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## A New World

One cannot view the complicated developments in the relations between the nations of the world that have occurred since V-J Day without realizing that henceforth the internal economy of the United States is going to be affected in many ways by our nation's obligations to other nations.

Already we have abundant evidence of the intricate manner in which our domestic affairs are meshed with those of other countries. Our strikes have embarrassed us by causing us to fall behind in our commitments to furnish steel, coal and other materials and supplies to war-devastated areas. Likewise, factional feuds throughout the world have delayed the resumption of orderly trade and thus have prevented us from receiving goods which are needed badly in reconversion at home. These and other current developments should impress us with the fact that the recent war has plunged us into a world economy from which there is no escape if our nation is to take its proper place in global affairs.

Just as the American public has been slow to grasp the significance of the new relations between nations, so have industrial executives been tardy in perceiving how these new bonds will affect American industry. Henceforth we must deal with an economy that in many respects is world-wide. We cannot return to an economy that is limited in scope to a single nation or even to a hemisphere. We have been embroiled in a global war and our postwar destiny will be influenced heavily by a global economy. The sooner we can get into the habit of thinking in terms of cause and effect on a world-wide instead of on a national basis, the sooner we will solve our most pressing problems—internal and external.

For one thing, American industry will be compelled to adopt new policies in regard to foreign trade. All previous concepts in regard to tariffs, cartels and similar devices must be revised drastically to confom to the new character of international relations. Private trading, for some time to come, must be co-ordinated with trade in which nations rather than private enterprises are the principals. In fact, almost all trading between nations must be subject to restrictions imposed by a certain degree of international economic planning.

These new complications present a challenge to American industry. One way to meet it is for industrial executives to begin now to bring their thinking in regard to world trade into harmony with new international relationships.

HORSEPLAY MUST GO: Truce of two weeks in the coal mine stoppage by grace of John L. Lewis should not blind the public to the menace which Lewis and other labor czars present our democratic society.

Lewis' move should fool no one. This is not a gracious gesture to keep the wheels of industry turning and the lights burning. Lewis' real motive is plain. Sensing the rising indignation of the people as the economy ground to a stop, he simply changed his tune a trifle, seeking to ingratiate himself with an anxious public in hope of corralling support for his demands while forestalling congressional action to curb his power.

Millions of tons of much needed coal and steel have been lost from potential 1946 production because of Lewis. Millions more tons of vitally needed production will be lost before our steel mills and manufacturing plants get back to normal operations.

It is time a stop be put to the horseplay of Lewis, Murray, et al. The bald fact is, the labor bosses are too powerful for their own or the country's good.

May 20, 1946

# VIEWS the NEWS

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As the EDITOR

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Settlement of the coal strike, no matter the terms, should not divert Congress from the task it so clearly needs to perform—amend the basic labor laws of the nation, especially the Wagner Act, so as to make the unions as equally responsible for their actions as is industry now. Congress, without delay, simply must correct the mistakes in national labor policy if we are to escape from the economic madhouse in which we have been penned these past New Deal years. —p. 79

**FUTURE PROMISE:** Strikes and raw materials shortages, principally the former, have prevented attainment of projected automobile production schedules in recent months. Consequently, millions who had hoped to go rolling along the highways this summer in brand new models, will have to swallow their disappointment and nurse along their war-worn jalopies for an indefinite period to come.

There is some consolation for the disappointed, however, in the fact that their wait may not be without recompense. While the auto builders are striving desperately to get current production to maximum levels as quickly as possible, they, at the same time, appear to be launched on a drive to engineer something new in cars for the future.

Primarily, the drive is aimed at meeting the demand for a light car for the millions of prospective buyers in moderate circumstances who are beginning to realize that cars formerly selling for around \$1000 will cost them a good deal more under existing conditions. More than "glitter and glamor" will be fashioned into the new cars, which, word from Detroit has it, it is hoped will be engineered beyond anything yet built in terms of performance and value. —p. 95

**MILESTONE IN JOINING:** By comparison with older fabricating techniques, the history of flash-butt welding is short but momentous. War provided a natural tonic for mushroom growth of the whole family of welding methods and brought new distinction to flash welding and related electrical resistance systems.

