931,38 I STEEH 31,92 28,67 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 18.39 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 41.12 45.44 45.44 24.35 29.21 23.80 | | | |
| CHROMI 302303 304 303304 308 308 310 312 312 312 312 314 314 314 314 314 314 314 314 314 315 314 315 316 317. | Suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 53.02 38.95 53.02 38.95 43.28 31.38 35.71 20.56 HT CHI 23.93 20.56 | nded Octase, Ceni CREL S' Plates 29.21c 31.38 36.79 43.28 43.28 47.61 36.79 41.12 23.80 30MIUM 26.51 23.93 | 11, 19 is per lb TFEELS Sheets 36,79c 38.95 44.36 50.85 57.35 53.02 51.94 44.36 931.38 (STEEH 31.92 28.67 29.21 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 18.39 19.75 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 50.85 50.85 51.94 41.12 45.44 24.35 29.21 23.80 25.45 | | | |
| CHROM) 302 303 304 308 309 310 312 312 312 312 314 321 | Suspe Bars 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 43.28 31.33 35.71 20.56 HT CHI 23.93 20.02 20.56 25.96 | mded Octase, Ceni ase, Ceni CREL S' Plates 29.21c 31.38 36.79 43.28 47.61 36.79 41.12 23.80 control 26.51 23.93 23.80 30.84 | 11, 19 is per lb TFELS Sheets 36,79c 38,95 44,36 50,85 57,35 53,02 51,94 44,36 31,38 ISTEE 31,38 ISTEE 31,92 28,67 29,21 36,25 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 18.39 19.75 25.70 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 51.94 41.12 45.44 24.35 29.21 23.80 25.45 39.49 | | | |
| CHROMI 302303 304 303 309 310 312 312 312 312 312 312 313 314 | Barse Barse Bars 25.96c 28.13 27.05 31.38 95 338.95 31.38 35.71 20.56 20.56 20.56 25.962 20.56 | nded Octase, Ceni CREL S' Plates 29.21c 31.38 31.38 36.79 43.28 56.26 43.28 47.61 36.79 41.12 23.80 36.79 41.12 23.80 30.84 23.80 30.84 23.80 | 11, 19 is per lb TFELS Sheets 36,790 38,95 38,95 38,95 38,95 38,95 38,95 38,95 38,95 38,95 38,95 31,38 57,35 57,35 53,02 51,94 44,36 48,69 31,38 44,36 49,22 29,21 36,22 31,38 | H. R. Strlp 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 18.39 19.75 25.70 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 41.12 45.44 24.35 29.21 23.80 25.45 39.49 24.35 | | | |
| CHROMI 303 303 304 308 309 310 310 310 311 311 311 311 311 431 431 410 410 410 4130 41420 41420 | Barse Barse Barse 25.96c 28.13 27.05 31.38 38.95 53.02 38.95 53.02 38.95 43.28 31.38 35.71 20.56 HT CHI 23.93 20.02 20.56 25.96 20.56 21.10 | mded Octase, Ceni cREL 8: Plates 29.21c 31.38 31.38 36.79 43.28 56.26 43.28 47.61 36.79 41.12 23.80 CMHUM 26.51 23.93 23.80 23.80 23.80 24.35 | 11, 19 is per lb TFELS Sheets 36,79c 38,95 34,36 50,85 57,35 53,02 51,94 44,36 50,85 57,35 53,02 51,94 44,36 931,38 STEEI 31,92 28,67 29,21 31,92 | H. R. Strlp 23.93e 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 18.39 19.75 25.70 18.94 20.29 | C. R. Strip 30.30c 35.71 32.46 37.87 50.85 60.59 41.12 23.80 29.21 23.80 25.45 29.49 24.35 | | | |
| CHROMJ 302 303 304 308 309 310 310 310 316 316 317 316 317 316 317 316 317 317 316 317 316 317 317 317 317 318 319 31 | Barspec Barspec Bars 25.96c 25.96c 31.38 31.38 35.71 20.56 20.56 20.56 20.56 20.56 25.96c 20.56 25.96c 20.56 25.96 20.56 20.56 20.56 21.10 25.96 25.96 | nded Oct ase, Cen CREL S' Plates 29.21c 31.38 32.37 32.38 36.79 32.38 36.79 32.38 36.79 32.38 36.79 32.38 36.79 32.38 36.79 32.38 36.79 32.38 36.79 32.38 36.79 32.38 30.39 30 | 11, 19 is per lb TEELS Sheets 36,79e 38,95 38,95 57,35 57,35 57,35 53,02 51,94 44,36 48,69 31,38 31,38 STEEI 31,39 228,67 29,21 36,25 31,38 31,39 23,67 29,21 | H. R. Strip 23.95c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 18.39 19.75 25.70 25.70 | C. R. Strip 30.30c 35.71 32.46 50.85 60.59 51.94 41.12 45.44 24.35 29.21 23.80 25.45 39.49 24.35 26.51 39.49 | | | |
| CHROMI 302 303 304 308 309 310 310 310 311 31 | Barse Barse Bars 25.96c 28.13 27.05 31.38 95 53.02 38.95 38.95 31.38 35.71 20.56 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 20.56 25.96 | nded Octase, Ceni CREL S' Plates 29.21c 31.38 31.38 36.79 43.28 56.26 43.28 47.61 36.79 41.12 23.80 OMIOM 26.51 23.93 23.80 OMIOM 26.51 23.93 30.84 23.80 30.84 23.85 30.84 | 011, 19 is per lb TFELS Sheets 36,79c 38,95 44,36 50,85 57,35 53,02 51,94 44,36 48,69 31,38 STEE 31,92 28,67 29,21 36,25 31,92 36,25 31,92 36,25 | H. R. Strlp 23.93c 29.21 25.45 30.84 40.03 52.74 31.65 35.71 18.94 22.99 18.39 19.75 25.70 18.94 20.29 25.70 | C. R. Strip 30.30c 35.71 32.46 57.85 50.85 50.85 51.94 41.12 23.80 29.21 23.80 29.21 23.80 29.49 24.35 39.49 24.51 39.49 24.51 39.49 | | | |
| CHROMJ 302 303 304 304 309 310 310 3110 312 3110 3110 312 3110 312 3110 312 3110 312 3110 | Barspec Bars 25.96C 25.96C 31.38 38.95 33.33 35.71 20.56 20.56 25.96C 20.56 25.96C 20.56 25.96C 25.96C 25.96C 24.35 24.35 | mded Oct ase, Cen OREL S' Plates 29.21c 31.38 31.38 31.38 31.38 31.38 31.38 31.38 47.61 36.79 41.12 23.80 30.84 23.80 23.80 30.84 23.80 24.35 30.84 27.59 | 511, 19 is per lb TFEELS Sheets 36,79c 38,95 38,95 38,95 57,35 57,35 57,35 57,35 57,35 51,94 44,36 48,69 31,38 31,38 STEEI 31,32 28,67 29,21 36,25 31,38 31,92 36,25 31,38 31,92 36,25 35,17 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 18.39 19.75 25.70 25.96 | C. R. Strip 30.30c 35.71 32.46 60.59 51.94 41.12 45.44 24.35 29.21 23.80 25.45 39.49 24.35 26.51 39.49 34.62 | | | |
| CHROMI 302303 304303 304309 308309 312 312 312 312 312 313 314 | Barse Bars 25.96c 28.13 27.05 31.38 35.71 20.56 23.93 20.56 21.30 25.966 22.596 20.56 21.10 25.966 20.56 21.10 25.966 24.35 24.35 24.35 24.35 24.35 24.35 24.35 24.35 24.35 24.35 24.35 24.35 24.35 35.75 31.38 35.76 36.76 37.76 | mded Oct ase, Cen CKEL S' Plates 29.21c 31.38 31.38 31.38 36.79 43.28 56.26 43.28 47.61 36.79 41.12 23.80 41.12 23.80 41.12 23.80 30.84 23.80 30.84 23.80 30.84 23.80 30.84 27.59 27.59 27.59 | 511, 19 is per lb TFELS Sheets 36,79 38,95 34,96 50,85 57,35 53,02 51,94 44,36 48,69 31,38 44,36 48,69 31,38 1,92 28,67 29,21 36,25 31,38 31,92 36,25 31,92 36,25 31,92 36,25 35,17 35,17 36,49 | H. R. Strip 23.93c 29.21 25.45 30.84 40.03 52.74 43.28 31.65 35.71 18.94 22.99 18.39 19.75 25.70 25.70 25.96 25.94 25.94 25.96 25.94 25.94 25.94 25.94 25.94 25.97 25.70 | C. R. Stripp 30.306 35.71 32.46 50.85 60.59 51.94 41.12 23.80 51.94 41.12 23.80 29.21 23.80 24.35 29.21 23.80 24.35 29.24 39.49 24.35 34.62 34.62 34.62 | | | |

Metallurgical Coke Price Per Net Ton

• With 2-3% molybdenum. § With titanium. † With columbium. •• Plus machining agent. †† High carbon. ## Free machining.

 502...
 9.44
 14.07
 15.12
 14.07
 15.43

 STAINIESS CLAD STEEL (20%)
 (Fob Piltsburgh and Washington, Pa., plate prices include annealing and pickling.)
 304...
 19.48
 20.56

 304...
 19.48
 20.56

 430...
 17.31
 18.39

 410...
 17.85
 18.94

 446...
 19.48
 20.56

12.98

14.07

17.04

18.12

12.98

14.07

18.39

19.48

| Beehive Ovens | |
|--|---|
| Connellsville, furnace Connellsville, foundry New River, foundry Wise county, foundry Wise county, furnace | *7.50 8.00- 8.50 9.00- 9.25 7.75- 8.25 7.25- 7.75 |
| By-Product Foundry | |
| Kearney, N. J., ovens Chicago, outside delivered Chicago, delivered Terre Haute, delivered Milwaukee, ovens New England, delivered Birmingham, delivered Indianapolis, delivered Cincinnati, delivered Suffalo, delivered Detroit, delivered Detroit, delivered Detroit, delivered | $\begin{array}{c} 13.05\\ 13.00\\ 13.75\\ 13.50\\ 13.75\\ 14.65\\ 10.90\\ 13.50\\ 13.20\\ 13.20\\ 13.20\\ 13.20\\ 13.20\\ 13.40\\ 13.75\\ 13.28\\ 13$ |
| Buffalo, delivered Detroit, delivered Philadelphia, delivered | 13.4 13.7 13.2 |

*Operators of hand-drawn ovens using trucked coal may charge \$8.00; effective May 26, 1945, †14.25 from other than Ala., Mo., Tenn.

Cake By-Products

446... 29.76 501... 8.66 502... 9.74

| CORE Dy-110ducts | |
|---|--------|
| Spot, gal, freight allowed east of | Omaha |
| Pure and 90% benzol | 15.00c |
| Toluol, two degree | 27.00c |
| Solvent naphtha | 26.00c |
| Industrial xylol | 26.00c |
| Per pound fob works | |
| Phenol (car lots, returnable drums) | 10.50e |
| Do., less than carlots | 11.25c |
| Do., tank cars | 9.50c |
| Eastern plants, per pound | |
| Naphthalene flakes, balls, bbl, to job- | |
| bers | 8.00c |
| Then Anny harly data mant | |

Per ton, bulk, fob port Sulphate of ammonia \$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on OPA mill prices anneunced March 1, 1946. Open market prices designated by dagger.

| | Hot-rolled bars | Structural abapos | Plates | Floor plates | Hot-rolled sheets (10-gage base) | Hoh-rolled strip (14-gage and lighter, 6-in and narrower) | Hot-rolled strip (12-gage and heavier wider than 6-inch) | Galvanized flat sheets (24-gage base) | Cold-rolled sheet (17-gage base) | Cold finished bare | Cold-rolled strip |
|--------|--|--|--|--|---|---|--|---|--|---|--|
| Beston | .2941 .103 ¹ .072 ¹ .072 ¹ .052 ¹ .315 ¹ .60 ¹ .50 ¹ .60 ¹ .50 ¹ .60 ³ .50 ¹ .60 ³ .50 ³ .86 ¹ .70 ¹ .293 ¹ .881 ¹ .881 ¹ .881 ¹ .883 ¹ .072 ² | 4.162 ¹ 4.008 ¹ 3.997 ¹ 3.997 ¹ 3.997 ¹ 4.252 ¹ 3.70 ¹ 8.85 ¹ 3.55 ¹ 3.858 ¹ 3.858 ¹ 3.838 ¹ 3.911 ¹ 4.243 ¹ 4.243 ¹ 3.941 ¹ 3.941 ¹ 3.941 ¹ 3.941 ¹ 3.947 ¹ 4.343 ¹ 3.947 ¹ 4.343 ¹ 3.947 ¹ 4.343 ¹ 3.947 ¹ 4.343 ¹ 4.343 ¹ 3.947 ¹ 4.343 ¹ 4.343 ¹ 4.343 ¹ 4.343 ¹ 4.343 ¹ 4.343 ¹ 4.343 ¹ 4.343 ¹ 4.343 ¹ 4.50 ¹ 4.50 ¹ 4.50 ¹ 4.50 ¹ 4.70 ⁸ | $\begin{array}{c} 4.162^1\\ 4.018^1\\ 3.855^1\\ 3.855^3\\ 3.844^1\\ 4.048^1\\ 4.221^1\\ \dots\\ 3.70^1\\ 3.85^1\\ 3.55^1\\ 3.65^1\\ 3.55^1\\ 3.65^1\\ 3.55^1\\ 3.85^3\\ 3.55^1\\ 3.85^3\\ 3.55^1\\ 3.85^3\\ 3.55^1\\ 3.85^3\\ 3.85^$ | 5.977 ² 5.824 ¹ 5.824 ¹ 5.70 ² 5.50 ² 5.50 ¹ 5.51 ³ 5.15 ³ 5.15 ³ 5.438 ¹ 5.943 ³ 5.943 ³ 5.943 ³ 5.943 ³ 5.943 ³ 5.943 ³ 5.943 ³ 5.541 ⁴ 5.581 ¹ 5.581 ¹ 5.581 ² 5.541 ³ 5.541 ³ 5.55 ³ 6.75 ⁵ 6.75 ⁵ 6.75 ⁵ 6.75 ⁵ 6.75 ⁵ | 3.999^{1} 3.818^{1} 3.743^{1} 3.619^{1} 3.743^{1} 3.619^{1} 3.575^{1} 3.575^{1} 3.575^{1} 3.575^{1} 3.475^{1} 3.675^{1} 3.675^{1} 3.650^{1} 3.475^{1} 3.612^{1} 3.622^{1} 4.190^{1} 3.675^{1} 3.675^{1} 3.675^{1} 3.622^{3} 4.190^{1} 3.675^{1} 4.190^{1} 3.675^{1} 4.283^{1} 3.988^{9} 5.225^{4} 4.87^{6} | 5.456 ⁴ 4.324 ³ 4.324 ³ 4.622 ¹ 4.252 ¹ 4.391 ³ 4.865 ¹ 4.169 ³ 3.85 ² 3.85 ² 3.85 ³ 3.85 ³ 4.050 ³ 4.025 ¹ 5.80 ⁴ 5.80 ⁴ 5.80 ⁴ | 4.356 ¹ 4.224 ¹ 4.224 ¹ 4.522 ¹ 4.52 ¹ 4.415 ¹ 4.415 ¹ 4.415 ¹ 4.415 ¹ 3.750 ¹ 8.850 ⁴ 3.750 ¹ 8.850 ⁴ 3.750 ¹ 8.850 ⁴ 3.750 ¹ 8.850 ⁴ 3.750 ¹ 8.850 ⁴ 3.750 ¹ 8.850 ⁴ 3.925 ¹ 4.293 ¹ 3.925 ¹ 3.925 ¹ 4.293 ¹ 4.293 ¹ 3.925 ¹ 5.750 ⁴ 3.925 ¹ 4.563 ^e 5.200 ⁴ 4.563 ^e 5.200 ⁷ 5.200 ⁷ 4.60 ^e | 5.67414 5.46013 5.46814 5.3441 5.64617 5.82117 5.2013 5.1013 5.2013 5.1013 5.2013 5.2758 4.8513 5.2758 4.8513 5.2758 5.86515 5.2758 5.86515 5.2758 5.86515 5.2758 5.86515 5.2758 5.86515 5.2758 5.86515 5.2758 5.86515 5.76836 5.76836 5.76836 5.76836 6.35116 6.35116 6.35116 6.4015 | 4.969 ¹⁴ 4.838 ¹⁴ 5.097 ³⁵ 5.077 ³⁵ 5.06 ²⁰ 4.490 ³⁴ 4.525 ¹⁶ 4.525 ¹⁶ 4.525 ¹⁶ 4.525 ³⁶ 4.525 ³⁶ 4.525 ³⁶ 4.525 ³⁶ 4.525 ³⁶ 4.525 ³⁶ 4.525 ³⁶ 4.525 ³⁶ 4.525 ³⁶ 4.525 ³⁶ 4.725 ³⁶ 5.668 ³⁶ 5.668 ³⁶ 5.005 ¹⁴ 5.005 ¹ | 4.594 ¹¹ 4.553 ²¹ 4.022 ²¹ 4.022 ²¹ 4.615 ²¹ 4.615 ²¹ 4.20 ²¹ 4.25 ¹³ 4.481 ²¹ 4.481 ²¹ 4.481 ²¹ 4.481 ²¹ 4.481 ²¹ 4.481 ²¹ 4.481 ²¹ 5.079 ²¹ 4.0 ²² 5.079 ²¹ 4.10 ²² 5.079 ²¹ 4.10 ²² 5.783 ²¹ 5.783 ²¹ 5.783 ²¹ 5.783 ²¹ 6.23 ²¹ 6.23 ²¹ | 4.965 5.024 5.024 5.024 4.919 4.60 4.70 4.60 4.70 4.60 4.70 4.60 4.70 5.057 5.057 5.057 5.057 5.051 5.465 5.465 |

[•]Basing point cities with quotations representing mill prices, plus ware house spread. NOTE—Ceiling prices fixed by Office of Price Administration in revised price schedule No. 49, as amended. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES 400 to 1999 pounds; 400 to 14,999 pounds; 600 to 1999 pounds; 400 to 1999 pounds; 400 to 8999 pounds; 600 to 9999 pounds; 400 to 39 999 pounds; 400 pounds; 600 pounds; 600 pounds; 400 to 39 999 pounds; 100 pounds; 600 pounds;

| Ures | Inolan and Allican |
|--|---|
| Lake Superior Iron Ore Gross ton, 51½% (Natural) Lower Lake Ports | 48% 2.8:1 |
| Old range bessemer \$4.95 Mesabi nonbessemer 4.55 High phosphorus 4.55 Mesabi bessemer 4.70 Old range nonbessemer 4.80 | South African (Transvaal) 27.40 44% no ratio \$27.40 45% no ratio \$28.80 48% no ratio \$1.00 50% no ratio \$2.80 |
| Ensiern Local Ore Cents, units, del. E. Pa. Foundry and basic 56- 63% contract 13.00 | Brazilian—nominal 44 44% 2.5:1 lump 433.65 ti 48% 3:1 lump 45.50 0 |
| Foreign Ore Cents per unit, cif Atlantic ports | |
| Manganiferous ore, 45- 55% Fe, 6-10% Mn Nom. N. African low phos Nom. Swedish basic, 60 to 68% Nom. Spanish, N. African ba- | NATION |
| sic. 50 to 60% Nom. Brazil iron ore, 68-69% fob Rio de Janeiro 7.50-8.00 | (Extras for alloy content) |
| | |

| Rhodesian |
|---|
| 45% no ratio \$28.30 48% no ratio \$1.00 48% S:1 lump 41.00 |
| Domestic (seller's nearest rail) |
| 48% S:1 \$48.50 less \$7 freight allewance. |
| Manganese Ors |
| Salas prices of Office of Metals Re- |

ales prices of Office of Motau ru-erve, cents per gross ton unit, dry, 18%, at New York, Philadelphia, Bal-imore, Norfolk, Mobile and New Pricans, 85c; Fontana, Calif., Provo,

Utah, and Pueblo, Colo., 91c; price are subject to premiums, penains and other provisions of amended M.P.R. No. 248, effective May 15, 1944. Price at basing points which are also points of discharge of im-ported manganese ore is fob car, shipside, at dock most favorable to the buyer. Outside shipments direct the manganese at 10c per unit less than Metal Reserve prices.