Not long ago a flash welder, properly handled, performed the unusual feat of butt welding into a single ring such dissimilar materials as SAE 1020-30-40, 18-8, Monel and high chromium-bearing steel. Flash welding of the hard-to-weld steels is now commonplace and the new milestone, butt-welding aluminum, has been passed via a much shorter welding cycle and upsetting at maximum speed. As a result, flash-butt welding of many nonferrous materials in commercial quantities soon may become a reality. --p. 147

SIGNS OF THE TIMES: Must bills on the Senate's calendar before it adjourns for the summer include Senator McMahon's atomic energy measure (p. 88) to establish a civilian commission with authority over every phase of atomic energy development. Research is lagging in the field largely because a national policy to deal with the problem is lacking. Delay in fashioning policy cannot be brooked for long if we are to maintain leadership in this field . . . Significant change in name is that of the Army Industrial College (p. 91) to the Industrial College of the Armed Forces. Increasing participation of the Navy in the activities of the institution is reflected . . . Council representing 100 chambers of commerce in 11 western states (p. 100) is backing U. S. Steel's bid for the government-owned steel plant at Geneva, Utah. Spokesman for the council says acceptance of the corporation's bid would do most to aid western steel development . . . Expectations on the West Coast are that within the next two or three months a major portion of war-built aluminum producing capacity in that area (p. 101) will be put in operation by private interests, an achievement exceeding by a wide margin expectations of a year ago . . . Move in Congress and administration circles in recent years looking toward so-called decentralization of industry seems to be slowing down. Proposal to shift industries to less populous areas (p. 82) has been a nightmare to long established industrial districts. Now, however, it appears the chances are increasingly slim the special Senate Committee looking into the matter will be continued . . . World attention in recent weeks has been focused on Soviet Russia's plans for expanding her industry, including steelmaking facilities which already are substantial. In Siberia, Russia's third largest steelworks (p. 92), American-designed, is scheduled for expansion that will increase output in 1950 by 50 per cent compared with present-day production. . . . Investigations of Ryan Aeronautical (p. 119) show stainless steel one of the few metals that provide a completely satisfactory material for transferring high-temperature exhaust gases from large aircraft engines . . . Success of large-scale industrial processing is intimately associated with development of precise control instruments. Newer electronic instruments (p. 114) are aiding the chemical industry to such extent it appears logical to regard instrumentation as a unit operation.

E.L. Shar

EDITOR-IN-CHIEF

Pouring ingot molds at Inland's Indiana Harbor Plant.

# New Steels

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1.

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Workers deep in the McKay mine in Illinois load coal cars during the two-week truce declared by John L. Lewis as a national blackout was threatened due to the coal shortage. NEA photo

## Industrial Operations Decline in Face of Coal Strike Truce

Steel and metalworking plants receive only small portion of fuel mined during two-week period. Ingot operations drop 6<sup>1</sup>/<sub>2</sub> points. More metalworking plants close for lack of steel. President proposes coal strike arbitration

NOTWITHSTANDING the resumption of coal mining under the two-week truce in the miners' strike, steelmaking operations and metalworking activities continued to drop last week and further declines are in prospect.

Lifting of the three-day freight embargo and removal of power conservation measures brought some relief in some districts, particularly northern Illinois and Indiana. However the overall trend was downward. Steel mills and metalworking shops are getting little of the coal mined during the truce, the bulk going to other classes of users.

Steel ingot production receded 6<sup>1/2</sup> points to 49 per cent of capacity as more mills reached the bottom of stock piles. Additional metalworking plants were closed or placed on shortly curtailed operations for lack of steel, components and fuel.

As the disruption in steelmaking operations continues, it is becoming increasingly difficult for producers to set up schedules for the remainder of the year. Some already are so far behind on production that their present carryover likely will absorb all of third quarter output. Producers are making no definite commitments on the general run of products, being largely obligated for all output for the remainder of this year, and accepting no new orders for 1947.

By the end of last week, more than 2 million tons of steel production had been lost as a direct result of the coal strike. The steelmaking rate has dropped 40½ points from the pre-strike rate of 89½ per cent of capacity. Late last week the coal strike negotiations continued deadlocked over the demand of John L. Lewis, president of the United Mine Workers-AFL, for a 7 per cent payroll levy for his proposed welfare fund. This was estimated to be the equivalent to a \$70 million tax on the coal industry, on the basis of present payrolls.

The UMW chieftain's proposal was rejected by the mine operators after they had conceded to a demand for \$3 million back holiday pay in an effort to break the deadlock and entice Lewis to tell them what he wants in the way of increased wages. Late last week, the miners' czar had refused to divulge his wage demands, and President Truman had proposed the dispute be submitted to arbitration.

Another ominous cloud shadowing reconversion activity last week was the threat of a country-wide railway strike. Hope was held that a last minute settlement might avert the railway workers walkout before the Saturday deadline.

In contrast to the miners, the railway

### COAL STRIKE

workers' wage demands have been known for several months. Briefly they are:

Trainmen and engineers ask an increase of 25 per cent or a minimum of \$2.50 a day. A fact-finding board recommended a raise of \$1.28 a day.

Switchmen, conductors and firemen ask a \$2.50 a day raise. An arbitration board awarded \$1.28 a day.

Fifteen nonoperating unions ask 30 cents more an hour. An arbitration board awarded 16 cents.

Regardless of the outcome of current strikes and threatened strikes, industrial observers believe the forecasts made at the end of the war for fairly rapid return to full peacetime production have been knocked into a cocked hat by the work stoppages and the loss of production experienced in the past eight months. Strikes in the steel, automobile, electrical, coal and miscellaneous industries have created shortages and set up stresses in the economic machinery that will require months to relieve.

The shortage of steel in recent weeks has been the most acute in this country's history and will grow even worse in the weeks immediately ahead. Makers of electrical motors, essential for so many durable and consumer goods, are booked for many months ahead, deliveries on some types extending to more than two years.

Strikes and the resultant shortages of goods, combined with the higher costs resulting from wage increases and the less-than-full production, have virtually blasted effective price control out of the picture, according to these observers, who are convinced the work stoppages were a more deadly dagger to OPA than any protestations made before congressional committees.

#### National Prestige Suffering

Furthermore, they believe the sorry picture of United States reconversion is causing this country to lose prestige in the eyes of other nations. Strikes have contributed to our difficulty in fulfilling commitments for steel, coal and other materials. Shortages of goods are so acute at home that manufacturers are unable to take advantages of the opportunities for foreign trade.

Little optimism can be found for early recovery from cumulative effects of the postwar strikes, even if the coal dispute should be settled promptly.

Steel mills will require three to four weeks, or possibly longer, to recover to pre-strike ingot operations after coal mining is resumed. Mill operators point out that starting up the mills will take considerably longer now than after the steel strike. At that time, the mills had



Seated on a ledge on the steps of the Labor Department Auditorium, John L. Lewis, center, chief of the coal miners, confers with Harry M. Moses, left, spokesman for the steel company mine operators, and Percy Tetlow, UMW representative, before entering another session of negotiations. NEA photo

adequate supplies of raw materials on hand and the job was one of getting facilities back into production. Now stocks of fuel and scrap are badly depleted and additional time will be required to assemble a sufficient quantity of raw materials before normal operations can be attained.

Coal must be mined and brought to the plant, with the movement probably encountering congestion of railroad traffic.

Steps involved in resuming operations at blast furnaces or steel plants that have been partially or completely shut down are parts of closely interconnected and highly complicated procedures. Each step is dependent upon those that have preceded it and upon those that will follow.

The plant must have coke and, in most cases, it must have the gas that goes from the coke ovens to every section of the plant. Some patching of the by-product ovens is necessary if they have been out of production for any length of time. The amount of patching generally depends on how much heat the plant has been able to get during the stoppage. If the bricks have cooled below a certain point, with a resulting disruption of the lining, a big rebuilding job will be necessary.

Blast furnaces are started up next. The stoves that supply the heat for the furnaces are warmed up with whatever heat is available. The heating system is reconnected. Wind is restored. The length of time the furnace has been out of operation will be a determining factor. It is standard practice to bank a furnace if the stoppage is not more than three or four weeks. For any longer period, the furnace would ordinarily have been drained, allowed to cool and go out. One day of preparation for every week banked is a good rule of thumb for the time it takes to resume the operation of a blast furnace.

Under ideal conditions, the open hearths can turn out a heat of steel within 18 hours after hot metal can be delivered. However, if the shutdown has been a long one, patching will be necessary here, too. In some cases, the roofs may fail when the furnace cools. Six months is the average life of a roof.

Soaking pits where the ingots are heated for further working can be started up in times that vary from 2 days to 2 weeks.

Rolling mills are a comparatively easy problem. The hydraulic lines are reconnected and heat lines opened up.

These are the main steps in the process. There are, however, miles of pipe to inspect, hundreds of pieces of electrical equipment to look over, and countless steam, gas and water lines to be opened up.