Melybdenum

Sulphide conc., lb, Mo cont., 10.75 mines

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for allow content)

Basic open-hearth Electric furnace

| Tungsten Ore | Desta | - | Chemics | d Composi | tion Limits | , Per Cent- | | Bars | Billeta | Bars | Billets |
|----------------------------------|-----------|--------|-----------|-----------|-------------|-------------|-------|---------|---------|---------|---------|
| short ton unit, duty | nation | Carbon | Mn. | SŁ | Cr. | NI. | Mo. | 100 lb. | per GT | 100 lb. | \$26.00 |
| paid \$24.0 | 0 NE 9415 | .1318 | .80-1.10 | .2035 | .8050 | .8060 | .0815 | \$0.780 | \$15.60 | 1.300 | 28.00 |
| Chrome Ore | NE 9425 | 2828 | 1.00-1.30 | .2035 | .3050 | ,80-,60 | .0815 | .832 | 16.64 | 1.352 | 27.04 |
| (Equivalent OPA schedules): | NE 9722 | .2025 | .5080 | .2035 | .1025 | .4070 | .1525 | .676 | 13.52 | 1 812 | 32.24 |
| Gross ton fob cars, New York | , NE 9912 | .1015 | .5070 | .2035 | .4060 | 1.00-1.30 | .2080 | 1.248 | 24.90 | 1.812 | 33.94 |
| Philadelphia, Baltimore, Charles | - NE 9920 | .1023 | .50-,70 | 2035 | .4000 | 1.00-1.30 | .2030 | 1.440 | 22.00 | | |

Philadelphia, Baltimore, Charles- NE 9920 10-23 .50-70 20-55 .40-60 1.00-1.50 20-50 1.20

Ores La Gross

Pig Iron

Prices (in gross tons) are maximum fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, Oct. 23, 1945, and March 15, 1946. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included.

| | No. 2 | | | Mal- |
|---------------------------------|---------|---------|----------|---------|
| | Foundry | Basic | Bessemer | leable |
| Bethlehem, Pa., base | \$27.50 | \$27.00 | \$28.50 | \$28.00 |
| Newark, N. J., del. | 29.03 | 28.53 | 30.03 | 29.53 |
| Brooklyn, N. Y., del. | 30.00 | | | 30.50 |
| Birdsboro, Pa., base | 27.50 | 27.00 | 28.50 | 28.00 |
| Birmingham, base | 22.88 | 21.50 | 27 50 | |
| Baltimore, del. | 28.11 | | | |
| Boston, del | 27 64 | | | |
| Chicago, del. | 26.72 | | | |
| Cincinnati, del. | 26.94 | 26.06 | | |
| Cleveland, del. | 26.62 | 25.74 | | |
| Newark, N. J. | 28 64 | | | |
| Philadelphia, del. | 27.96 | 27 46 | | |
| St. Louis, del | 26.62 | 27 54 | | |
| Buffalo, base | 26 50 | 25 50 | 27 50 | 27.00 |
| Boston, del | 28.00 | 27.00 | 29.00 | 29 50 |
| Rochester del | 28.03 | 21.00 | 20.00 | 20.00 |
| Syracuse del | 28 58 | | 20.59 | 20.00 |
| Chicago, hase | 26.50 | 26.00 | 23.00 | 25,00 |
| Milwaukee del | 27.60 | 20.00 | 27,00 | 20.50 |
| Muskegon Mich dol | 27.60 | 21.10 | 20,10 | 27.00 |
| Cleveland haco | 26.50 | 26.00 | 07.00 | 21.09 |
| Akron Canton dol | 20.00 | 20.00 | 41.00 | 20.00 |
| Detroit base | 21.05 | 21.39 | 28.39 | 27.89 |
| Saginew Mich dol | 20.00 | 20.00 | 21.00 | 26.50 |
| Duluth base | 20.01 | 20.31 | 29.31 | 28.81 |
| St Paul del | 27.00 | 20.00 | 27.50 | 27.00 |
| Ede Pa hara | 29.13 | 20.03 | 29.03 | 29.13 |
| Everett Mong hone | 20.50 | 20.00 | 21.00 | 27,00 |
| Boston dol | 21.00 | 27.00 | 28.50 | 28.00 |
| Granite City Vit have | 28.00 | 21.50 | 29.00 | 28.50 |
| St Louis del | 26.50 | 26.00 | 27.00 | 26.50 |
| Hamilton O bees | 27.00 | 26,50 | | 27.00 |
| Cincinnati dal | 26.50 | 26.00 | | 28.50 |
| Neville Jaland The house | 27.61 | 27.11 | | 27.61 |
| Pittshungh dat by 0 claid | 26.50 | 26.00 | 27.00 | 26.50 |
| Provo Vitale have N. & S. Sides | 27.19 | 26.69 | 27.69 | 27.19 |
| Sharpeville De Louis | 24.50 | 24.00 | | |
| Sparround Tat., Dase | 26.50 | 26.00 | 27.00 | 26.50 |
| Roltimore del | 27.50 | 27.00 | | |
| Stealton De 1 | 28.49 | | | |
| Streddland Dase | 1.11.1 | 27.00 | | |
| Dhilodalabla, base | 27.50 | 27.00 | 28.50 | 28.00 |
| Toleda O del. | 28.34 | 27.84 | | 28.84 |
| Youngatown O. | 26.50 | 26.00 | 27.00 | 26.50 |
| Mon-Gold O., base | 26.50 | 26.00 | 27.00 | 26.50 |
| 44941SHP/0. () 101 | */8 AA | 27 04 | 90.04 | 00 44 |

*To Neville Island base add: 55 cents for McKees Rocks, Pa.; 84 cents, Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97 cents (water), Monongahela; \$1.11, Oakmont, Verona; \$1.24, Brack-enidge.

Exception to Celling Prices: Struthers Iron & Steel Co., Struthers, O. Exception to Celling Prices: Struthers Iron & Steel Co., Struthers, O., may charge 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron. Celling Prices are aggregate of (1) governing basing point, (2) differ-entials, and (3) transportation charges from governing basing point to

Ferromanganese, standard: 78-82% C.I. gross ton, duty paid. \$135 fob tras, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. Is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. Is producer); \$140 fob cars, Pitteburgh (where Carnegic-Illinois Steel Corp. Is producer); add \$6 for packed c.I., \$10 for ton, \$13.50 for tess ton; \$1.70 for each 1%, or frac-tion cartaned manganese over \$2% or under 78%. or under 78%-

or under 78%. Ferromanganese, low carbon: East-fra zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.55c; regular, 21.0cc; medium, 15.75c. Prices are per pound contained Mn, bulk car-lot alignments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

and 0.06% P spiereidsen: 19-21% carlot per gross ton, Palmerton, Pa., \$36; Pittsburgh, \$40.50; Chicago, \$40.60. Licetrotytic Manganese: 99.9% plus, fob knowille, Tenn., freight al-lowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1%c for hydrogen-removed metal.

metal Chromium Metal: 97% min. chromi-un, max. 0.50% carbon, eastern zone, per lb contained chromium bulk, cl. 79,50c. 2000 lb to c.l. 80c; central 81c and 82,50c; west-ern 82.25c and 84.75c; fob ship-ping point, freight allowed. Herocolumbium: 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 1b higher.

over 0.75%. Special Foundry Ferrochrome: (Cr 62-66%; Capprox. 5-7%.) Con-tract, carload bulk 13.50c, packed 13.95c, ton lots 14.40c, less 14.90c, oastern, 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 0.25c. S.M. Ferrochrome, high carbon: (Cr 60-65%, Si 4-6% Mn 4-6% and

spot up 0.25c. S.M. Ferrochrome, h i g h carbon: (Cr 60-65%, Si 4-6%, Mn 4-6% and C 4-6%.) Contract. carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.49c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c

High Silicon, Silvery

6.00-6.50 per cent (base) \$32.00 6.51-7.00... \$33.00 9.01-9.50. 38.00 7.01-7.50... 84.00 9.51-10.00. 39.00 7.51-8.00... 35.00 10.01-10.50. 40.00 8.51-9.00... 35.00 10.51-11.00. 41.00 8.51-9.00... 37.00 11.01-11.50. 42.00 Fob Jackson county, O., per gross ton; Buifalo base \$1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilleon: Si 14.01 to 14.50%, \$45.50 Jackson co.; each additional 0.50% silicon up to and including 18% add \$1; low im-purities not exceeding 0.005 P, 0.40 Si, 1.0% C, add \$1.

Bessemer Ferrosilicon

Prices same as for high silicon sil-very iron, plus \$1 per gross ton. Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn., \$33.00 (For higher silicon irons a differ-ential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., \$32.00 base; \$33.24, del. Philadel-phia. Intermediate phosphorus, Cen-tral Furnace, Cleveland, \$29.00.

Differentials

Basing point prices are subject to following differentials:

billowing differentials: Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%). Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over. Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion there-of, manganese in excess of 1%. Nickel: An additional charge for nickel content as follows: Under Nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, \$2 a ton; for each addi-tional 0.25% nickel, \$1 a ton.

Ferroalloy Prices

and 17.25c, western; spot up 0.25c; per pound contained chromium.

per pound contained chromium. S.M. Ferrochrome, low carbon: (Cr 62-66%, Sl 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c. 0.25c.

0.25c. SMZ Alloy: (SI 60-55%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) per lb of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up 0.25c. Silleaz Alloy: (SI 35-40%, Ca 9-11%, AI 5-7%, Zr 5-7%, TI 9-11% and B 0.55-0.75%), per lb of alloy con-tract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up 0.25c. Silvaz Alloy: (SI 35-40%, Va 9-11%,

central; 27.30c, 28.90c and 29.90c, western; spot up 0.25c. Sllvaz Alloy: (Si 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Tl 9-11% and B 0.55-0.75%), per lb of alloy. Con-tract, carlots 53.00c, ton lots 59.00c, less 60.00c, eastern freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up 0.25c. CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, reight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 0.25c. CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-

Refractories

Per 1000, fob shipping point. Net prices

Fire Clay Brick

| Super Ducy | |
|------------------------------|----------------|
| Pa., Mo., Ky | 576.0 5 |
| High Heat Duty | |
| Pa., Ill., O., Md., Mo., Ky. | 60.40 |
| Ala., Ga. | 65.90 |
| Intermediate Heat Duty | |
| Ohio | 50.60 |
| Pa., Ill., Md., Mo., Ky | 54.80 |
| Ala., Ga. | 49.10 54.80 |
| Low Heat Duty | |
| Pa., Md., Ohio | 42.35 |
| Malleable Bung Brick | |
| Multicorbito Indiana | |
| All bases | 70.45 |

Ladle Brick

(Pa., O., W. Va., Mo.)

| Dry | Press | | | | • | • | | | | • | • | | • | | • | • | • | | • | • | 36.45 |
|------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|
| Wire | Cut | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | 34.15 |

Silica Brick

..... 60.40 Pennsylvania Joliet, E. Chicago 69.30 Birmingham, Ala. 60.40

Magnesite

Domestic dead-burned grains, net ton fob Chewelah, Wash., net ton, bulk 22.00 net 26.00 net ton, bags

Basic Brick

n, fob Baltimore, Plymouth Meeting, Chester, Pa. Net ton,

Fluorspar

Metallurgical grade, fob III., Ky., net tons, carloads, CaF³ content, 70%, or more, \$33; 65 but less than 70%, \$32; 60 but less than 65%, \$31; less than 60%, \$30. After Aug. 29, 1944, base price any grade \$30.00 \$30.00.

1.25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c, 12.50c, 13.00c, cen-tral; 13.25c, 13.75c, 14.50c and 15.00c interacting the 0.25c. 15.00c, western; spot up 0.25c. Ferro-Boron: (B 17.50% mln., Si 1.50% max., Al 0.50% max. and C 0.50% max.) per lb of alloy con-tract ton lots \$1.20, less ton lots \$1.30, eastern, freight allowed; \$1.2075 and \$1.3075 central; \$1.229 and \$1.320 weatern, and add for and \$1.329, western; spot add 5c. Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) per lb of alloy. Contract ton lots, \$1.89, less \$2.01, eastern; freight allowed; \$1.903 and \$2.023, central; \$1.935 and \$2.055 western; spot up 5c. Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). per lb of alloy. Contract, 5 tons or more, \$1.90, 1 ton to 8 tons, \$2.00, less than ton \$2.10, eastern, freight all 0 wed; \$1.9125, \$2.0125 and \$2.1125, central; \$1.9445, \$2.0445 and \$2.1445, western; spot same as contract. and \$1.329, western; spot add 5c. contract.

and g. Arho, Matchi, spot same us contract. Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Sl 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, ex-cept 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: Vana-dium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake; Vana-dium oxide 85% approx., sodium ox-ide, 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 contract in all cases. Calcium metal, cast, Contract top Calcium metal; cast: Contract ton lots or more \$1.35, less, \$1.60, pound of metal; \$1.36 and \$1.61 central, \$1.40 and \$1.65, western; spot up 5c. Calcium-Manganese-Silicon: (Ca

Calclum-Manganese-Sillcon: (Ca 16-20%, Mn 14-18% and Si 53-58%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

18.05C, 19.10C and 19.60C western; spot up 0.25C.
Calcium-Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, hump 13.00C, ton lots 14.50C, less 15.50C, eastern, freight allowed; 13.50C, 15.25C and 16.25C central; 15.55C, 17.40C and 18.40C, western; spot up 0.25C.
Briquets, Ferromanganese: (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Con-tract, carlots, bulk 0.0605C, packed 0.063C, tons 0.0655C, less 0.068C eastern freight allowed; 0.063C, 0.0655C, 0.0755C and 0.078C, central; 0.066C, 0.0685C, 0.0855C and 0.088C, western; spot up 0.25C.

0.065c, 0.0655c, 0.0855c and U.USSc, western; spot up 0.25c. 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 0.3c for c.l. and 0.5c for 2000 lb to c.l.; western add 0.70c for c.l., and 0.2c for 2000 lb to c.l.; silicomanganese,

eastern, containing exactly 2 lb Mn and approx, ½ lb Si, bulk, c.l., 5.80c, 2000 lb to c.l., 6.35c; central add 0.25c for c.l. and 1c for 2000 lb to c.l.; western, add 0.55c for c.l., and 0.2c for 2000 lb to c.l.; ferro-silicon, eastern, approx. 5 lb, con-taining exactly 2 lb Si, or weighing approx. 2½ lb and containing exactly 1 lb of Si, bulk, c.l. 3.35c, 2000 lb to c.l., 3.80c; central, add 0.15c for c.l., and 0.40c for 2000 lb to c.l.; western, add 0.30c for c.l. and 0.45c for 2000 to c.l.; fob shipping point, freight allowed. Ferromolybdenum: 55-75% per lb

Ferromolybdenum: 55-75% per lb contained Mo, fob Langeloth and Washington, Pa., furnace, any quan-tity 95.00c.

Ferrophosphorus: 17-19%. based on 18% P content, with unitage of \$3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale. Tenn.; contract price \$58.50, spot \$62.25.

Will Recentle, Fehr, Contract price 558:50, apot \$62.25.
Ferrosilicon: Eastern zone, 90-95%, blk, 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., 9.95c; 75%, bulk, c.l., 8.05c; central 90-95%, bulk, c.l., 12.0c; 2000 lb to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 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., 11.65c, 2000 lb to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000

lb to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 lb to c.l., 8.75c; fob ship-ping point, freight allowed. Prices per lb contained St.