### Hourly Earnings of Steelworkers Rise Despite Overtime Reduction

AVERAGE hourly earnings of workers receiving hourly, piecework or tonnage wages in the steel industry established a record of 135.1 cents per hour in March, according to the American Iron & Steel Institute. This record was made although steel production (compared to that in March of a year ago) reflected some after-effect of the steel strike in January and February.

With practically the same number of employees as in March, 1945, the industry's total payroll in March, 1946, was only about 10 per cent less than it was in March of a year ago, when steel production was near maximum and total payroll reached its all-time monthly high, The payroll for March, 1946, was \$138,-756,100, and for March, 1945, was \$154,-976,700.

In March, 1945, payments for overtime work were excessive because the industry was under high pressure to produce steel urgently needed for war purposes, and average overtime earnings amounted to about 12.5 cents per hour. In March, 1946, overtime work had been reduced to a nearly normal peacetime amount, and was equivalent to average earnings of about 1.5 cents per hour. Net average earnings per hour in March, 1945, were approximately 115.4 cents, and in March, 1946, they were 134.3 cents, the difference reflecting the recent increase of 18.5 cents per hour.

Average employment during March of this year was 570,500 compared with 570,100 in March of one year ago. Wage earners worked an average of 37.9 hours per week in March, 1946, compared with 47.4 hours per week in 1945.

The production of steel ingots and steel for castings was 6,507,047 tons, or about 15 per cent less in March, 1946 than in March, 1945.

### Annual Wage Demand To Be Considered by Steel Union

Wage Policy Committee of the United Steelworkers of America (CIO) will consider establishment of a guaranteed annual wage in the industry as a 1947 contract demand when it meets next fall, Philip Murray, president of the union, said at a press conference in Atlantic City, N. J., last week where the steelworkers are in convention.

Earlier, Murray spoke to the convention in favor of a resolution which called for appropriate proposals to be negotiated with employers to provide payment of a guaranteed annual wage.

In another resolution the convention declared the steelworkers would combat a speedup in work, described as intended to nullify the recent 18<sup>1</sup>/<sub>2</sub> cents per hour wage increase.

Present wage contract with the steel

companies expires Feb. 15. Comparative peace during the life of the contract was indicated at the Atlantic City convention in a statement by Murray to the effect the steelworkers have an outstanding commitment to the industry to stand on present wage standards until Feb. 15 next. This was taken to mean any benefits that may be obtained by the coal miners, or even abolition of price control should not set off a wave of new wage demands by the United Steelworkers.

### Present, Past and Pending

### SHARON STEEL PLANS TO EXPAND FARRELL PLANT

SHARON, PA.—Sharon Steel Corp. is planning to install an electric furnace, additional soaking pits and a 21-inch continuous billet and bar mill at its Farrell plant. Electric furnace and soaking pits are to be moved from its Lowellville plant while the 21-inch billet and bar mill also will be moved from that plant if that unit is dismantled.

### DELAY IN BRITISH STEEL NATIONALIZATION SEEN

LONDON—Publication of the British iron and steel industries' plans for reconstruction and expansion has served, in the opinion of most persons, to emphasize the lack of any real excuse for placing industry under public ownership. The iron and steel industry accounted for 10 per cent of United Kingdom exports in the first quarter compared with only 9 per cent in 1938. March exports exceeded the 1938 level by 29.5 per cent in tonnage and 87.4 per cent in value.

### SINCLAIR REFINING EXTENDING PIPE LINE SYSTEMS

NEW YORK—Sinclair Refining Co. plans to extend to Detroit its pipe line system from Chicago to Toledo, or a distance of 56 miles. A terminal with a capacity of 120,000 barrels will be constructed in Detroit. Another line is being built from Toledo through Marion, O., calling for construction of 118 miles of 6-inch pipe, two pumping stations and about 100,000 barrels storage capacity at Columbus, O. It will extend later to Akron, Youngstown and Cleveland, or about 225 miles.

### OUTLAWING OF STRIKES FOR SIX MONTHS URGED BY SMALL

WASHINGTON—Temporary emergency legislation outlawing strikes for at least six months was urged last week by Civilian Production Administrator John D. Small. He also called for an end to the "leapfrogging" of wages and prices.

### MINNEAPOLIS-HONEYWELL ENLARGES EXPANSION PLANS

MINNEAPOLIS—Minneapolis-Honeywell Regulator Co. has purchased a new plant and plans construction of a new machine shop in addition to its recently announced \$4 million plant expansion program.

#### MALLEABLE IRON CASTINGS SHIPMENTS, ORDERS INCREASE

WASHINGTON—Shipments of malleable iron castings increased 24 per cent in March to 49,839 short tons while new bookings for outside trades increased 60 per cent over February to 49,609 tons.

#### GENERAL ELECTRIC TO GIVE EMPLOYEES \$4,434,778

New Yonk—General Electric Co. will distribute \$4,434,778 for 1945 to 130,000 eligible employees under the company's general profit sharing plan. Awards to employees under the company's suggestion plan totaled \$158,000 during 1945.

### ENGINEERS PLAN FOR ELIMINATION OF JAP WAR POTENTIAL

NEW YORK—National Engineers Committee of the Engineers Joint Council, representing five national engineering societies, is preparing a program at the request of the Departments of War and State to eliminate the industrial war potential of Japan.

### W. K. FITCH ELECTED CHAIRMAN OF DRAVO CORP.

PITTSBURGH-W. K. Fitch has been elected chairman of the board, Dravo Corp., succeeding J. D. Berg who has resigned that position but who continues as chairman of the executive committee. Carl B. Jansen has been elected president, succeeding the late V. B. Edwards, while Robert W. Marvin has been named vice president and a member of the executive committee and W. E. Clark has been elected a director.

## Drive To Shift Industries Slows Up

Chances for continuation of Senate special investigating committee slim. Aims of group vigorously opposed by old industrial centers

#### WASHINGTON

CHANCES for continuation of the Senate Special Committee Investigating Industrial Centralization which was created in the 79th Congress have about reached the vanishing point. This is the committee appointed by the Senate in December of 1943, at the instance of Sen. Pat McCarren (Dem., Nev.), with McCarren as chairman.

The committee was regarded generally as aiming to interfere with the normal growth of industry in the United States as a result of the play of economic factors, and to substitute for the free enterprise system some form of governmental direction over future industrial expansion. It was suspected by industrialists from the first because of its makeup. The majority of the seven senators composing it were from thinly populated states with almost no industries. Senators on the committee hailed from Nevada, Alabama, Iowa, Utah, Idaho, North Dakota and Wyoming.

#### Suggested Control from Washington

Widespread rumors that the committee wanted to build up the prosperity of western and southern states by shifting industries from the northeastern area to those states appeared to be justified when the committee, in 1944, published a report showing that 65 per cent of the country's manufactures were located in 11 "Blue" states-Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio, Michigan, Illinois, Delaware and Maryland. This report suggested that industry in those states should be frozen at the then existing volume, and that the future expansion of industry should be in locations selected from Washington.

So much resentment was stirred up by this report that when Senator McCarren asked the Senate in the 79th Congress to continue his special committee, the senators from the industrial states were ready for him. The resolution, identified as Senate Resolution 15, was referred to the Senate Committee on Interstate Commerce which, in turn, turned it over to a subcommittee consisting of Senators Brien McMahon (Dem., Conn.), Ernest W. McFarland (Dem., Ariz.),



APPROVES NEW AIRPORTS: President Harry S. Truman signs bill designed to provide the country with 300 new airports during the next six years. Federal funds will be allocated among the states on a formula based on both area and population. Looking on are, left to right: Sen. Pat McCarren, Nevada; Rep. Jennings Randolph, West Virginia; Gael Sullivan, assistant postmaster general; Rep. Alfred Bulwinkle, North Carolina; William A. M. Burden, assistant secretary of commerce; Theodore P. Wright, CAA administrator; Charles Donaldson, assistant administrator of airports; L. Welch Pogue, CAA chairman. NEA photo

Hugh B. Mitchell (Dem., Wash.), Henrik Shipstead (Rep., Minn.), and Homer E. Capehart (Rep., Ind.).

The subcommittee held three hearings, one last October, one in April and one in May. At the hearing in October, Senator McCarren denied that he or his committee had any intention of promoting the prosperity of certain states by moving industries to them from other states. He hoped to encourage industrial growth in the South and the West, he said, but he had no intention of doing it by limiting the industrial growth of the northeastern states.

At the three hearings, the witnesses who wanted a continuation of the McCarren committee included three spokesmen for the West Central Industrial Council, one for the Builders of the West Inc., one for the state of Oklahoma, one for the California Commission on Industrial Development, one from the Kansas Commission on Industrial Development, and one from the Lyme Foundation Inc., Hartford, Conn., which is interested in distributing the population of cities over rural areas "for better and more enjoyable living."