Grainai: Vanadium Grainai No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Silicon Metal: Min. 97% Si and Silicon Metai: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l., 12,90c; 2000 lb to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l., 12.50c, 2000 lb to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c, fob shipping point, freight allowed. Price per lb con-tained Si. tained Si.

tained Si. Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, east-ern zone, bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c. Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, \$1.90; contract, \$1.83; freight allowed as far west as St. Louis. Tungsten Metal Powder: Spot, not less than 97%, \$2.50-\$2.60; freight allowed as far west as St. Louis. Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton

retrontanium: 40-407%, R.R. freight allowed, per lb contained Ti; ton lots \$1.23; less-ton lots \$1.25; east-ern. Spot up 5c per lb. Ferroittanium: 20-25%, 0.10 maxi-mum carbon; per lb contained Ti; ton lots \$1.35; less-ton lots \$1.40

contract basis, per ph. Nigara Falls, N. Y., freight al-

lowed to destination cast of Missis-sippi river and north of Baltimore and St. Louis, 6.8% C \$142.50; 3-5% C \$157.50.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Bortam: B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

Ferrovanadium: Va 35-55%, coe-tract basis, per lb contained Va, fob producers plant with usual freight allowances; open-hearth grade \$2.70; special grade \$2.80; highly-special grade \$2.90.

Zirconium Alloys: Zr 12-15%, per lb of alloy, eastern contract, carlota, bulk, 4.60c, packed 4.80c, ton lota 4.80c, less tons 5c, carloads, bulk, per g ross tons 5102.50; packed \$107.50; ton lots \$108; less-ton lota \$112.50. Spot up ¼c per ton.

Sill2.50. Spot up ¼c per ton.
Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up ¼c.
Alsifer: (Approx. 20% AI, 40% SI, 40% Fe) contract basis fob Niagara Falls, N. Y., lump, per lb 5.50c; ton lots 6.00c. Spot up ½c.
Siminal: (Approx. 20% each SI, Mn, Al) Contract, freight not exceeding St. Louis rate allowed, per lb alloy; carlots Sc; ton lots 8.75c; less-ton lots 9.25c.
Borosil: 3 to 4% B, 40 to 45% SI, 56.25 lb contained B, fob 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 maximum price regulation No. 4 Quotations are on gross tons.

Street Car Axles Steel Rails, 3 ft. Steel Angle Bars Cast Iron Wheels No. 1 Machinery Cast. Machine Turnings Short Shovel Turnings... Mixed Borings, Turn... Cast Iron Borings Low Phos. Machine Turnings 24.50 PHILADELPHIA:

 PHILADELPHIA:

 (Delivered consumer's plant)

 No. 1 Heavy Melt, Steel

 No. 2 Heavy Melt, Steel

 No. 2 Bundles

 No. 3 Bundles

 21.50 21.00 \$18.75 20.00 18.75 18.75 20.00 21.75
 Cast Iron Borings
 11.30-12.00

 Mixed Borings, Turnings 10.50-11.00
 10.00

 No. 1 Cupola Cast
 20.00

 Breakable Cast
 16.50

 Low Phosphorus
 21.00-22.00

 Scrap Rails
 20.50-21.00

 Stove Plate
 18.50-19.00
 Railroad Malleable Breakable Cast Stove Plate Grate Bars Brake Shoes 22.00

 Low Prios.
 2

 PITTSBURGH:
 (Dellvered consumer's plant)

 Rallroad Heavy Melting
 \$2

 No. 1 Heavy Melt. Steel
 2

 No. 1 Comp. Bundles...
 22

 No. 2 Comp. Bundles...
 22

 Short Shovel Turnings...
 11

 Match. Shop Turnings
 11

 Mixed Borings, Turnings
 12

 No. 1 Cupola Cast
 \$2

 Heavy Breakable Cast...
 \$2
 Mixed Borings, Turnings Machine Shop Turnings Billet, Forge Crops Bar Crops, Plate Scrap Cast Steel 16.75 16.50 13.7513.7523.7519.00 \$21.00 20.00 20.00 15.25 21.25 21.25 21.25 21.25 Cast Steel Punchings BIRMINGHAM: 20.00 20.00 20.00 17.00 15.00 DETROIT: Elec. Furnace Bundles. 19.75 18.25 Heavy Turnings Cast Grades (Fob Shipping Point) \$22.50 19.00 18.50 (Delivered consumer's plant) Heavy Melting Steel ... No. 1 Busheling Hydraulic Bundles \$17.32 15.00 •20.00 •16.50 17.32 20.50 Heavy Breakable Cast... Charging Box Cast Cupola Cast Rerolling Rails Angle Splice Bars Solid Steel Axles Cupola Cast Stove Plate Long Turnings Cast Iron Borings Iron Car Wheels 16.50 19.00 20.50 Machine Summers Machine Turnings Short Shovel, Turnings Cast Iron Borings Low Phos. Plate No. 1 Cast Heavy Breakable Cast... Heavy Breakaute Cast... Cast Iron Borings Billet, Bloom Crops Sheet Bar Crops Plate Scrap, Punchings 17.32 16.0025.0022.5024.00 20.00 17.50 22.00 17.32 12.32 14.32 13.32 20.00 Unstripped Motor Blocks Malleable Chemical Borings 19.00 11.00 13.00 Sheet Bar Croppenchings Plate Scrap, Punchings Railroad Specialties ... Scrap Rall 22.50 24.50 16.51 19.82 20.00 NEW YORK: (Dealers' buying prices) No. 1 Heavy Melt. Steel No. 2 Hyd. Bundles ... No. 3 Hyd. Bundles ... Chemical Borings Machine Turnings Mixed Beatern Theorem 20.00 21.50 16.50 Axles Rall 3 ft. and under Railroad Malleable 26.00 23.50 LOS ANGELES: CHICAGO: (Delivered consumer's plant; cast grades fob shipping point; rallroad grades fob tracks) No. 1 R.R. Heavy Melt. \$19.75 No. 1 Heavy Melt. Steel 18.75 No. 2 Heavy Melt. Steel 18.75 No. 2 Heavy Melt. Steel 18.75 No. 2 Dir. Bundles ... 18.75 Baled Mach. Shop Turn. 18.75 Baled Mach. Shop Turn. 18.75 Machine Turnings ... 13.75 Mik. Borings, Sht. Turn. 13.75 Short Shovel Turnings. 15.75 Cast Iron Borings ... 14.75 Scrap Rails ... 20.25 Cut Rails, 3 feet ... 22.25 Cut Rails, 3 feet ... 22.25 Plate Scrap, Punchings 21.25 Railroad Specialties ... 22.00 R.R. Malleable 22.00 \$15.33 CHICAGO: (Delivered consumer's plant) 15.33 22.00 No. 1 Heavy Melt. Steel No. 2 Heavy Melt. Steel No. 1, 2 DIr. Bundles. Machine Turnings Mixed Borings, Turnings No. 1 Cast \$14.00 13.00 12.00 15.33 13.33 "Shipping point. CLEVELAND:

 CLEVELAND:

 (Delivered consumer's plant)

 No. 1 Heavy Melt. Steel
 \$11

 No. 2 Heavy Melt. Steel
 11

 No. 1 Comp. Bundles
 11

 No. 2 Comp. Bundles
 12

 No. 1 Busheling
 12

 Mach. Shop Turnings
 12

 Mort Shovel Turnings
 12

 Mixed Borings, Turnings
 14

 No. 1 Cupola Cast
 12

 Heavy Breakable Cast
 12

 Cast Iron Borings
 13.50-13

 14.33 5,50 5,50 10.33 10.33 20.00 \$19.50 Mixed Borings, Turnings 20.00 No. 1 Cupola Charging Box Heavy Breakable Unstripped Motor Blocks 19.50 19.50 19.00 16.50 17.50 SAN FRANCISCO: 19,50 19.50 (Delivered consumer's plant) (Delivered consumer's No. 1 Heavy Melt. Steel No. 2 Heavy Melt. Steel No. 1 Busheling No. 1 Busheling No. 3 Bundles Machine Turnings Billet, Forge Crops Bar Crops, Plate Cast Steel Cut, Structural, Plate, \$15.00 14.00 15.50 13.00 14.50 16.50 Stove Plate 19.00 BOSTON: 14.50 20.00

 BOSTON:
 (Fob shipping points, Boston differential 99c higher, steelmaking grades; Providence, \$1.09 higher)

 No. 1 Heavy Melt, Steel
 \$14.06

 No. 2 Heavy Melt, Steel
 \$14.06

 No. 2 Bundles
 \$14.06

 No. 2 Bundles
 \$14.06

 8.50 7.00 15.50 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 15.50 Cast Steel Cut, Structural, Plate, 1 ft and under Alloy-free Turnings Tin Can Bundles No. 2 Steel Wheels Iron, Steel Axles No. 2 Cast Steel Uncut Frogs, Switches... Scrap Rails Locomotive Tires 15.50 14.06 14.06 14.06 1 Busheling 18.00 No. Machine Shop Turnings. Mixed Borings, Turnings Short Shovel Turnings. VALLEY: 9.06 9.06 11.06

 VALLEY:
 (Delivered consumer's plant)

 No. 1 R.R. Heavy Melt.
 \$2

 No. 1 Heavy Melt Steel
 2

 No. 1 Comp. Bundles.
 2

 Short Shovel Turnings.
 1

 Cast Iron Borings
 1

 Machine Shop Turnings
 1

 Low Phos. Plate
 2

 14.50 15.50 \$21.00 20.00 20.00 17.00 23.00 13.3116.5620.00Chemical Borings 15.50 15.50 Low Phos. Clippings ... No. 1 Cast Clean Auto Cast Stove Plate ST. LOUIS: (Delivered consumer's plant; grades fob shipping point) cast 16.00 15.00 15.00 20.00 19.00 15.50 grades fob shipping Heavy Melting No. 1 Locomotive Tires Misc. Ralls Railroad Springs Bundled Sheets Axle Turnings Axle Turnings Shoveling Turnings Rerolling Rails Heavy Breakable Cast... \$17.50 22.50 16.50 21.00 19.00 22.00 MANSFIELD: SEATTLE: BUFFALO: (Delivered consumer's plant) No. 1 Heavy Melt. Steel No. 2 Heavy Melt. Steel Heavy Railroad Scrap. 1 (Fob shipping point) No. 1 Cupola Cast 20

 BUFFALO:

 (Delivered consumer's plant)

 No. 1 Heavy Melt. Steel
 \$1

 No. 2 Heavy Melt. Steel
 1

 No. 1 Bundles
 1

 No. 2 Bundles
 1

 No. 1 Busheling
 1

 (Delivered consumer's plant) Machine Shop Turnings \$1 \$14.12 14.12 14.50 \$15.00 \$19.25 19.25 19.25 17.50 17.00 CINCINNATI: (Delivered consumer's plant) No. 1 Heavy Melt. Steel \$1 No. 2 Heavy Melt. Steel 1 10.50 \$19.50 20.00 12 50 19 25 19.50 21.00 19.25

STEEL

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, del. Conn., less carlots 12.12½c, refinery; dealers may add χ_c 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 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; No. 1 yellow (No. 405) 10.00c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.45c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland - Akron - Detroit area, New Jorsey. 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., plus 14.00c del.; metallurgical 94% min. 3.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 iype) 10.50-11.00c; No. 12 foundry alloy (No. 2 trude) 10.50-10.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-971, 11.75-12.00c; grade 2 (92-95%) 10.25-10.75c; grade 3 (90-92%) 8.50-90.00c; grade 4 (85-90%) 8.25-8.50c. Above prices for 30,000 h) or more; add ½c 10,000-30,000 h); ½c 1000-10,000 h); 1c less than 1000 lb. Prices month freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard inguts (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.1 Extruded 12-in. sticks 27.50c, carlots; 29.50c 100 lb to c.1.

The Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., $1\frac{1}{2}c$ 1000-2239. $2\frac{1}{2}c$ 500-999, 3c under 500. Grade A. 99.8% or higher (includes Straits), 52.00c; Grade B, 99.9% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arene, 51.87 $\frac{1}{2}c$; Grade C. 99.65-99.79% incl. 51.62 $\frac{1}{2}c$; Grade D, 99.50-99.64 $\frac{1}{3}$ incl., 51.50c; Grade E, 99-99.49% incl. 51.12 $\frac{1}{2}c$; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots fob Laredo, Tex., 90.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.502; 93.8% and over (arsenic, 0.05%, max.) 14.502; 93.8% and over (arsenic, 0.05%, max.) of the impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10.000 h; ¼c for 9999-224 h); and 2c for 223 lb, and less; on sales by dealers, distributors and jobbers add ¼c, 1c, and 3c, respectively.

Nicket: Electrolytic cathodes, 99.5%, fob refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nicket shot or ingot for additions to cast iron, 34.00c.

Mercury: Open market, spot, New York, \$103-\$107 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, \$14.75 lb

Cadmium: Bars. ingots, pencils, pigs, plates, rods, slabs, slicks, 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%, \$2.25 per troy ounce.

Gold: U. S. Treasury, \$35 per ounce.

Sliver: Open market, N. Y. 70.625 per ounce.

Platinum: \$35 per ounce.

Palladium: \$24 per troy ounce. Iridium: \$165 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 23.44c; yellow brass 22.09c; commercial bronze, 90% 23.68c, 95% 23.89c; red brass, 80% 22.76c, 85% 22.97c; phosphor bronze, grades A and B 5%, 41.20c; Everdur, Herculoy, Duronze or equiv., 28.61c; naval brass 27.11c, manganese bronze 30.61c; muntz metal 25.36c; nickel silver 5% 30.69c.

Rods: Copper, hot-rolled 19.79c; cold-drawn 20.79c; yellow brass 17.06c; commercial bronze 90% 23.37c, 95% 23.58c; red brass 80% 22.45c, 85% 22.66c; phosphor bronze grades A and B 5% 41.45c; Everdur, Herculoy, Duronze or equiv., cold-drawn, 27.55c; naval brass 21.17c; manganese bronze 24.55c; muniz metal 20.92c; nickel silver 5% 32.94c.

Seamless Tubing: Copper 23.48c; yellow brass 24.85c; commercial bronze 90% 26.09c; red brass 80% 25.42c, 85% 25.63c.

Extruded Shapes: Copper 23.29c; architectural bronze 21.17c; manganese bronze 26.05c; muntz metal 22.17c; naval brass 22.42c,

Angles and Channels: Yellow brass 30.59c; commercial bronze 90% 32.18c; red brass 80% 31.26c, 85% 31.47c.

Copper Wire: Base prices on bare, weatherproof and magnet wire withdrawn pending issuance by manufacturers of new price lists conforming to amendment 7 to maximum price regulation 82, effective as of May 8, 1946.

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 |
| 10 01 | 2" 2 1/ | 25 600 | 20.204 |

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.

Zine Products: Sheet fob 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%. Boller 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 boller 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, fob, Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00e; 10,000-lb. lots 13.00c fob Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 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 fob Grasselli, N. J.; 100-lb, kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 35.50c.

Zine Cyanide: 100-lb, kegs or bbls, 33.00c fob Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. fob shipping point. Add %c for 15,000-40,000 lbs.; 1c for 40,000 or more.

| | Clean Heavy | Rod Ends | Clean Turnings |
|---------------------|----------------|-------------|-------------------|
| Copper | 10.250 | 10 250 | 9,500 |
| Tinned Copper | 8.75 | 8.75 | 8.00 |
| 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 |
| Naval brass | 8.250 | 8.000 | 7.500 |
| Mang. bronze | 8.250 | 8.000 | 7.500 |

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are fob shipping point; add %c 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 linned 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; babbitt-lined brass bushings 13.00c.

(Group 3) Admirally condenser tubes, brass pipe, 7.25c; muntz metal condenser tubes 6.75c; old rolled brass 6.75c; manganese bronze solids: (lead 0.00%-0.40%) 5.50c; (lead 0.41%-1%) 4.50c; manganese bronze borings: (lead 0.00%-0.40%) 4.00c; (lead 0.41%-1%) 5.00c.

Aluminum Scrap: Price fob point of shipment, truckloads of 5000 pounds or over: Segregated solids, 2S, 3S, 5c ib., 11, 14, etc., 3 to 3,50c ib. All other high grade alloys 5c ib. Segregated borings and turnings, wrought alloys, 2, 2,50c ib. Other high-grade alloys 3,50, 4.00c ib. Mixed plant scrap, all solids, 2, 2,50c ib. borings and turnings one cent less than segregated.

Lead Scrap: Prices fob point of shipment. For soft and hard lead, including cable lead, deduct 0.35c from basing point prices for refined metal.

Zine Scrap: New clippings 6.50c, old zine 4.75c, fob point of shipment, add ½c for 10,000 lb or more. New die cast scrap 4.45c, radiator grilles 3.50c, add ½c for 20,000 lb or more. Unsweated zinc dross, die cast slab 5.30c, any quantity.

Nickel, Monel Scrap: Prices fob 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 14% copper 23.00c; 90-98% nickel, 23.00c per lb nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8 00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheet & Strip Prices, Page 150

Sheet and strip production is declining as fuel shortage cuts into general steel production. Mills are loaded with orders for practically the entire year and have a carryover inevitable for next year. No pretense is made at promising delivery in view of the many uncertainties and allotment schedules are not being set up for the same reason. Much effort is made by consumers to place orders with mills from which they never have bought before.

New York-With sheet production still on the decline as a result of shortage of coal, sellers have increasing difficulty in setting up schedules over the remainder of the year. Some, selling on a quarterly quota basis, will go into the next period well behind on current commitments, with a result that their allotments for the quarter will be limited to one to two months production.

Demand continues active, although many consumers are reconciled to the disturbed situation at mills and not pressing too hard in a number of instances. Narrow hot and cold-rolled strip appears in more urgent demand than sheets, according to some sellers; at least, they claim that there is more floating inquiry from companies with whom they never have done business before.