Witnesses opposed to continuation of the McCarren committee included Senator Green of Rhode Island, Senator Saltonstall of Massachusetts, and spokesmen for many organizations including the Massachusetts Postwar Readjustment Committee, Indiana State Chamber of Commerce. New Hampshire State Planning & Development Commission, Rhode Island Industrial Commission, Providence Chamber of Commerce, New York State Department of Commerce, New York State Department of Connecticut, Pennsylvania Department of Commerce, New Jersey Department of Economic Development. Pennsylvania State Planning Board, Michigan Planning Commission, etc.

A typical statement was that of Lieut. Governor Richard T. James of Indiana who objected to the extension of artificial aid to give certain areas of the country economic advantages over others. He thought that industrial and other development was a matter requiring local action.

"Indianapolis started off to be the automobile capital of the world, but today we manufacture only one car in Indiana, the Studebaker. We are not complaining about this. The industry moved away from Indianapolis from perfectly natural and logical causes.

"On the other hand, we have many industries in Indiana which thrive in their present locations. The people in the states know about such things and they are in a better position to promote economic activities in their areas than people in the government."

Don C. Weeks, director of the Michigan Planning Commission, opposed the continuation of the McCarren committee because of what he termed a biased attitude. While he had no substitute action to recommend, he favored encouragement of industrialization in areas of the country which today are backward. "We cannot produce motor cars in large volume in Michigan," he said, "unless people in Colorado and Mississippi have money with which to buy them."

Lieut. Governor Wilbert Snow of Connecticut pointed out that even the industrial states have problems of the same nature as the nonindustrial states.

"We in Connecticut wondered what was going to happen to Groton when the Electric Boat Co.'s plant folded up. Now, fortunately for us, a large streptomycin company plans to take it over. We are still wondering what is going to happen to the Hamilton Propellers Co., one of our biggest Hartford firms, if jet propulsion crowds out the old propellers."

Analyzing reports of the McCarren committee, said Lieut. Governor Snow, they contain two concrete suggestions: 1—That freight rate discrimination against the nonindustrialized states be discontinued, and 2—that research work be organized to explore and report on the economic possibilities of thinly-populated areas of the nation.

"The matter of freight rates is one for the Interstate Commerce Commission," said Mr. Snow, "whereas that of research and exploration is a purely local job one that can very well be done by research professors in the various state universities."

### Industry Advisers on U. S. Specifications Named

Full membership of the Industry Advisory Council which is to advise with the Federal Specifications Board on revision of current government specifications and formulation of new specifications (STEEL of April 8, p. 64) has been announced by Secretary of the Treasury Vinson, as follows:

Howard Coonley, chairman of the executive committee, American Standards Association, and a director of the Walworth Co.; P. G. Agnew, vice president and secretary, American Standards Association; Clarence L. Collens, chairman, Reliance Electric & Engineering Co., and representing the National Electrical Manufacturers Association; L. A. Danse,

chairman of the metallurgical committee, General Motors Corp., and representing the Society of Automotive Engineers; Vincent dePaul Goubeau, general purchasing agent and director of materials, Radio Corp. of America; Clifford B. LePage, assistant secretary, American Society of Mechanical Engineers; Harold S. Osborne, chief engineer, American Telephone & Telegraph Co.; Thomas Spooner, manager of Engineering Laboratories and Standards Department, Westinghouse Electric Corp.; C. L. Warwick, secretary, American Society for Testing Materials; Warren N. Watson, secretary, Manufacturing Chemists Association.

### National Metal Congress Show To Be Held Nov. 18-22

The 28th annual National Metal Congress and Exposition will be held in Atlantic City's Municipal Auditorium from Nov. 18 through Nov. 22.

Meeting jointly during the NMC will be the American Society for Metals, the Iron & Steel and the Institute of Metals divisions of the American Institute of Mining & Metallurgical Engineers, the American Welding Society and the American Industrial Radium & X-ray Society.

### Irwin H. Such Appointed Editor of STEEL

IRWIN H. SUCH, who since 1943 has been Engineering Editor, has been named Editor of STEEL. He is succeeded as Engineering Editor by D. B. Wilkin.

At the same time, it was announced that Ben K. Price, Associate Editor in STEEL's New York office, has been named Eastern Editor, and E. C. Kreutzberg, who since 1943 has been in charge of the extensive coverage of activities in Washington, was named Washington Editor.