St. Louis—All sheet and plate pro-duction remains stalled by a strike, now in its tenth week. The mill normally serves a fan-shaped area based at Terre Haute and extending to Texas, Califor-nia and Minnesota. No orders have been canceled but customers are re-ported in bad straits because of inability to get into other mills' schedules. Cincinnati — Rolling equipment in

district sheet mills is engaged near capacity, although there are signs that without more coal soon a drastic curtail-ment will be forced. Reserves of coal, coke, scrap and pig iron are shrinking. Some furnaces are out of blast and others on subnormal production. Some coke ovens have been cooled. Mill interests refrain from comment on the delivery situation until uncertainties are cleared and the outlook for third quarter scheduling clarified.

Pittsburgh - Demand for sheets and strip has steadily receded, due to realization among consumers that producers are unable to make definite commitments. Most mills state present order backlog under present quota system will absorb capacity output through remainder of this year. Some steel sales offices are not processing new orders, and will probably not do so until mine strike is settled. In instances where tin plate is involved, sheet and strip output is being curtailed to sustain production of the former for perishable food pack requirements. The 80-inch hot strip mill at Irvin works was again shut down last week after a brief resumption of operations to furnish hot coils for tin plate. Finishing operations on galvanized and electrical sheets were resumed on a 10-turn basis at Carnegie-Illinois Steel Corp.'s Vandergrift plant here recently, but this mill also was forced to shut down last week. Local mill reports receipt of a contract for 1100 tons of 25-gage cold-rolled sheets for 1947 Pennsylvania automo-bile license plates. Boston — While cold strip producers

plan to resume deliveries in order of sequence, when output is again near normal, this will depend largely on hot mill shipments, now badly disrupted and falling behind schedule. Rerollers are now pinched for material, operating on depleted inventories. New supplies of hot stock are uncertain and a thorough revision of narrow cold strip schedules appears unavoidable. As in sheets of all grades, notably in light gages, consumer stocks are unbalanced and low with few exceptions; among these are electrical equipment plants, until recently down. Deliveries taken in during suspensions, built up stocks in some grades and sizes and relatively these large consumers are better off than the average. For heavier hot-rolled carbon sheets, pressure is strong from builders of 275-gallon household tanks. Before production of flat-rolled approximates demand, in view of extended deliveries, carryovers and resumption of heavy buying, consumers will probably be pinched for stock more than now. Most desirable surplus in both sheets and strip has been absorbed.

Cleveland-Shipments of sheet and strip are falling steadily behind commitments, resulting in substantial in-crease in tonnage carried over into third quarter. In some instances April ton-nages will not be delivered until July at the earliest. Producers selling on a strictly quota basis either have not announced quotas for third quarter or have reduced them sharply below second quarter level. This voluntary allocation system under which district offices are assigned a definite proportion of total output and are responsible for making an equitable distribution among their customers has proved successful and is not likely to be replaced by a government allocation system.

Chicago — Although the coal strike has seriously affected all steelmaking operations, it would appear that sheet schedules have suffered least. This is probably because sheets have been the tightest of all products and effort has been made to keep the situation from growing worse. Fact that some eastern sheetmakers are withdrawing from this area has complicated the consumer's situation. Many manufacturers have been forced to curtail operations for lack of sheets and strip, and unable to place orders well in advance are concerned over future supplies.

Birmingham - Sheet production has been somewhat curtailed in the past few days, in the face of the most insistent demand in the district's history. New inquirers, however, are conspicu-ous by their absence since they apparently know the overbooked situation of mills. The truce in coal has had little worthwhile effect on production. A scattered tonnage of cotton ties is being produced here.

Steel Bars . . .

Bar Prices, Page 150

Small carbon bars continue most in demand and little is available for this year. Larger sizes may be had for late delivery, but in small quantity. Hot-rolled alloy bars are available in four to eight weeks. Small consumer inventories are handicapping operations in numer-

ous lines of consumer goods. Pittsburgh — Most cold finishers have

sufficient bar stock for less than a week of balanced production, while at least one interest has been forced to shut down due to depleted inventories. Dwindling finished bar stocks among automotive parts manufacturers and other users also is resulting in reduced production. Bar mills at leading producers' plants here have been idle for over three weeks and other companies are steadily reducing output. Mills are sold through year on smaller sizes, with large rounds and flats generally promised for fourth quarter. Alloys are available for July and August and cold-fin-ishers are booked through year. All these schedules, of course, are subject to drastic revisions as result of negligible production developing out of the coal strike. Carryover tonnage cur-rently is heaviest on record and is expected to be substantally increased before coal strike ends.

New York — Demand for smaller sizes of carbon bars, both hot-rolled and cold-drawn, is pressing, with sellers gen-erally having nothing to offer for this year and still refraining from opening books for 1947. In hot-rolled carbon grades only larger sizes, ranging per-haps from 1 7/16 and higher, are available for this year and even then in no large quantity. In cold-drawn carbon bars the situation is somewhat easier on the larger sizes than in hot-rolled, it still being possible to place some tonnage for third quarter delivery. Hot alloy bars can be had for shipment in

four to eight weeks. St. Louis - Production of merchant bars increased last week as one of two furnaces down for repairs resumed operation. Shipments dropped sharply in the rail strike confusion, but output continued without interference. Mills here have not yet felt the effects of the coal shortage. Oil, gas and coal are report-ed in fair supply. Order backlogs continue to mount as consumer goods manufacturers seek to stock all components against future tieups. Small bars are under extreme pressure. Mills are booked through first quarter, with rein-forcing bars the only item available sooner.

Boston — Detroit Nut Co., Detroit, has been the heaviest buyer of steel bars, including rounds, dipping deeply into surplus in this area; 1240 tons of bars and nearly two million feet of small rounds of the 2000 tons recently sold went to the Detroit consumer. This makes a considerable dent in surplus in New England and represents substan-tially the bulk of buying. Extended deliveries in carbon bars, small sizes, and also cold-finished alloy under asinch, together with production losses, has slowed down mill buying. In these wanted sizes and grades, producers are filled through fourth quarter. How large carryovers will ultimately mount is problematical, with deliveries on orders previously scheduled slipping back-ward steadily. Consumer inventories are becoming more unbalanced, includ-ing those held stationary during produc-tion tion suspensions earlier.

Chicago - Barmakers will go into Chicago — Barmakers will go and June with heavy carryovers. Con-sumers are pressing for deliveries but the coal strike has forced ir-regular operation of rolling facili-ties and makes fulfillment of sched-ules difficult. Some farm implement makers still have their plants closed by strike, others are rapidly recovering their pace following extended strikes.

Steel Plates . . .

Plate Prices, Page 151

Plate demand, especially for lighter gages, continues to press hard but with mills generally sold for the year little new tonnage is being booked. Shipbuilding is declining but tank demand is strong, both for small household units and for large storage tanks for cities. An eastern Pennsylvania platemaker has resumed production after being down two weeks.

Philadelphia — Contrary to the usual trend one district plate producer resumed operations May 22 after suspension of two weeks, starting up his larger mill with expectation of starting operations on the smaller mill May 27. He also lighted two additional open hearths. Plate producers generally have little capacity left for this year, with one district mill reported to have canceled some export tonnage with a view to accommodating additional domestic tonnage in fourth quarter. Demand for light plate, 3/16 and ¼-inch, continues to come out in far greater volume than mills can handle, especially with strip mills, which could produce this lighter tonnage, centering production on sheets and strip. Some plate mills which have little capacity left for this year are accepting this type of tonnage on a pro rata basis while others in similar position are not accepting any. As a matter of fact, some producers have been out of the market for some time on tonnage for this year and have not opened books for 1947. District ship work still declines, with the Chester, Pa., yard planning to complete all work now on schedule by August.

Boston — Although construction projects taking plates will be delayed beyond original estimates, those authorized, including water storage tanks and standpipes are being placed on fabricators' books, accounting for upwards of 1000 tons. General run of plate volume is much confused, with loss of production and more extended deliveries overshadowing other factors, which include selectivity in order acceptance, application of price increases and spreading deliveries on flanged and dished material. Some suppliers are reluctant to take on additional tank steel tonnage in narrow gages although small tank fabricating shops are pressing for tonnage. Latest compilation of surplus sales include 675 tons of plates.

Birmingham — Tank manufacturers especially are pressing for plate deliveries, while shipbuilding has shown some easing with a resultant relaxing in demand, although the overall need for plates is practically-unabated. Backlogs remain the heaviest the district has ever experienced.

Seattle — Plate fabricators are practically out of steel but demand for plate products is active. Chicago Bridge & Iron Co. is low for a water tank and tower for Magnolia Bluff, Seattle, at \$120,497. United States engineer, Glasgow, Mont., has called bids June 14 for three steel surge tanks, 40 feet diameter. 168 feet high and a section of steel riser pipe for Fork Peck dam. Spokme, Wash., has awarded 500 tons of plates to Washington Culvert & Pipe



Between-press congestion is eliminated when the "Press-Veyor" brings extra efficiency to the stamping room. The "Press-Veyor" reduces accident hazard through better shop-housekeeping, and facilitates continuous, smooth flow of products in process. Through elimination of the "shovel and lift" in parts handling, the "Press-Veyor" effects considerable savings in manpower and reduces operating costs.

The new "Press-Veyor" is a portable, power driven, endless belt conveyor . . . Compact in design for efficient operation in close quarters. Its two-wheel balanced construction allows it to be readily moved to any location without physical strain on the operator.

Built in 6' and 8' models, the "Press-Veyor" is ruggedly constructed of heavy-gauge formed steel, enabling it to easily withstand the hard abuse of stamping room operations. Being readily adjusted at both delivery and receiving ends, it is ideal for conveying trimming scrap to scrap boxes . . . conveying parts between progressive line operations . . . and for many other varied uses.

K Just completed, the Announcement Bulletin contains full information on the construction and many uses of the new "Press-Veyor." Write for your free copy today.





Sales Division—335 Peoples National Bank Bldg., Grand Rapids 2. Michigan



Co., Seattle, for 14,300 feet of 24-inch steel pipe.

Wire . . .

Wire Prices, Page 151

Boston - Production of drawn wire is down, with rod supply short. Some mills are operating at about 50 per cent in finishing departments and others are down, having started vacations early. Not in recent history of wiremaking has the semifinished situation been so serious in this district. Quotas have been reduced and several producers are not selling on the Worcester base. Selectivity in production and order acceptance is forced on producers by ceiling mar-gins and even curtailed schedules are subject to frequent revisions. Pressure from consumers is heavy, many being out of needed sizes and grades. Demand from the automotive trade is strong, notably for wire for seat and strong, notably for whe for scalar and cushion springs, a high-carbon manga-nese product. Some mills have cur-tailed output of this grade and carry processing further into oil tempered stock. Some rope wire is finding its way into these types of springs. Consumers are taking what wire they can from mills, often in specifications not normally fabricated.

Rails, Cars . . .

Track Material Prices, Page 151

New York—While few awards have been reported recently, some fair sized lists are still being figured and indications are that domestic freight car buying this month will exceed the 3405 awarded in April. Recent contracts include a total of 23 coaches for the Union Pacific, Chicago & North Western and Wabash railroads, for joint operation, all going to the American Car & Foundry Co., New York. The New York Board of Transportation plans to buy 400 subway cars, with specifications to be brought out at some future date.

Tubular Goods . . .

Tubular Goods Prices, Page 151

Cleveland—A series of interruptions to pipe production since early last fail has thoroughly d is rup t ed delivery schedules. The situation is particularly bad in butt-weld pipe, with some producers booked to capacity into third quarter of next year. At least one seller will not issue quotas for June since the carryover already is more than enough to absorb all of next month's output. In some cases, seamless and electric weld tubing are in slightly better position but sellers are not accepting additional business for 1946 delivery.

Boston — Utilities and industrial users of steel pipe, in addition to jobbers, are more active buyers from surplus as mill deliveries decline and become more extended. Substantial volume is moving from the Davisville, R. I., navy depol. Among the larger lots going to distributors are 121,783 feet to Washburn & Garfield Co., Worcester, \$22,286.66. Rockwood Sprinkler Co., Worcester, Grinnell Co., Providence; Market Forge Co., Everett, Mass.; L. B. Foster Co., New York; Greenpoint Iron & Pipe Co., Brooklyn, and W. A. Case & Sons Mfg. Co., Buffalo, are also among the larger buyers of pipe and tubular goods from

• The AAF Roto-Clone is built to withstand the heavy demands of foundry dust control service. The Roto-Clone installations shown here are typical of many such systems serving leading foundries throughout the country. Send for complete information and Bulletin No. 274A.

The name Roto-Clone is a registered Trade-Mark for a Dynamic Precipitator or Hydrostatic Baffle-Type Wet Collector.





a solution for

HEAVY DUTY

DUST CONTROL

Constant Rolo-Clone performance permits fines control in steel foundry by adjusting dampers at breaker screen and other exhaust points. surplus in this area recently. Merchant steel pipe quotas are being revised downward; boiler tube orders for delivery this year are usually tied in with some contingency as to production and steel supply.

Seattle -- Demand is heavy for cast iron pipe but dealers are handicapped by labor and transportation difficulties. Local inventories are nearly exhausted, with little prospect of replenishment. Orders are being taken subject to conditions and for this reason many projects are being held up. Cle Elum, Wash., has awarded 3800 feet of 12-inch pipe to H. D. Fowler Co., Seattle.

Structural Shapes . . .

Structural Shape Prices, Page 151

Much new business is coming out but awards do not keep pace, some fabrica-tors being slow to bid unless steel delivery is assured. Public work, mainly bridges, not subject to CPA restriction, is slow, many appropriations being insufficient to meet current bids. Some projects are being abandoned for the present.

Pittsburgh — Expected difficulty in getting CPA authority for proposed construction projects appears unfounded in this area, as indicated by general approval granted most projects the agency has screened in recent weeks. A \$581,-000 construction project for a new huilding and stripper crane to speed the handling of ingots at the Jones & Laughlin Steel Corp.'s Aliquippa Works was the largest job approved the first half of May. In the week ending May 16, the local CPA office approved 109 com-mercial and industrial construction proj-ects, valued at \$2,237,923, while 15 jobs with a value of \$310,950 were de-pied About 00 percent of the 477 nied. About 90 per cent of the 478 jobs checked by CPA officials from Apr. 2 through May 16 have been approved, valued at \$17,924,957. Rejected projects numbered 45 with a proposed expenditure of \$1,586,522.

Coal strike has forced almost complete shut down of structural mills here, and fabricators also are curtailing operations, due to dwindling steel inventories. Car-negie-Illinois Steel Corp.'s structural mills here are shut down, but output is fairly well sustained at other plants. Present reduced mill output is expected to extend producers' backlogs well into fourth quarter on such popular items as angles 6 x 6-inch and under, and channels 15-inch and under. Philadelphia While some fourth

Philadelphia - While some fourth quarter tonnage still is available most shape producers are well covered for the remainder of the year. Two leading sellers are refusing further tonnage, pointing to a probable heavy carryover into 1947 even as cohedules new stond into 1947 even as schedules now stand, because of labor disruptions in coal and steel. Structural activity has been checked by the CPA limitation of a few week ago. However, there is still con-siderable structural inquiry and de-mand from jobbers for light sections appears as pressing as ever, with active inquiry from abroad, which sellers are bypassing to a considerable extent. However, public work, which is exempt from the CPA ruling, is not going ahead as ripilly as expected a few months ago, as appropriations in general are not keeping pace with higher costs. This is reflected particularly in state bridge





plants. Multigrip protects your workers from injuries due to skids, slips and falls, your floors from the wear and tear of plant traffic.

The scientific, patented design in which the flat-top risers are arranged insures resistance to slipping from all directions. Com-fortable, too, for workers' feet, Multigrip Floor Plate reduces accident-causing fatigue. There are no pockets to accumulate dirt and grease, to hold water, to catch vehicle wheels.

Quickly and easily installed, U·S·S Multigrip Floor Plate adds structural strength, insures longer repair-free life for wood and concrete floors on which it is laid.

LISTEN to the United States Steel radio show every Sunday evening. Consult your local newspaper for time and station. RAMPS POWER HOUSE FLOORS **U·S·S MULTIGRIP** WOIS STEEL **FLOOR PLATE** CARNEGIE-ILLINOIS STEEL CORPORATION Pittsburgh and Chicago Columbia Steel Company, San Francisco, Pacific Coast Distributors Tennessee Coal, Iron & Railroad Company, Birmingham, Southern Distributors United States Steel Export Company, New York TED STATES STEEL

SIDEWALK OPENINGS



"a particularly EXACTING JOB"

then Mr. Ashmore C. Johnson, vice president of
Downingtown Iron Works, goes on to say: "We
want to take this opportunity of complimenting King Fifth
Wheel both on the service and quality of work which
they have furnished us." Thank you, Mr. Johnson.

Rings, embracing bands and flanges (bent the hard way) are products turned out every day at this plant. Your individual requirements can be met by King

if it's bending you want. Small, medium, large rings bent

to exacting tolerances . . .

that's King's job. You are invited to send for the latest folder. Our thanks again to Mr. Johnson and Downingtawn Iron Works for the photo topping the ad.

KING Fifth Wheel 2919 N. Second Street, Philadelphia 33, Pa.

work, some projects having been readvertised three or four times and some postponed indefinitely.

Boston—Although considerable industrial construction is authorized, structural inquiry has subsided, due largely to mounting costs and uncertainity as to procurement. Structural mills are losing ground in meeting commitments and can promise nothing definite on many small sizes in the immediate future. Some larger units have also slackened and lack of semifinished may well retard recovery. Meanwhile, most fabricating shops with a fair volume of small orders are seeking plain material and have about cleaned out warehouses. Inquiry for small bridges holds, but highway construction schedules are behind in several states. Maine has closed on 300 tons and Connecticut will close this week on a 170-foot girder bridge, East Hartford-Manchester, and a three-span I-beam bridge, Danbury.

I-beam bridge, Danbury. New York—Phoenix Iron Co., Phoenixville, Pa., has been granted a \$5 increase on shapes for domestic account by Office of Price Administration, but for the time being at least is applying only \$3 of this amount. In other words, the company is now quoting the equivalent of 2.60c Bethlehem, Pa., on the general range and 2.70c on beams and channels, from 4 to 10 inches. An increase has also been granted on shapes for export, the company now quoting 2.85c f.o.b., Phoenixville.