E. L. Shaner, president of the Penton Publishing Co. and Editor-in-Chief of STEEL since 1937, at present is in the Far East as Iron and Steel Consultant for a special U. S. Government Reparations Mission. William M. Rooney, News and Markets Editor since 1943, will continue in that capacity.

Mr. Such joined the Penton Publishing Co. in 1928 as Associate Editor of Daily Metal Trade, following his graduation from Western Reserve University. He subsequently became Nonferrous Editor and Business Manager of that publication, and in 1937 he went to New York as Eastern Editor for all Penton publications. In 1940 he was named Editor of Daily Metal Trade and in 1943 became Engineering Editor of STEEL.



IRWIN H. SUCH

Mr. Wilkin joined the staff in 1942 as Associate Editor. Previously, he served as editor of *Finance and Industry*, a Cleveland publication, and as continuity editor for the Muzak Corp. He also was assistant to the president of Consolidated Iron & Steel Mfg. Co., Cleveland, and sales manager of the company's Republic Iron Works Division.

Walter F. Toerge and Richard D.



D. B. WILKIN

Conly, until recently with the armed services for four and three years, respectively, have been appointed assistant editors. Mr. Toerge formerly was associated with the Jones & Laughlin Steel Corp., Pittsburgh.

Jay DeEulis, who joined STEEL in 1937, has returned to his post as Associate Editor after serving in the Navy for three years.

### FINANCIAL

## Steel Industry's Earnings Decline

PRODUCTION for a peacetime market rather than for war resulted in a 52.8 per cent drop in aggregate net earnings of 17 producers of steel ingots during the first quarter of 1946, compared with the corresponding period of last year. The drop was intensified by the steel strike in January and February.

Evidence of the decline is an aggregate net earnings figure of \$19,590,822 for 17 leading producers for the first quarter of 1946, compared with \$41,560,721 for those companies in the initial quarter of 1945. Those 17 producers have 82.8 per cent of the nation's ingot capacity.

Aggregate net earnings in the first quarter of 1946 were the lowest for the corresponding period in any of the past six years. Six companies reported losses aggregating \$3,219,938 in the first quarter, while in the initial quarter of 1945 only two companies had losses, the total of which was \$50,633. The two producers reporting losses in the first three months of 1945 also showed losses in the initial quarter of 1946. Only one of the 17 companies reported a loss in the first quarter of 1944. None of them had losses in the first quarter of 1941, 1942, and 1943.

Only one company had a greater net profit in the first quarter of 1946 than Aggregate net profit of 17 producers of ingots in first quarter of 1946 falls 52.8 per cent below that of corresponding period of 1945

in the initial quarter of 1945. In fact, that company's net profit in the first quarter of 1946 was larger than in the corresponding period of any year since and including 1941.

Three merchant pig iron producers had aggregate net earnings in the first quarter of 1946 of \$679,294, an 18,6 per cent rise over the total of \$572,558 in the initial quarter of 1945. In fact, the aggregate net earnings of those three pig iron producers was greater in the first three months of 1946 than in any first quarter since 1943. However, one producer earned less in the first quarter of 1946 than in the corresponding period of last year.

Because of abnormal conditions in the steel industry in the first quarter, net earnings for that period are not necessarily an indication as to earnings for the remaining quarters of the year. The steel industry has huge backlogs of orders that would assure high-level operations for a long period ahead, given stable

conditions.

In some instances the decline in first quarter steel earnings this year was cushioned, and in a sense obscured, by tax credits arising from the "carry-back" of unused excess profits tax credits.

### Net Earnings of Monarch Machine Tool Co. Decline

Net earnings of the Monarch Machine Tool Co., Sidney, O., for the first quarter of 1946 totaled \$124,397, compared with \$160,794 in the corresponding period of 1945. Wendell E. Whipp, president, said the profit for the first guarter of 1946 reflects greatly curtailed shipments due to work stoppages in principal suppliers' plants and scarcity of essential units supplied by others.

### General Refractories Co. **Reports Decline in Income**

General Refractories Co., Philadelphia, has reported its net income for the first quarter of 1946 was \$137,395, a decrease from the \$202,799 in the corresponding period of 1945. Curtailed operations in the steel industry are reflected in lower shipments of refractories by the company.