Structural activity continues to reflect limitations of the Civilian Production Administration's order of a few weeks ago, although a substantial amount of work is still being figured. One of the larger recent awards involves 650 tons for an apartment for the Thornley Realty Co., 215 East 79th Street, contract going to Schacht Steel Construction Inc., this city.

Chicago — A noticeable bulge in awards of fabricated structural steel within the past two weeks does not reflect easing in the steel situation. Rather the awards represent business offered weeks ago and held up following the receipt of bids. For the present, fabricators are overcommitted and show little interest in new business coming out. Delivery of plain shapes is behind schedule as a result of the steel and coal strikes, and this delays completion of jobs in process.

Cleveland — Activity in structural steel has declined, due to seasonal considerations, government restrictions on nonessential construction, and the general uncertainty of obtaining other building supplies. Although practically no projects were canceled here which involved structural steel, a considerable number of construction jobs have not been placed, due to the government restrictions. Assuming that plain material can be obtained, December and January delivery is now being booked on new business. Fabricating shops have enough material on hand to maintain operations for a few weeks longer but if mill shipments are not resumed in volume soon fabricating shops will be forced to curtail.

Seattle—Fabricators are handling a large aggregate of small jobs, but inventories are almost exhausted and no important steel supply is being received. For this reason they are not bidding on much work. Kern & Kibbe, Portland, Oreg., are low at \$247,767 for a 300-

MARKET NEWS

foot state highway arch span in Wasco county, Oregon. Hawkins & Armstrong, Seattle, are low at \$41,065 for steel grill to redeck Montlake bridge, Seattle.

Birmingham—Inquiry for shapes has tapered considerably in the past few weeks. The situation is described as temporary and probably in view of postponed projects from the extremely tight situation in shapes. One of the distirict's biggest fabricating plants remains down, due to a strike.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 151

Philadelphia — Largest reinforcing bar award in this area for some time involves 3200 tons for the Philadelphia Inquirer building, awarded through Mc-Closkey & Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa. A leading inquiry calls for 450 tons of reinforcing steel for a state institution at Penhurst, Pa., on which Ralph Herzog, Philadelphia, is general contractor.

Pittsburgh — Production is at a standstill at leading producers' plants and sharp reduction in output is noted among other interests. Those companies still producing reinforcing bars are using only off-heat steel. Producers state a substantial price increase will be necessary if output is to meet current heavy demand. One interest is not accepting new business because of uncertain production outlook, and is not making definite delivery promises. Reflecting prospect of acute shortage through remainder of this year, a number of housing and other construction projects have been redesigned to utilize other materials. Considerable reinforcing steel tomage is involved in highway and flood control projects in New York and Pennsylvania. Most mills have sufficient orders to sustain prestrike operating schedules through late this year. Rerollers are having trouble getting rails.

New York—Approximately 4300 tons of reinforcing steel are pending for the Brooklyn-Battery tunnel. Bids on 3200 tons for the Manhattan approach will be opened May 28 and bids on 1100 tons for a highway approach on the Brookklyn side were opened recently, with Charles F. Vachris Inc., Brooklyn, low on the general contract. Reinforcing bar demand is light, with considerable difficulty experienced in obtaining steel. Some bar fabricators have been virtualiy out of the market for several weeks.

Seattle — Reinforcing bar demand is strong and mill backlogs are increasing. General Construction Co., Seattle, has a contract for navy piers at Puget Sound yard, requiring about 3000 tons of reinforcing. Puget Sound Bridge & Dredging Co., Seattle. has contract for a school stadium, requiring about 1000 tons. A. Dovert, Klamath Falls, Oreg., is low at \$49,960 for two state concrete bridges.

Chicago — Dearth of steel continues to restrict operations of reinforcing steel interests in this district. As a result, desirable and approved building projects go begging for material. Already overcommitted and with future steel supply uncertain, suppliers are wary over booking sizable orders. Current business consists mostly of small jobs of less than 100 tons. Limited supply of rails is holding down output of rerolling mills. In keeping with the critical

150% Safety margin in every CM HERC=ALLOY SLING CHAIN

That's right! Herc-Alloy formula steel has a tensile strength that offers a 150% factor of safety—an important contribution to uninterrupted production and maximum safety to both men and materials. CM Herc-Alloy Sling Chains seldom if ever require annealing. The short stubby links are electric welded by the patented Inswell process. As for service life...some of the earlier CM Herc-Alloy Sling Chains are still on the job after years of continyous duty.

Here is sling chain par excellence measured from any angle. Check it from the angle of your job application and safety requirements. Your mill supply distributor will help you, ar write us.

> HERC-ALLOY LINK SHOWING PATENTED INSWELL WELD

COLUMBUS=MCKINNON CHAIN CORPORATION

GENERAL OFFICES AND FACTORIES: 118 Fremont Ave., TONAWANDA, N.Y. SALES OFFICES: New York, Chicago and Cleveland MARKET NEWS

steel situation, new inquiry for construction has dropped markedly,

Pig Iron . . .

Pig Iron Prices, Page 153

Foundries continue to drop out of production as pig iron supply dwindles. Coke shortage is a further factor in limiting castings production. Further banking of blast furnaces cuts into production and adds to the scarcity. Truce in the coal strike has had little effect in adding to fuel supply and its uncertain period gives little assurance of continued supply.

New York—Castings production continues to decline, with some foundries being more directly affected by short-



Pittsburgh — There is a growing belief some form of pig iron allocation may be put into effect to aid reconversion programs which are far behind, due in part to shortage of castings. In most instances pig iron is in more critical supply than coke. Even should the coal strike be terminated soon, pig iron supply through the remainder of this



Brosius Auto Floor Chargers are designed to handle charging boxes, or are equipped with tongs to handle billets, etc., for serving heating furnaces, mills, hammers, presses, etc.

Box Charging Machines are made with a rotating peel to handle the conventional box or, as shown in the above cut, with a stationary box and a pusher head which pushes the material out of the end of the box into the furnace. Brosius Chargers are built in capacities of from 2,000 to 20,000 pounds.

Write for Your Copy of Our NEW General Catalog



year is not expected to meet steady expansion in demand from foundries serving automotive, farm implement and housing industries. The one merchant iron producer here was scheduled to bank its blast furnace May 26, due to lack of coke. At the close of last week only 15 out of 54 blast furnaces here were pouring iron, with prospect of a still further reduction over the next few days.

Philadelphia — Pig iron consumers find conditions increasingly difficult. Some are down completely and others are operating on steadily declining basis. Even early settlement of the soft coal strike would do no more than check the trend for a while, in the opinion of some consumers who look for acute scarcity of pig iron and scrap for some time. However, at the moment, some foundries are more handicapped by coke shortage than by lack of metal.

Boston — Open-hearth melt has been curtailed by lack of pig iron, one steelworks going down to one unit for which supply is about 15 days. Foundries also are affected, some suspending entirely and others reducing schedules. Deliveries of iron have declined to less than 20 percent of normal, with indications recovery by blast furnaces will be slow. With few exceptions foundries are in no position to weather this drastic reduction. Several malleable shops in southern New England have better inventory than average. When deliveries again are normal, however, those needing iron most are likely to get first shipments and the few fair inventories now held will have been depleted.

Cleveland — Shipments of pig iron to foundries have dropped sharply, forcing a steady decline in melt. At least one large foundry is closed and others have adopted conservation measures, such as reducing working hours, shifting operations to lighter castings, etc. Coke supplies are dwindling rapidly and will force additional closings by the end of this week.

Cincinnati—Pig iron shipments into this district, mainly southern fumaces, are far below contracted tonnages. The foundry melt is steadily declining, as reserves become exhausted. Some foundries are trying to meet most urgent demands for castings by using more scrap but find scrap supplies also short. Some shutdowns have been ordered but most melters are trying to meet reduced schedules even if this means virtually day-today planning.

day planning. Buffalo — Confusion dominated the pig iron trade last week as uncertainty over coal and rail operations continued at the same time iron producers cut operations to 31 per cent of capacity in this area. Some consumers were stynied by lack of coke also. Limited local output is being spread as widely as possible. The first barge fleet for the scaboard moved last week with about 2000 tons and a cargo of 5000 tons moved up the lakes.

Chicago — Foundries are caught squarely in the shortage of both pig iron and coke. Inventories of both are close to the vanishing point and future supplies are uncertain until the coal mining and railroad labor situtions are settled. It is estimated that the coal strike will cost foundries at least one month's production of castings, which already are one of bottlenecks withholding consumer goods from the market. Of the district's 41 blast furnaces, 18 are active, same as a week ago, and comparing with 34 preceding the coal strike.

St. Louis—Pig production remains at capacity, as yet unaffected by the coal shutdown. Producers were able to stock a supply of coke because the Illinois coal fields were the last to be struck. Demand is heavy and the supply to outside melters somewhat improved by virtue of the continued strike idleness of this district's principal iron consumer. Melters here normally supplied by southern and eastern producers are becoming increasingly short and are putting more pressure on the scrap market.

Birmingham—The coal truce has had little effect on pig iron except for slight improvement in merchant production which momentarily slumped to only two furnaces. Steel plant furnaces remain down and pipe plants are on curtailed schedules, some remaining completely down. Several smaller foundries are idle until improvement of a lasting nature is evident.

Scrap . . .

Scrap Prices, Page 154

Continued scarcity of scrap troubles melters, even though steel production is at a low mark and foundries are operating at much less than capacity. However, all consumers are pressing strongly for delivery and are using every effort to obtain material from a distance by paying springboards and high freight cests. Cast scrap is perhaps in smallest supply, the situation being tightest ever remembered.

Philadelphia — Scarcity of scrap is increasingly severe in spite of reduced steelworks and foundry operations. Unquestionably the heavier melting load in relation to pig iron is a factor. The lighter supply of industrial scrap as a result of interrupted manufacturing operations is a further cause of scarcity. Dealers are paying much attention to salvage now that government surpluses and cancellation material offers profitable opportunity. Another consideration is desire of consumers to build inventories, as it is expected it will be several weeks after the coal strike end before pig iron production will reach normal. At the same time, with the upward trend in commodity prices they believe they take no chance of inventory depreciation.

As for some time, some heavy melting steel consumers are buying low phos at the differential, complicating the situation for electric furnace operators. Meanwhile, cast scrap continues tighter than in steel, being scarcer than in the memory of most dealers. Some lots of unprepared scrap are no longer bringing ceiling prices, regardless of quantity. On 2000 tons of light miscellaneous scrap at the Philadelphia Navy Yard recently the high bid was \$12.63 per time unitted by a local dealer, against \$14.01 per ton by a consumer recently

Actually the high bid was \$12.05 per ten submitted by a local dealer, against \$14.01 per ton by a consumer recently. Pittsburgh — Unusually heavy demand for all grades of scrap continues despite curtailment in open-hearth, blast funace and foundry operations. Producers are accepting all material offered and paying higher freight equalizations. Volume of industrial scrap is declining steadily, reflecting gradual curtailment of metalworking cperations. Inadequate pig iron supply has forced many found ies to use a greater proportion of cast scrap. Unusual heavy demand and dwindling scrap supply have caused an increasing number of instances of upgrading.

Boston—Decline in melt is not reflected in any easing in demand for steel or cast scrap. For the moment several open-hearth consumers in this district are maintaining inventories and tend to hold strictly to specifications. Supply of top grade heavy melting steel is limited, more so than low phos, which still is favored by most dealers for the differential. Production of industrial scrap is below expectations and continues scarce. Yards are confronted by higher wages in this area, which must come out of dealer buying prices. New York—Scrap brokers are con-

New York—Scrap brokers are confronted by far more demand than they can supply. This is true not only of cast grades, which are scarcer than ever, but of heavy melting steel and borings and turnings. Supply of the latter reflects decline in manufacturing operations over recent weeks. Pittsburgh, as well as eastern Pennsylvania and other eastern seaboard consumers, is pressing for heavy melting steel.

Buffalo — Shortage of scrap is more severe than dealers had expected. Two of the three leading mill consumers have small reserves. Lack of steel for industrial use limits production cf scrap. Not only are water receipts falling far short



Seriously, it is a fact that no wheeled equipment — tool, implement or conveyance—is stronger than the wheels that carry it. Wheels should be suited to the work to be done.

An Invitation to YOU

If you are a manufacturer of mobile equipment, whatever its nature, we invite you to submit your Wheel Specifications to us. Perhaps we can recommend STANDARD WHEELS and HUBS adaptable to your duty.

Send Your Wheel Problems to Us

FRENCH & HECHT, INC. SUBSIDIARY OF KELSEY-HAYES WHEEL CO. DAVENPORT, IOWA Wheel Builders Since 1888


YOU DON'T BORE A HOLE THROUGH A DOUGHNUTthe hole's already there!

And the "hole's already there" in BISCO TOOL STEEL TUBING. So when you make circular tools or parts with a hole in the centersuch as dies, punches, slitters, sleeves, bushings, collets, cams-saw off a piece of TOOL STEEL TUBING and the tool is finished except for final machining. TUBING saves 30% to 60% by weight and up to 80% of machining cost-and there is no scrap. "Sawing is cheaper than boring."



MAIL THE COUPON

Today to insure getting your copy of the new BISCO catalog and hand book.

The NEW BISCO Book is on the press. It contains physical and technical information on all BISCO products, Carbon and Alloy Steels, HR and CD -Ball Bearing Steel • Aricraft Steels • Boiler Tubes • Chisels • Cold Finished Steels • Cumberland Ground Shafts • Drill Rods • High Speed Tool Bits • Shim Steel • Spring Steels • Tool Steels and Tool Steel Tubing.



of a year ago but the procedure was reversed last week, a cargo of 5000 tons moving from here to an upper lakes port.

Chicago — Supply of scrap in this area is growing shorter, but demand from all sources continues undiminished. Most manufacturing plants have resumed operations but are handicapped for steel and other raw materials, consequently are producing less scrap than normal. As result of coal shortage, steel mills have banked blast furnaces and have sought to make up hot metal deficiency with scrap. Suffering from lack of pig iron, foundries also have tried to lean more heavily on scrap, without measurable success as foundry grades are extremely short. With the exceptions of certain alloys not wanted, virtually all types of scrap hold firmly at ceiling prices. Steelmaking is at only 56 per cent of capacity, however, mills seek melting material actively.

Cincinnati—Demand for iron and steel scrap shows no slackening but in face of declining receipts, appears stronger. Brokers attribute the situation to a genuine scarcity, complicated by current shipping problems. Production scrap is light. Some melters are lenient, accepting tonnage which, in normal times, surely would be rejected. Railroads, whose offerings have been small, are doling out tonnage to the abnormally large number of bidders. St. Louis—Scrap shipments continue

St. Louis—Scrap shipments continue low, with losses during the rail embargo not yet filled. Brokers believe not enough scrap is available in this district to fill this gap for many weeks. Localpressure is eased somewhat by closing for the remainder of the month of two large foundries. These are refusing dealer scrap and are stockpiling only railroad grades. Mill reserves are declining but have been aided by the tenweek strike shutting down of the principal sheet and plate maker. In general the shortage is increasing and remote points offer the only prospect of better supply. Springboards are being paid readily on premium grades. Seattle—The scrap market is firm

Seattle—The scrap market is firm and ample supplies are coming to mills, meeting all current needs. The recent advance in prices has stimulated flow of materials. Some scrap is still being supplied by shipyards but this source is being rapidly exhausted, much of it having been shipped to the East. The outlook is firm as demand is certain to continue strong through this year. Birmingham—Transportation difficul-

Birmingham—Transportation difficulties have added to an already tight situation in scrap, several reductions in freight service having been made. Weather conditions remain bad and receipt of scrap is limited. Overall demand is great and considerable payment of springboard is in evidence.

Warehouse . . .

Warehouse Prices, Page 152

Cincinnati—Stocks of some steel jobbers in this district are lower than in several years. Bars and plates are being doled out, whereas sheets and structurals are scarce to unobtainable. Replacement tonnage from mills has fallen away abruptly. St. Louis — Warehouse inventories

St. Louis — Warehouse inventories have dropped to the lowest point in years as a result of the coal strikes, following the steel strike. Mills generally are three to four months behind in shipments. The recent rail embargo also reduced receipts except for truck shipments of light material. Most sellers report no decline in inquiries, though threat of the railroad strike caused some consumers to adopt a waiting attitude.

Scattle—Steel inventories are at record low with fabricating plants, warehouses and agencies of eastern mills facing acute scarcity for an uncertain period. Orders are being accepted but no delivery promised. Coast mills are running almost at capacity but output is far below needs and items not produced here are unobtainable.

Metallurgical Coke . . .

Coke Prices, Page 151

- Higher prices on by-New York order No. 21, Maximum Price Regula-tion No. 29. Under this order prices are to be billed at current levels but with the proviso that higher prices, when they can eventually be determined, will be retroactive as of May 16. The new prices apparently cannot be determined until there has been an adjustment in the soft coal dispute, with definite information as to what the new wage rates for miners will be and what their effects will be on costs. . The current local price on by-product foundry coke is \$13.05 Kearny, N. J. ovens, a level which has been maintained since Aug. 7, 1945, when prices were increased 40 cents per net ton.

Iron Ore . . .

Iron Ore Prices, Page 152

Consumption of Lake Superior iron ore in April totaled 4,768,718 gross tons, compared with 6,021,018 tons in March and with 6,641,552 tons in April, 1945, according to the Lake Superior Iron Ore Association, Cleveland. Consumption for four months this year totaled 16,257,163 tons, against 27,076,751 tons in the comparable period last year. Stocks of ore at furnaces and on Lake Erie docks May I were 23,078,989 tons, compared with 27,601,106 tons on April 1, and with 16,428,765 tons on May I. 1945. Active blast furnaces in the United States depending principally on Lake Superior ore numbered 108 May 1, compared with 154 April 1, and 168 on May 1, 1945.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 151

Pittsburgh — Continued shutdown at a number of plants and acute steel shotage have forced curtailment in overall output of fasteners. Producers' order backlogs average seven months' output at present reduced rate, and are still expanding, with new orders exceeding production substantially. In some items, such as track bolts and cut spikes, output has been drastically reduced because these products are unprofitable under present ceilings.

Producers are expected to put into effect June 1 a voluntary simplified list of recommended standard stock production sizes for small round head rivers, flat head, truss or wagon box head, and countersunk head, belt rivets, tinners and coopers' rivets and large rivets with button head. This simplified practice MARKET NEWS

While sheet production has not yet been curtailed demand is running far

ahead of supply and producers decline additional bookings. Unfilled orders are

sufficient to absorb most output through

third quarter. Regular deliveries are being made to customers but tonnages

are far below actual requirements. Ware-

house operators are receiving their monthly quotas and this tonnage is

terment.

recommendation will be identified as R221-46 Steel Rivets. General use of this list will aid consumers in that it will provide a guide to sizes of rivets readily available from stock and also would assure prompt delivery. Producers will, of course, continue to produce odd sizes to meet particular needs of customers.

Nonferrous Metals . . .

Nonferrous Prices, Page 155

New York — Shortages in supply of copper and other major nonferrous metals result in additional production curtailments. Final revision in ceiling prices for copper, zinc and lead are expected momentarily, but in the meantime this factor, coupled with strikes, has retarded buying. Stoppages from labor troubles appear to be on the mend. Prices paid for copper by foreign buyers are in excess of ceilings on the domestic market, about 14.375c, Connecticut valley. Revised ceilings are also to be made for brass and bronze ingot producers.

Demand for zinc is active but metal is being held back pending new ceilings. Zinc stockpile is estimated at about 240,000 tons, of which about 148,000 tons is regular high grade.

Lead available for distribution in June will she restricted thy strikes in primary plants and restricted imports. Probably not much more than 30,000 tons will be available. Sellers are taking orders on the basis of price prevailing at time of shipment.

Purchase of Bolivian tin concentrates by the government to the end of the year at 62.50c per pound of tin contained, fob South American ports, is indicated. This would be retroactive to Apr. 1, this year and terms also call for 1 cent per pound premium if shipments exceed the 1943-44 average by 15 per cent. Stockpile of in is mounting slowly. Starting this month it was 55,402 gross tons, 21,997 tons being pig tin and the remainder in ores and concentrates, an increase of 1584 tons.

Canada . . .

Toronto, Ont. — The Canadian steel shortage has become more critical with reduced production resulting from shortage of fuel caused by the United States soft coal strike. Algoma Steel Corp. and Dominion Steel & Coal Co. have reduced pig iron production by 25 per cent to conserve coke for civilian purposes, on an order from the government, and both companies also have temporarily suspended production of steel rails. The Steel Co. of Canada is not blowing in its newly relined blast furnace owing to coke shortage. This curb in pig iron output with the serious shortage in scrap also has had a tendency to restrict steelmaking operations. Further curtailment in output is expected almost immediately unless coal supplies are available without delay and this hardly seems possible even if the coal strike was settled forthwith.

Previous to suspension of soft coal shipments from the United States, a serious shortage of steel prevailed in Canada and this condition has been further aggravated and has resulted in reduction of manufacturing activities in practically all branches of industry. While there has been no serious cut in automotive production to this time it is stated that curtailment in motor car and truck output can be expected at any time, as there has been general slowing down in delivery of various parts from across the line. Actually serious shortages continue in all types of civilian goods with no indication of early bet-

Some tightening is indicated in steel plates but so far no actual shortage has been reported. Most current demand is from rolling stock builders and the agricultural implement industry although some sales recently have been made on shipbuilding accounts. Demand from boiler and tank builders has developed some action of late but the tonnage involved is comparatively small.

volved is comparatively small. Shortage of scrap iron and steel continues to affect steel mill and foundry





operations. While there has been some improvement in dealers' receipts, incoming material is confined largely to baling grades, with only small tonnages of No. 1 grades appearing at irregular intervals. Scrap shipments from Western Canada have been curtailed to permit increased shipments of coal.

- NEW BUSINESS -

STRUCTURAL SHAPES ...

STRUCTURAL STEEL PLACED

- 3380 tons, paper mill, Acme, N. C., for Riegel Paper Corp., to Virginia Bridge Co., Roanoke, Va.
- 2250 tons, girder spans, bridge over Missouri river, Garrison dam, N. Dak., for U. S. Engineer, Omaha, to Bethlehem Steel Co., Bethlehem, Pa.; Missouri Valley Constructors Inc., Leavenworth, Kans., and Winston Bros. Co., Minneapolis, contractors jointly; bids April 11.
- 1900 tons, alterations to merchant mill warehouse, Carnegic-Illinois Steel Corp., Gary, Ind., to American Bridge Co., Pittsburgh.
- 1800 tons, tunnel section and plaza, New York. to American Bridge Co., Pittsburgh, through E. W. Foley Associates Co., Inc.
- 1675 tons, truss and beam spans, bridges 876, 886 and 913, various locations in Iowa, for Chicago & North Western railroad, to American Bridge Co., Pittsburgh; bids April 16
- 1400 tons, addition, Des Moines, for Des Moines Register and Tribune, to Pittsburgh-Des Moines Steel Co., Pittsburgh.
- 1300 tons, engineering office building, Standard Oil Co. of Indiana. Hammond, Ind., to American Bridge Co., Pittsburgh.
- 1100 tons, paper mill and power plant, U. S Gypsum Co., Clark, N. J., to American Bridge Co., Pittsburgh.
- 1000 tons, general service building, Ann Arbor, Mich., for University of Michigan, to American Bridge Co., Pittsburgh; Bryant & Detwiler Co., Detroit, contractor; bids March 28.
- 980 tons, DPG spans and towers for bridges 33. 36 and 40, Yellowstone division, Mont., for Northern Pacific railroad, to American Bridge Co., Pittsburgh; bids April 24.
- 960 tons, maintenance shops, Ecorse, Mich., for Great Lakes Steel Corp., to Whitehead & Kales Co., Detroit; bids March 25.
- 900 tons, nurses' home, Cleveland, to American Bridge Co., Pittsburgh, through Gillmore-Carmichael-Olson Co., Cleveland.
- 899 tons, bridge, Sec. 421-F, Fayetteville, Ill., for state highway commission, to Illinois Steel Bridge Co., Jacksonville, Ill.; bids April 23.
- 700 tons, service hangar, Chicago, to American Bridge Co., Pittsburgh, through Austin Co., Cleveland.
- 665 tons, power house, La Grange, Ill., for Electro-Motive Division, General Motors Corp., to American Bridge Co., Pittsburgh; bids Jan. 2.
- 650 tons, 15-story apartment, Thomley Realty Co., 215 East 79th St., New York, to Schacht Steel Construction Inc., New York.
- 600 tons, bridge ever Kaskaskia river, Vandalia, Ill., for state highway commission, to Illinois Steel Bridge Co., Jacksonville, Ill.; bids May 8.
- 550 tons, Gold Water department store, Phoenix, Ariz., to Bethlehem Pacific Coast Steel Corp., San Francisco; Del E. Webb, contractor.
- 425 tons, warehouse, Akron Coffee & Grocery Co., Akron, O., to American Bridge Co., Pittsburgh.
- 365 tons, addition to heat treating building, East Peoria, Ill., for Caterpillar Tractor Co., to Mississippi Valley Structural Steel Co., Decatur, Ill.; Fred Harbers Sons, Peoria, Ill., contractor.

275 tons, bottle and pasteurizing building, New-

ark, N. Y., to American Bridge Co., Pittsburgh, through James Mitchell, Inc.

- 272 tons, Spec. 1249, Columbia Falls, Mont., for U. S. Bureau of Reclamation, to American Bridge Co., Pittsburgh.
- 270 tons, DPG span, No. W-354-8, Webster City, Iowa, for Illinois Central railroad, to American Bridge Co., Pittsburgh; bids April 15.
- 240 tons, penstock coaster gates, Shasta dam, Coram, Calif., for U. S. Bureau of Reclamation, to American Bridge Co., Pittsburgh; bids April 9.
- 220 tons, two apple storage buildings for A. R. Warner, at Lessport, Pa., and Fleetwood, Pa., 100 and 120 tons respectively, to Bethlehem Steel Co., Bethlehem, Pa.
- 212 tons, bridge, Sec. F-2, Carbondale, Ill., for state highway commission, to Illinois Steel Bridge Co., Jacksonville, Ill.; bids April 23.
- 200 tons, viaduct, Indianapolis, for Pennsylvania railroad, to Bethlehem Steel Co., Bethlehem, Pa.; Smith & Johnson, Indianapolis, contractors; bids April 5.
- 190 tons, bridge, Sec. 6-VF, Murrayville, Ill., for state highway commission, to Illinois Steel Bridge Co., Jacksonville, Ill.; bids April 23.
- 190 tons, warehouse, Long Island City, N. Y., to American Bridge Co., Pittsburgh, through Peerless Construction Co.
- 175 tons, dock huilding, Carteret, N. J., to American Bridge Co., Pittsburgh, through Peters Iron Works.
- 130 tons, bridge over Pequabuck river, Plainville, Conn., to American Bridge Co., Pittsburgh, through Brunalli Construction Co.

STRUCTURAL STEEL PENDING

- 3700 tons, bridge, Milan, Ill., for state highway commission; bids May 3 rejected.
- 3100 tons, manufacturing plant, Baltimore, for National Gypsum Co.
- 2800 tons, highway bridge, Silver Creek, N. Y., for state.
- 2660 tons, 1188 trash racks, Spec. 1291, Grand Coulce dam, Odair, Wash., for U. S. Bureau of Reclamation; Southwest Welding & Mfg. Co., Alhambra, Calif., low; bids May 10.
- 2448 tons, risers and surge tanks, Ft. Peck dam, Ft. Peck, Mont., for U. S. Bureau of Reclamation; bids June 3.
- 2400 tons, Ft. Gibson dam, Ft. Gibson, Okla., for U. S. Bureau of Reclamation.
- 1790 tons, miscellancous state bridge work, Allegheny county, Pennsylvania; bids June 13
- 1595 tons, flood wall improvements, near Cairo. 11., includes 1085 tons sheet piling and 510 tons bearing piling, for U. S. Engineer, Memphis; bids May 1 rejected; new hids June 10.
- 835 tons, steel sheet piling, section three, Wolf River flood wall; bids May 28, U. S. engineer, Memphis, Tenn.; also 125 tons concrete reinforcing bars, and 34 tons structural steel
- 500 tons, sheet piling, lock and guide wall extension, dam No. 21, Quincy, Ill., for U. S Engineer, Rock Island, Ill.; bids April 12 rejected.
- 450 tons, bottling plant for Coca Cola Co., Philadelphia; Ralph Herzog, Philadelphia, contractor; similar plant planned for Reading, Pa.
- 225 tons, steel sheet piling, flood protection project, Lisle, N. Y.; bids to U. S. engineer, Syracuse, N. Y., June 6; also 65 tons reinforcing bars.
- 200 tons, includes 150 tons, beam span, bridge R-208, Lawler, Iowa, and 50 tons, repair to bridge A-316^{1/2}, Milwaukee, for Chicago, Milwaukee, St. Paul & Pacific railroad; bids March 25, work postponed indefinitely.

185 tons, locomotive repair plant addition fer

- NEW BUSINESS -

Steelton & High Spire railroad, Steelton, Pa

- 180 tons, state bridge Montgomery county, Pennsylvania; bids May 29.
- 100 tons, state bridge Lackawanna county, Pennsylvania; bids June 13, up for third time.
- 100 tons, state bridge Lancaster county, Pennsylvania; bids June 13.
- Unstated, two 350-ton traveling cranes, Coulce Dam; Morgan Engineering Co., Alliance, O., low at \$264,234.
- Unstated, 300-foot arch span for Oregon Highway Department, Wasco county; Kern & Kibbe, Portland, Oreg., low at \$247,767.
- Unstated, steel grill bridge deck, Montlake bridge, Seattle; Hawkins & Armstrong, Seattle, low at \$41,065.
- Unstated tonnage, drum gates, Central Valley project, bureau of reclamation, Denver, American Bridge Co. low at \$492,449 f.o.b. Gary, Ind.
- Unstated, bridge at Indian Rock Dam, YorA county, Pennsylvania; bids rejected by United States engineers, Baltimore.

REINFORCING BARS

REINFORCED BARS PLACED

135 tons, store addition, Chicago, for Goldblatt Bros. Inc., to Ceco Steel Products Corp., Cicero, Ill., J. W. Snyder Co., Chicago, contractor.

REINFORCED BARS PENDING

- 3150 tons, Bull Shoal dam and appurtenances, White river, Ark.; bids June 27, U. S. engineer, Little Rock; other major steel requirements: 1685 tons, slide gates, accessories and conduit lining; 1800 tons, penstock and supporting frame; 250 tons, trash rack guides and protection plates; 200 tons, tainter gates anchorage structural steel; 675 tons, tainter gates; 865 tons, penstock gates stop logs and lifting beams; 170 tons, penstock gate guide and frames; 300 tons, miscellancous structural steel; 750 tons, cast iron pipe and 240 tons, flanged cast iron pipe fittings.
- 3000 tons or more, piers at Puget Sound Navy Yard; general contract to General Construction Co., Seattle.
- 845 tons, wall and appurtenant work, contract 7, Cincinnati; bids to U. S. engineer, Cincinnati; also 70 tons steel sheet piling.
- 835 tons, flood wall, Cairo, Ill.; bids June 10, U. S. engineer, Memphis, Tenn.; also 2370 lons steel sheet piling, 26,500 linear feet steel bearing piles, and 75 tons structural and miscellaneous steel.
- \$07 tons, Friant, Calif., for U. S. Bureau of Reclamation.
- 600 tons, elevators, soy bean plant, Kankakee, III, for Borden Co.; James Stewart Corp., Chicago, contractor.
- 500 tons, power house and warehouse, Cloquet, Minn., for Wood Conversion Co.
- 490 tons, flood wall improvements, near Cairo, III., for U. S. Engineer, Memphis; bids May 1 rejected; new bids June 10.
- 400 tons, Bull Shoals dam, Cotter, Ark.
- 375 tons, Ohio river flood wall improvement, Cairo, Ill.; bids May 28 to U. S. engineer, Memphis, Tenn.; also 900 tons, steel sheet piling.
- 300 tons, engineering building, Ann Arbor, Mich., for University of Michigan.
- 210 tons, Sunnyslope sanitarium, Ottumwa, iowa; bids rejected.
- -00 tons, Onondaga dam, New York; bids May 29, U. S. engineer, Syracuse, N. Y.

165 tons, flood protection project, Williamsport, Pa.; bids in to U. S. engineer, Syracuse, N. Y.

160 tons, flood protection project, Steuben







day in industrial Detroit. Those coveted innersprings (out for the duration) are still with us!

ETROIT-LELAND 🕹 имэнг

800 OUTSIDE BOOMS ALL WITH PRIVATE BATH ... SINGLE FROM \$2.50 ... DOUBLE FROM \$4.00

167

county, New York; bids May 28 to U. S. engineer, Syracuse, N. Y.; also 350 tons, steel sheet piling.

- 152 tons, Tucumcari, N. Mex., for U. S. Bureau of Reclamation.
- 145 tons, lock and guide wall extension, dam No. 21, Quincy, Ill., for U. S. Engineer, Rock Island, Ill.; bids April 12 rejected.
- 125 tons, nurses home, Ft. Wayne, Ind., for Lutheran hospital.

100 tons, elevators, Ft. Dodge, Iowa, for Borden Co.

- 100 tons, expansion, Milwaukee, for Wisconsin Telephone Co.
- Unstated, 1000 feet 23-foot diameter concrete siphon, Coulce Dam project; C. E. Connally Inc., San Francisco, low at \$3,537,820.
- Unstated, five-story addition, St. Joseph Hos-pital, Aberdeen, Wash.; bids May 29.
- Unstated, two state highway bridges, Klamath county, Oregon; A, Dovert, Klamath Falls, Oreg., low at \$49,960.
- Unstated, replacement steel and concrete bridge, Astoria, Oreg.; M. P. Butler, Seattle, low at \$16,617.

PLATES ...

PLATES PENDENG

- 500 tons, 14,300 feet of 24-inch water pipe, Spokane, Wash.; Washington Culvert & Pipe Co., Seattle, low.
- Unstated, three surge tanks and riser pipes, Fort Peck Dam; bids to United States Engi-neer, Glasgow, Mont., June 14.

Unstated, Magnolia Bluff water tower and tank,

Seattle; Chicago Bridge & Iron Co., Chicago, low at \$120,497.

Unstated, steel sewer pipe and supports, canal crossing, Columbia Basin project; bids to Bureau of Reclamation, Denver, June 21, Spec. 1346.

RAILS, CARS . . .

RAILROAD CARS PLACED

- Delaware & Hudson, 50 covered hoppers, to Greenville Steel Car Co., Greenville, Pa.; is also inquiring for gondolas.
- Union Pacific, 15 sleeping cars; Chicago & North Western, 4 sleeping cars; Wabash, 4 sleeping cars; to American Car & Foundry Co., New York; to be operated jointly by the three roads.

RAILROAD CARS PENDING

Delaware & Lackawanna, six sleepers; bids opened June 3.

LOCOMOTIVES PENDING

- Finnish State Railways, 50 steam locomotives, 25 of 2-10-0 type and 25 of 2-8-4 type.
- Great Northern, 20 diesel-electric locomotives, 1500 to 3000 horsepower each; includes freight, passenger and switch engines.

CONSTRUCTION AND ENTERPRISE

ALABAMA

BIRMINGHAM-Tennessee Coal, Iron & Railroad Co. has let contract to Building Constructors Inc., Memphis, .Tenn., for a ware-

TORONTO



house at Memphis 200 x 245 feet. Hanker & Heyer, Memphis, are architects,

CALIFORNIA

- COMPTON, CALIF.—Southern Heater Co. is building a plant 68 x 120 feet, to cost \$13,500, at 133 East Palmer St.
- CULVER CITY, CALIF .-- American Welding & Mfg. Co. has been organized by Donald A. Vorhies and is conducting its operations at 13444 Washington Blvd.
- LOS ANGELES-Approved Faucet & Valve Co. has been formed by A. A. Newar and has established operations at 2039 West Pico Blvd.
- LOS ANGELES-Sweeney Metal Finishing Co., organized by William J. Sweeney, is con-ducting business at 310 West 54th St.
- LOS ANGELES-Almar Metal Products & Mfg. Co. has been formed by Henri A. Alcarez and associates and has established its business at 1570 East Slauson Avo.
- LOS ANGELES-California Steel & Construction Co., 3833 East Medford St., is erecting a steel fabricating building at that address, to cost about \$15,000.
- LOS ANGELES-Forest O. Lamson, 3669 West 59th Place, is building a trailer factory at 4823 West Rosecrans Ave., Lawndale District, containing 8860 square feet of floor space, to cost about \$15,000.

CONNECTICUT

- GLENBROOK, CONN.-Charles H. Phillips Chemical Co., 652 Glenbrook Rd., has plans for a chemical plant to cost about \$265,000.
- SAYBROOK, CONN.-Taylor-Graves Inc., Main St., has plans for a machine shep to cost about \$175,000.
- WATERBURY, CONN.-Scoville Mfg. Co., 99 Mill St., plans construction of a foundry plant to cost about \$650,000.
- WEST HARTFORD, CONN .- Bush Mfg. Co., 100 Wellington St., has let contract to F. H. McGraw & Co., 780 Windsor St., for a plant building to cost about \$600,000.
- WEST HAVEN, CONN .- Western Electric Co. Inc., 135 Wood St., has plans for a plant addition to cost about \$275,000.

FLORIDA

JACKSONVILLE, FLA .- Niagara Sprayer & Chemical Division of Food Machinery Corp. plans a manufacturing plant to cost about \$135,000.

GEORGIA

FITZGERALD, GA.—Campbell Coal Co., At-lanta, will build \$250,000 'sawmill on 10,-000-acre timber tract in Ben Hill county.

ILLINOIS

- CHICAGO-Rheem Mfg. Co., 7600 South Ked-zie Ave., will spend \$600.000 enlarging its plant, adding 50,000 square feet; products are water heaters, home storage tanks, range boilers and similar products.
- CICERO, ILL .- American Can Co., 104 South Michigan Ave., Chicago, has plans by R. Love, care company, for a canmaking plant to cost about \$1 million.
- CICERO, ILL .- Sola Electric Co., 2525 North Clybourn Ave., will build a one-story 157 x 500-foot plant. Klefstad Engineering Co., 3600 West Fullerton Ave., Chicago, is engineer.
- ROCKFORD, ILL .- Sanitary district, A. H. Peterson, president, 3300 Kishwaukce St., has voted bonds for sewage treatment plant enlargement and equipment costing \$715,000 and trunk line sewer extensions costing \$785,000. Greeley & Hansen, 6 North Michi-gan Ave., Chicago, are consulting engineers. costing
- TUSCOLA, ILL.-Panbandle-Eastern Pipe Line Co., Box 148, Stinnett, Tex., will build a 24-mile 26-inch loop gas line, to cost about \$700,000.
- WOOD RIVER, ILL .- Wood River Oil & Re-

Why it pays you to send your tough precision parts problems to WESTERN

> This piston pin was not a tough job for Western. Total tolerance .0005, finished to better than a No. 5 Profilometer reading. Produced in tremendous quantities, pinswere individually inspected and grouped in size variations of .0001.

We want your hard-to-do, complicated screw machine products jobs . . . the ones with difficult operations and fussy tolerance. We like that kind of work because we have extensive batteries of up-to-the-minute precision equipment to perform those tricky operations, and we want to keep that equipment busy. These modern machines, plus advanced

engineering methods and experienced operators mean precision products on a quantity production basis — *exactly as* you want your parts, and *when* you want them. Send us your inquiries today — we'll be glad to quote.

> We like straight production work, too. Our range is $\frac{1}{16}''$ to $4\frac{5}{8}''$ round. And we do all secondary and finishing operations, including precision grinding, heat-treating and pentrating.



Edera NOARK MOTOR CONTROLS

MAGNETIC A.C. STARTER. Bulletin 504 – equipped with weatherproof, watertight cast Iron enclosure; built in 4 sizes for molors up to 50 hp 440-600 v.

built to meet the needs of the **STEEL INDUSTRIES**

Federal builds dependability into every motor starter that bears the Federal name ... through exclusive features that assure positive protection and unfailing performance. Federal Motor Starter—Bulletin 504—typifies the high standard of design and manufacture that has helped to make Federal a "must" in important specifications throughout the steel industries.

JUST ONE OF MANY FEDERAL MOTOR CONTROLS FEATURED IN THE

FEDERALOG

. . . one of today's most important catalogs on Motor Controls, Safety Switches, Circuit Breakers, Service Equipment, Panelboards and Multi-Breakers. Keep a copy handy; mail coupon today!

FEDERAL ELECTRIC PRODUCTS COMPANY, Inc. 50 Paris St., Newark 5, N. J. (Dept. S)

Please send a copy of the FEDERALOG to

Name.

Co. and Title ____

Address_____

fining Co. will build a 70-mile pipe line from Peru, 111., to Rockford, 111., a@ cost of about \$1 million.

MARYLAND

BALTIMORE, MD.—General Motors Corp., 2100 Broening Highway, has let contract to Consolidated Engineering Co., 20 East Franklin St., for an operations building, to cost about \$200,000.

MASSACHUSETTS

- FITCHBURG, MASS.—Simonds Saw & Steel Co., Intervale Rd., has let contract to E. J. Cross Co., 150 Prescott St., Worcester, Mass., for a one-story 210 x 360-foot plant building, estimated to cost about \$350,000.
- TAUNTON, MASS.—Glenwood Range Co. has let contract to L. M. Witherell & Sons, 29 Court St., for plant additions and improvements to cost about \$75,000. George Briggs, 63 State St., Boston, is architect.

MICHIGAN

- DETROIT—Sturdimatic Tool Co., 5220 Third Ave., has been incorporated with \$50,000 capital to manufacture tools, dies, jigs and fixtures, by Joshua Patrick, 15735 Oakfield St.
- DETROIT—Field Inc., 3774 East Congress St., has been incorporated with \$25,000 capital to manufacture fixtures, tools, dies and screw machine products, by Leonard Thurston, same address.
- DETROIT Highland Industrial Engineering Co. Inc., 8770 Linwood Ave., has been incorporated with \$1000 capital to manufacture precision gages, tools, dies and jigs, by Sam Pasutin, 1603 Roseland Ave., Royal Oak, Mich.
- DETROIT Monroe Industrial Engineering Corp., 4612 Woodward Ave., has been incorporated with \$50,000 capital to manufacture

dies, tools and machinery, by George Berbynuk, 825 Iroquois Ave.

- DETROIT—Sav-Way Industries Inc., Box 117, Harper Station, Detroit, has been incorporated with \$1,500,000 to manufacture machines, by Thomas F. Saffady, 185 West Hildale Ave., Detroit.
- FOWLERVILLE, MICH. Fowlerville Machine Products Inc., 5010 East Grand River Ave., has been incorporated with \$20,000 capital to manufacture machine products, by John R. Anderson, 7800 Theisen Ave., Dearborn, Mich.
- GRAND RAPIDS, MICH.—State Heat Treat Inc., 520 32nd St., has been incorporated with \$10,000 capital to do general commercial heat treating, by Louis Haga, 1346 Ransom St., Muskegon, Mich.
- PONTIAC, MICH.—Die Products Corp., 2255 Rosemary, has been incorporated with 50,000 shares no par value to manufacture metal products, by Howard W. Evilsizer, 468 Ditmar Ave.
- WYANDOTTE, MICH. Benkol Engineering Co., 637 Orange St., has been incorporated with \$50,000 capital to manufacture tools, dies, jigs and automotive parts, by John A. Kolcher, 15846 Eastwood avenue, Detroit.

MISSOURI

- DEXTER, MO.—City, T. J. Ross, mayor, has plans by Russell & Axon, 6635 Delmar Blvd., St. Louis, for a sewage disposal plant, water tank on tower and sewer extensions to cost about \$150,000.
- SEDALIA, MO.—Pittsburgh Corning Corp., 632 Duquesne Way, Pittsburgh, has let contract to H. K. Ferguson Co., Hanna Bldg., Cleveland, for two plants, to cost about \$2 million.
- ST. LOUIS—Roehlk Spring & Body Co., 318 South Fifteenth St., has let contract to W. D. Quigley, 4523 Page Blvd., for a one-story



100 x 110-foot plant addition to cost about \$55,000.

OHIO

- CINCINNATI, O.—Procter & Gamble Co., Spring Grove Ave., Ivorydale, will build an alcohol plant costing about \$150,000. Day & Zimmerman Inc., Packard Bldg., Philadelphia, are engineers.
- CLEVELAND—Bargar Sheet Metal Co., J. F. Bargar, president, 12401 Euclid Ave., will build a plant and office building on East 134th St., 90 x 200 feet, with loading dock and crane, to cost about \$150,000.
- CLEVELAND—Wheeling & Lake Erie railroad, T. J. Williams, chief engineer, 626 Huron Rd., will establish new yards at foot of Campbell Rd., including \$750,000 sevenstall roundhouse, office and locker building, with powerhouse and 100-foot stack.
- CLEVELAND—Weatherhead Co., A. J. Weatherhead Jr., president, 300 East 131st St., plans a branch plant costing \$200,000 at Montpelier, O., for stainless steel products, contingent on Montpelier business men raising \$50,000 toward 400 x 800-foot plant.
- CLEVELAND—R. & K. Tool & Die Co., 6321 ¹ Detroit Ave., is building a machine shop at 3891 West 150th St., to cost about \$15,000.
- CUYAHOGA FALLS, O.—Prospect Mold & Die Co., J. T. Green in charge, will build a plant 40 x 78 feet.
- WARREN, O.—Peerless Electric Co., 1401 West Market St., will expand its motor manufacturing space by a two-story building 100 x 100 feet, loading platform and freight elevator, to cost about \$120,000.

OREGON

PORTLAND, OREG.—Crown-Zellerbach Corphas applied to CPA for approval of proposed \$10,986,119 expansion of pulp and paper plant at Camas, Wash., including 11 units of steel and concrete. Construction will take \$3,756,088, the remainder being for equipment.

PENNSYLVANIA

ALTOONA, PA.-W. H. Baird, city clerk, City Hall, has plans for a sewage disposal plant to cost \$500,000 at Altoona and another at same cost in Allegheny township. Albright & Friel, 1520 Locust St., Philadelphia, are consulting engineers.

TENNESSEE

- BOLIVAR, TENN.—International Shoe Co., St. Louis, has bought 200-acre site for large tannery, for which surveys and plans are being made.
- LEWISBURG, TENN.—Florence Stove Co. is expanding plant by erection of a large enamcling unit at works here.

WASHINGTON

- OLYMPIA, WASH.—Jack Ballew, director of state department of finance, budget and business, will receive bids June 4 for a \$65,-000 treatment plant and \$60,000 filtration system.
- SEATTLE—Sternoff Metals & Iron Works, 7118 Eighth St., plans warehouse 98 x 99 feet, to cost about \$10,000.
- SPOKANE, WASH.—War Assets Administration plans expenditure of \$150,000 in overhauling aluminum rolling mill at Trentwood, leased by Henry J. Kaiser. Previously \$500,-00 was allocated for improvements and enpansion of Mead aluminum plant, also leased by Kaiser.
- SPOKANE, WASH.—Spokaue Industries Inc. has been incorporated with \$100,000 capital to operate a sheet metal works, by John R. Sleeth, 2323 West Wabash Ave.
- TACOMA, WASH.—J. D. English & Co. Inc. has been incorporated with \$49,999 capital to deal in steel and steel products, by J. D. English, 2008 East Prospect St., Seattle, and associates.



This advertisement appears as a matter of record only and is under no circumstances to be construed as an offering of these securities for sale, or as an offer to buy, or as a solicitation of an offer to buy, any of such securities. The offering is made only by the Prospectus. This advertisement is published on behalf of only such of the undersigned as are registered or licensed dealers in securities in this State.

NOT NEW ISSUES

The Thomas Steel Company

16,428 Shares 4¹/₄% Preferred Stock (Par Value \$100) Price \$103.00 per Share Plus accrued Dividends from March 15, 1946

> 246,420 Shares Common Stock (Par Value \$1) Price \$18.00 per Share

Copies of the Prospectus may be obtained from only such of the undersigned as_are registered or licensed dealers in securities in this State.

McDonald & Company

Blyth & Co., Inc.*

Harriman Ripley & Co.*

Smith, Barney & Co.*

*Underwriters as to Common Stock only

Union Securities Corporation*

May 22, 1946







PEDRICK SPEED PRODUCTION BENDER

The illustration shows one of these machines bending fifteen 1" tubes in multiple. The buyer of this machine has elected to furnish his own loading mechanism. We are prepared to supply a loading gate for production laading to a jig, if desired. This makes the machine adaptable for almost any kind of mass production bending. It will solve your production problems also. Write for illustrated folder.

PEDRICK TOOL & MACHINE CO. 3638 N. Lawrence Street PHILADELPHIA 40, PA.





880 E. 67th Street, CLEVELAND 8, OHIO Howell Works: Howell, Mich.







EQUIPMENT ... MATERIALS

FOR SALE **"STEWAR** GAS FIRED RECIRCULATING **BOX TYPE FURNACES**

Heat Chambers 20" x 20" x 20"-Max. heat range 1100° F-complete with temperature controls, blower and motor-excellent condition.

NATIONAL RIVET AND MFG. CO. Waupun, Wisconsin

FOR SALE

1-#5 REED PRENTICE JIG BORER and Vertical Boring Machine. Complete with 71/2 HP Motor.

- 1-NEW HAVEN KEY SLOTTER 32" Dia. Table with 2 HP Motor.
- 1-BARRETT HORIZONTAL BORING MILL. Cuts up to 40" Dia. Circle, with countershaft.
- 1-BARRETT HORIZONTAL BORING MILL. Cuts up to 36" Dia. Circle, with countershaft.
- 1-Barnes 22" SWING HYDRAM DRILL with Hoeffer EC4 Head, Direct Connected to 5 HP Motor.
- 1-WICKES 12' BENDING ROLL driven by 2 Cylinder Geared Steam Engine.

Contact R. W. Homan, Pur. Agt. THE C. H. DUTTON CO.

Kalamazoo 6, Mich. 630 Gibson St. Phone 3-1675

FOR SALE

1 U. S. Engineering Co. F. N. 4 SHEAR Capacity 2 3/4" Square with 20 H.P.D.C. Motor M. A. BELL COMPANY St. Louis 2, Mo.





CRANES **OVERHEAD** 6-Ton Shaw 23' Span 5-Ton "American" 10

200-Ton Alliance 100' Span 150-ton Whiting 30' Span 89-Ton "American" 40'6"

130-ton "American" 409"
B9-Ton "American" 409"
B9-Ton Alliance 37' Span
78-Ton Alliance 78' Span
700 Ton Alliance 78' Span
80-Ton Shaw 68'10" Span
700 Ton Alliance 82' Span
30-Ton Morgan 27' Span
30-Ton Morgan 30' Span
30-Ton Reading 56' Span
25-Ton Hedford 50' Span
25-Ton F&H 70' Span
25-Ton Whiting 106' Span
25-Ton Whiting 62' Span
20-Ton Alliance 77' Span
20-Ton Morgan 77' Span
20-Ton Morgan 77' Span
20-Ton Morgan 77' Span
20-Ton Northern 60' Span
20-Ton Northern 60' Span
20-Ton P&H 31'6'' Span
20-Ton P&H 39'6'' Span 20-Ton P&H 39'6" Span 20-Ton Shaw 76'4" Span 20-Ton Shepard Niles 49'6" Span

15-Ton Alliance 50' Span 15-Ton Alliance 35' Span 15-Ton Cleveland 55'6'' Spar

18-Ton Cleveland 35' Span 15-Ton Morgan 77' Span 15-Ton Niles 32' Span 15-Ton Northern 53' Span 15-Ton Shaw 82' Span 18-Ton Shaw 77' Span 18-Ton Whiting 74'8 ½' Span

Span 12-Ton Morgan 56' Span 10-Ton Alliance 58'9' Span 10-Ton "American" 27'

10-Ton Manuales of The Span 10-Ton Case 31'9'' Span 10-Ton Case 31'9'' Span 10-Ton Cleveland 38' Span 10-Ton Cleveland 50' Span 10-Ton Lares 50' Span 10-Ton Morgan 39''' Span 10-Ton Morgan 77' Span 10-Ton P&H 37' Span 10-Ton P&H 87'' Span 10-Ton Shepard 38' Span 1''-Ton Shepard 38' Span 1''-Ton Shepard 38' Span 1''-Ton Milwaukes 70' Span

Span 5-Ton Champion 37'6" Span 8-Ton Euclid 5-Ton Milwaukee 39 8 Span 5-Ton Milwaukee 66'9" Span S-Ton Milwaukes 70' Bpan S-Ton Northern 49'6" Span S-Ton P&H 45' Span S-Ton Shew-Box 25' Span S-Ton Shepard 40' Span S-Ton Toledo 96' Span 5-Ton Whiting 80' Span 3-Ton P&H 46'4" Span 3-Ton Shaw 33' Span 3-Ton Whiting 57'3" Span 2-Ton Detroit 28' Span 2-Ton Louden 19'2" Span 2-Ton P&H 46'4" Span 2-Ton Shep. Niles 18' Span 2-Ton Shep. Niles 14' Span 1 14-Ton Cleveland 25' Span 1 14-Ton P&H 22'8'' Span 34' Span

1-Ton Curtis 24' Span 1-Ton "American" 17 Span

Take advantage of the ECONOMY service by telephoning to us collect, which will enable us to discuss your requirements and

present our suggestions. In addition to overhead cranes we can supply all types of shovels, cranes, draglines, tractors, or practically everything in the equipment field. May we have your inquiries?





EQUIPMENT...MATERIALS

FOR SALE OR LEASE

FURNACES

- 1-Stewart No. 204 Tempering
- 1-Stewart No. 4 Hardening
- 1-Stewart No. 42 Industrial
- 1-Stewart No. 29 Heat Treat
- 1-Draw 38' lg. x 4'6" x 4500 lbs. Steel Per Hr.
- 1-Tate Jones 13'6" dia. Rotary
- 1-Heating 33' x 4'6" Pusher Table 1-Cooling 5'0" x 25' x 5' high L.B. Conv.
- 1-Surf. Comb. Draw-600,000 BTU Hourly

PRESSES

- 1-2000 Ton United Hydraulic
- 1-1500 Ton R. D. Wood Hydraulic
- 2- 322 Ton Baldwin-S Hydraulic
- 1- 170 Ton Broaching Geared

PAINT SPRAYS

8-Of various sizes and types

SAND & SHOT BLAST UNITS 6-Of various sizes and types

YOU NAME PRICE AND TERMS

HETZ CONSTRUCTION COMPANY, Warren, Ohio, Phone 4474

FOR SALE

50 Tons Mild Steel Plates suitable for bending-39" Diameter x 14" thick. Considerable Tannage Rounds-11/6" Diam-

eter and larger. 75,000 Galv. Mach. Bolts-78" x 11/2" Square Head & Hex Nuts.

100,000 Galv. Mach. Bolts-7/8" x 134" Square Head & Hex Nuts.

Address Box 551.

STEEL, 16 E. 43rd St., New York 17, N. Y.



FOR SALE 10 TON P&H ELEC. GANTRY CRANE D. C., 30 ft. span, 23 ft. lift. Located Chicago. WALLACK BROS. 7409 S. Damen Ave., Chicago 36, 1H.

FLANGE STEEL considerable tonnage of 1/4" Flange Steel Corners of sufficient size to blank 10" to 8" diameter circles. Subject to prior sale.

FOR SALE

THE COMMERCIAL SHEARING & STAMPING CO. P.O. Box 719 Youngstown 1, Ohio



FOR SALE MISCELLANEOUS HIGH SPEED STEEL Molybdenum type and 18-4-1 type in bar lengths, flats, and rounds. Surplus stock in internal combustion engine plant. Address Box 550, STEEL, Penton Bidg., Cleveland 13, O.

WANTED USED OR NEW

COMPLETE ROLLING MILLS with gear set suitable for sheets and tin-plates, shapes, plates, concrete reinforcing and merchant bars, etc. Also ONE DRIVING MECHANISM for the motion of at least two of the four 2 high single stand Hand Hot tin-plates mill of rolls 800 x 1100 m/m. Must be converted for connection with three phase AC net 50 cycles 6000 or 380 Volt.

ANNEALING TRUCKS, COVERS AND BOXES for sheet 1 x 2 meters. TINNING & GALVANIZING MA-CHINE.

STEELWORKING MACHINE, TOOLS, AND EQUIPMENT.

Send illustrated descriptive circular and give full description and price.

Wire: Halivdolefko, Piraeus Or Write by Airmail To:

Sheet Steel & Tin Plate Co., Ltd. 24 Benaki St. Athens, Greece





Help Wanted

Help Wanted

Accounts Wanted

ASSISTANT MANAGER (Drop Forge Shop)

Nationally known, successful organization wants an experienced forging executive as assistant plant manager-requirements are for a man of less than 50 years of age in good health, with full knowledge of operating steam and board hammers and upset forging machines. In reply give all particulars regarding experience, education, personal data, and references. Address Box 530, STEEL, Penton Bldg., Cleveland 13, O.

SALES ENGINEER

Nationally known manufacturer of technical product requires services of sales engineer on salary and traveling expense basis, working out of Pittsburgh office. Must be mechanical or electrical engineering graduate, age 25-35, to contact builders and manufacturers of all types machinery. In first letter give full account of yourself, age, education, experience, dependents, present position and when available. Interview will be arranged.

Address Box 554, STEEL, Penton Bldg., Cleveland 13, O.

CHECKERS AND DETAILERS FOR STRUCTURAL STEEL SHOP DRAWINGS Must have experience with steel fabricators on mill and office buildings. Large Program. Top Rates-Overtime Pay-with large Chicago Organization. Write-Wize or Phone HARrison 7747 THE FRANCIS COMPANY 343 S. Dearborn St. Chicago 4.

WANTED: STEEL FARRICATING PLANT LO-ind in the south desires to employ a qualified there engineer. Applicant must have a thorough howledge of and experience in welding pro-outers, both manual and machine. Requires thor-ough knowledge of steel plate fabricating, with wide experience in welding quality for large vol-ume of pressure vessels of varying designs. sizes and weight Address: Box-555, STEEL, Penton Bldg., Cleveland 13, O., indicating salary desired and date of availability.

SALES REPRESENTATIVE FOR EASTERN Sale office of manufacturer of welded stainless and alloy tubing. Age 28-40, with good appear-ance and willing to do considerable traveling. Salary and all expenses paid. Address: Box 553, STEPT, 16 E. 43rd St., New York 17, N. Y.

Wanted PRODUCTION CHIEF

To set up new plant for the manufacture of farm equipment and other similar equipment. Must be capable of forming organization to administer entire operation. Only top flight men need apply.

Write Box 547

STEEL, Penton Bldg., Cleveland 13, O.

FACTORY MANAGER WANTED FOR PLANT employing 2000 people. Must have good back-ground in industrial management and in metal cutting practices. Location castern Penna. Ap-plicant should be between 40 and 50 years old and have carned at least \$12,000. Complete in-formation should be submitted including name of present employer and reasons for leaving. Em-ployer will not be contacted without permission. Reply: Box 557, STEEL, Penton Bldg., Cleveland 13, O.

CHIEF ENGINEER-FOR NON-INTEGRATED STEEL COMPANY WITH SEVERAL PLANTS. MUST BE OUALIFIED TO ASSUME FULL CHARGE OF DESIGN, INSTALLATION MAINTENANCE AND INPROVEMENT OF EQUIPMENT, PLEASE GIVE OUALIFICA-TIONS AND SALARY DESIRED IN LETTER TO BOX 549. STEEL, PENTON BLDC., CLEVELAND 13, O.

WANTED: TRAINED TUBE SALESMAN FOR Pacific Coast territory sales position, to be an em-ployce only, not a sales agent. Must have previous tube selling experience carbons, alloys and stain-less. Preferable applicant be presently located Los Angeles area. Apply by letter stating quali-fications fully and requirements to Box 556, STEEL, Penton Bldg., Cleveland 13, O.



Covering all principal countries with established connections, desires additional industrial lines such as machinery, tools, etc. Can offer thorough and competent coverage for suitable products.

Address Box 548 STEEL, Penton Bidg., Cleveland 13, O.

Employment Service

SALARIED POSITIONS \$2,500-\$25,000. THIS thoroughly organized confidential service of 36 years' recognized standing and reputation car-ries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated through a procedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. BIXBY, INC., 110 Dun Bldg., Buffalo 2, N. Y.

CLASSIFIED RATES

CLASSIFIED RATES All classifications other than "Positions Wanted." set solid, minimum 50 words, 7.00, each addi-tional word .14: all capitals, minimum 50 words 9.00, each additional word .18: all capitals leaded, minimum 50 words 11.00, each additional word .22. "Positions Wanted." set solid, mini-mum 25 words 1.75, each additional word .07: all capitals, minimum 25 words 2.25, each additional word .09: all capitals, leaded, mini-mum 25 words 2.75, each additional word .11. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" adver-tisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Bldg., Cleveland 13, Ohio.



Difficult HARD CHROME and other PLATING SERVICES AGERSTRAND CORPORATION Muskegon, Michigan

STAMPINGS, FORMING, WELDING. SPINNING, MACHINING. All Metal or Combined with Non-Metal Materials Write for Felder LARGE SCALE PRODUCTION

OR PARTS AND DEVELOPMENT ONLY

GERDING BROS. SE THIRDVINE ST. . CINCINNATI 2, OHIO

ADVERTISING INDEX

| Adams, R. P., Co., Inc | 20 |
|---|--|
| Agerstrand Corp | 179 |
| Alan Wood Steel Co | 134 |
| Alliance Machine Co., The | 6 |
| Allied Products Corp | - 43 |
| Allis-Chalmers Mfg. Co | 8, 9 |
| Allay Metal Abrasive Co. | 171 |
| American Air Filter Co., Inc | 158 |
| American Broach & Machine Co | 2 |
| · · · · · · · · · · · · · · · · · · · | |
| American Chain & Cable, Wright Manutac- | |
| American Chain & Cable, Wright Manufac- turing Division | 26 |
| American Chain & Cable, Wright Manufac- turing Division American Gas Association | 26 12 |
| American Chain & Cable, Wright Manufac- turing Division American Gas Association American Magnesium Corp | 26 12 145 |
| American Petrametal Corp. | 26 12 140 176 |
| American Rolling Mill Co., The, Rustless Iron | 26 12 140 176 |
| American Chain & Cable, Wright Manufac- turing Division American Gas Association American Magnesium Corp. American Petrometal Corp. American Rolling Mill Co., The, Rustless Iron & Steel Division | 26 12 145 176 |
| American Chain & Cable, Wright Manufac- turing Division American Gas Association American Petrometal Corp. American Rolling Mill Co., The, Rustless Iron & Steel Division American Shear Knife Co. | 26 12 140 176 14 166 |
| American Chain & Cable, Wright Manufac- turing Division American Gas Association American Magnesium Corp. American Rolling Mill Co., The, Rustless Iron & Steel Division American Shear Knife Co. Anaconda Wire & Cable Co. | 26 12 145 176 14 166 139 |

8

| Bailey, William M., Co | 45 |
|--|-----|
| Bantom Bearings Division, The Torrington Co. | 32 |
| Bedford Foundry & Machine Co | 167 |
| Belmont Iron Works | 176 |
| Bethlehem Steel Co. | 1 |
| Bigwood, Joshua, & Son, Ltd | 175 |
| Bissett Steel Co., The | 164 |
| Bixby, R. W., Inc. | 179 |
| Bohn Aluminum & Brass Corp | 37 |
| Brosius, Edgar E., Co. | 162 |
| Bullard Co. The | 72 |

| A share the second s | |
|---|------|
| Carnegie-Illinois Steel Corp | 159 |
| Carpenter Steel Co., The | 97 |
| Chandler Products Corp | 101 |
| Cincinnati Bickford Tool Co., The | 49 |
| Cities Service Oil Co | 137 |
| Clark Controller Co., The | 7 |
| Cleveland Crane & Engineering Co., The | 113 |
| Cleveland Hotel | 170 |
| Cleveland Metal Abrasive Co., The | 173 |
| Cleveland Tramrail Division, The Cleveland | |
| Crane & Engineering Co | 113 |
| Cleveland Worm & Gear Co., The | |
| Inside Back Co | over |
| Columbia Steel Co | 159 |
| Columbus-McKinnon Chain Corp | 161 |
| Cone Automatic Machine Co., Inc | 67 |
| Continental Tool Works Division of Ex-Cell-O | |
| Corp | 83 |
| Cutler-Hammer, IncBack Co | over |
| | |

| Despatch Oven Co | 39 |
|-----------------------------|-----|
| | |
| Detroit-Leland Hotel | 167 |
| Detroit Sheet Metal Works | 47 |
| Diamond Mfg. Co | 174 |
| Differential Steel Car Co | 175 |
| Disston, Henry, & Sons, Inc | 36 |
| Dow Chemical Co., The | 127 |
| Dulien Steel Products, Inc. | 177 |

D

| Economy Co., Inc. | 177 |
|---|-----|
| Electric Controller & Mfg. Co., The | 142 |
| Electric Storage Battery Co., The | 31 |
| Euclid Crane & Hoist Co., The | 130 |
| Ex-Cell-O Corp., Continental Tool Works Di- | |
| vision | 83 |

E

| Fairbanks, | Morse & | Co. | | | | 50 |
|-------------|--------------|---------|----------|------|------|-----|
| Fate-Root-+ | leath Co., | , The | | | | 15 |
| Federal Ele | ectric Produ | icts Co | o., Inc. | | | 169 |

F

| erry Cop & Set Screw Co., The | 28 |
|-------------------------------|-----|
| oster, Frank B | 177 |
| oster, L. B., Co | 178 |
| rench & Hecht, Inc | 163 |

G

| Gas Machinery Co., The | 140 |
|----------------------------------|-----|
| General Blower Co | 178 |
| General Electric Co | 29 |
| General Steel Warehouse Co., Inc | 125 |
| Gerding Bros | 179 |
| Sisholt Machine Co | 21 |
| | |

н

| Harnischfeger Corporation | , 174 |
|-------------------------------------|-------|
| Harper, H. M., Co., The | . 81 |
| Haskelite Manufacturing Corp | . 17 |
| Hassall, John, Inc | . 132 |
| Haynes Stellite Co | . 44 |
| Heald Machine Co., The Inside Front | Cover |
| Hobart Brothers Co | . 175 |
| Horsburgh & Scott Co., The | . 136 |
| Hubbard, M. D., Spring Co | . 173 |
| Hydraulic Press Mfg. Co., The | . 25 |
| Hydropress, Inc | . 13 |
| | |

1

| Ingalls | Iron Works | Co., The . | | 41 |
|---------|-------------|------------|-----|---------|
| Inland | Steel Co. | | | 35 |
| Iron & | Steel Produ | cts, Inc | ••• | 177 |

3

Johnson Steel & Wire Co., Inc. 168 Jones & Laughlin Steel Corp. 105 к

Kidde, Walter, & Co., Inc. 135 King Fifth Wheel Co. 160

L.

| Lebano | n Steel F | oundry | 19 |
|---------|-----------|--------------|-----|
| Legion | Utensils | Co | 176 |
| Lincoln | Electric | Co., The108, | 109 |
| Lisbon | Hoist & | Crane Co | 174 |

Mc

| McDonald & C | Co. | | | ۰. | | | ۱. | | | | 172 |
|---------------|-----|-----|-------|-----|---|---|----|--|--|---------|-----|
| McKee, Arthur | G., | & | Co. | | | | | | | • • | 119 |
| McQuay-Norris | Ma | เทบ | factu | rin | g | С | ο. | | | | 34 |

м

| Macklin Co | 3 |
|---------------------------------|-----|
| Macwhyte Co. | 143 |
| Maehler, Paul, Co., The | 121 |
| Mesta Machine Co | 99 |
| Michigan Steel Tube Products Co | 103 |
| Michigan Tool Co | 141 |
| Midwest Steel Corp | 177 |
| Moline Tool Co | 171 |
| Morgan Construction Co | 52 |
| | |

N

National Fireproofing Corp. 176 Niagara Machine & Tool Works 22

0

| Oakite Products, Inc | 111 |
|--------------------------------|-----|
| Ohio Locomative Crane Co., The | 174 |
| Owen Bucket Co., The | 171 |

P

Pangborn Corporation 35 Parker Appliance Co., The 40

Pedrick Tool & Machine Co. 173 Perkins, B. F., & Son, Inc. 165 Philadelphia Steel & Iron Co. 176 Phillips Screw Manufacturers 27 Pittsburgh Commercial Heat Treating Co. .. 175 Pittsburgh Gear & Machine Co. 175 Plymouth Locomotive Works 15

R

R F R

R R

| Rail & Industrial Equipment Co | 177 |
|--|-----|
| Rapids-Standard Co., Inc., The | 157 |
| Ready-Power Co., The | 172 |
| Republic Steel Corporation | 23 |
| Rolock, Inc. | 174 |
| Rustless Iron & Steel Division, The American | |
| Rolling Mill Co. | 14 |
| Ryerson, Joseph T., & Son, Inc | 176 |

s

| Salem Engineering CoFront Co | over |
|--|------|
| Sharon Steel Corporation | 5 |
| Shawinigan Products Corp. | 174 |
| Shell Oil Co. Inc. | 133 |
| Shanganga Bann Mold Co | 172 |
| Simonda Coast & Mfg Co. The | 175 |
| Simonas Gear & Mig. Co., no treat | 16 |
| Snyder loor & Engineering Co | 177 |
| Sonken-Galamba Corp. | 46 |
| South Bend Lathe Works | 131 |
| Square D Co | 176 |
| Stanley Works, The | |
| Steel & Tube Division, The Timken Roller | 101 |
| Bearing Co | 100 |
| Sterling Grinding Wheel Division of the | |
| Cleveland Quarries Co | 122 |

T

Tennessee Coal, Iron & Railroad Co. 159 Timken Roller Bearing Co., The, Steel & Tube Torrington Co., The, Bantam Bearings Division 32 Trundle Engineering Co., The 138

U

Union Carbide & Carbon Corp. 44 United States Steel Corp., Subsidiaries 159 United States Steel Export Co. 159

v

w

| | 24 |
|---|-----|
| War Assets Administration | 33 |
| Weirton Steel Co | 169 |
| Western Automatic Machine Screw Co | 178 |
| West Penn Machinery Co | 174 |
| Wheeling Steel Corporation | 120 |
| Whitcomb Locomotive Co., The | 176 |
| Whitehead Stamping Co | 170 |
| Wisconsin Steel Co. | 114 |
| Wolff, Benjamin, & Co | 00 |
| Worth Steel Co. | 20 |
| Wright Manufacturing Division, American | |
| Chain & Cable | 20 |
| chum a cabio minim | |

Y

Youngstown Sheet & Tube Co., The 30

~~~

Table of Contents, Page 51 Classified Advertisers, Pages 177, 178, 179