### Comparison of First Quarter Earnings of Steel Industry

	First Quarter 1946	First Quarter 1945	First Quarter 1944	First Quarter 1943	First Quarter 1942	First Quarter 1941
United States Steel Corp. Bethlehem Steel Corp. Republic Steel Corp. Jones & Laughlin Steel Corp. Youngstown Sheet & Tube Co. National Steel Corp. Inland Steel Corp. Inland Steel Corp. Crucible Steel Corp. Crucible Steel Corp. Alan Wood Steel Co. Allegheny Ludhum Steel Corp. Continental Steel Corp. Continental Steel Corp. Keystone Steel & Wire Co. A, M. Byers Co. Follansbee Steel Corp. Totals		15,379,171 7,695,909 3,084,548 2,013,489 1,959,412 3,429,988 2,370,948 1,875,502 1,201,881 803,558 301,760 8,893° 936,690 151,892 336,492 41,740° 70,114 \$41,560,721	17,027,616 6,432,538 2,216,611 1,708,352 1,636,369 2,550,143 2,512,396 1,229,035 992,945 1,279,302 166,512 77,829 800,110 155,806 269,600 269,510 $171,316^{\circ}$ 399,153,358	\$15,406,597 6,228,693 3,666,557 2,399,369 2,147,023 2,680,850 2,796,321 1,535,205 961,391 1,915,905 445,564 174,786 936,135 118,159 220,854 350,600 187,133 \$42,171,142	\$27,921,534 6,140,688 4,716,962 2,491,718 2,576,579 2,675,837 2,689,090 1,731,635 1,200,090 1,676,044 250,302 217,040 915,644 169,337 364,083 363,263 165,308 \$56,270,154	$\begin{array}{c} \$36,559,995\\ 10,436,028\\ 8,189,966\\ 4,160,507\\ 4,576,197\\ 5,430,389\\ 3,469,046\\ 3,599,241\\ 1,981,009\\ 1,489,851\\ 527,253\\ 351,794\\ 2,720,164\\ 313,122\\ 410,137\\ 290,561\\ 29,930\\ \$84,535,190\end{array}$
PIG IRON CAPACITY ONLY		4				
Woodward Iron Co Sloss-Sheffield Steel & Iron Co Interlake Iron Corp	\$381,848 50,839 246,607	\$287,327 192,703 92,528	\$252,728 170,522 182,573	\$251,815 354,367 260,429	\$397,337 277,741 444,762	\$551,897 512,359 774,855
Totals	\$679,294	\$572,558	\$605,823	\$866,611	\$1,119,840	\$1,839,111
FINISHING CAPACITY ONLY						
Acme Steel Co. Superior Steel Corp.	\$679,329 36,678°	\$513,351 67,324	\$420,987 123,612	\$422,316 151,014	\$516,678 121,786	\$742,055 228,364

°Loss

### Westinghouse Science Forum Broad in Scope

Scientists discuss atomic energy, transportation, chemistry, communications, medicine and education

LEADING scientists in the fields of atomic science, transportation, chemistry, communications, medicine and education gattered in Pittsburgh May 16-18 to take part in the George Westinghouse Centennial Forum commemorating the 100th anniversary of the birth of this famous genius in the field of electricity.

The forum was arranged by the Westinghouse Educational Foundation to provide an opportunity for scientists, engineers and scholars to correlate knowledge, advanced immeasurably in World War II, and to consider subjects for future research for the benefit of the peacetime world.

On the program were included three Nobel prize winners, Dr. Archibald V. Hill, Royal Society of England, Dr. Enrico Fermi, who was closely associated with the atomic bomb project, and Dr. I. I. Rabi, also famous in the field of atomic science. Others included Dr. Vannevar Bush, director, Office of Scientific Research & Development; Dr. Robert P. Russell, president, Standard Oil Development Co.; Martin W. Clement, president, Pennsylvania Railroad; Dr. L. W. Chubb, director, Research Laboratories, Westinghouse Electric Corp.; and Dr. Charles F. Kettering, vice president and director, General Motors Corp. The forum was greeted by Gwilym A. Price, Westinghouse president.

According to Dr. Fermi, nuclear reactions can be used for production of controlled and usable power. Chain reacting "piles," in which energy is produced at an easily controllable rate, have been operated for over 3 years. Starting with the first pile, which was run only up to 200 watts, the power has been stepped up in successive units by enormous factors. Energy produced in piles built until now, however, is delivered at such a low temperature that it is of no practical use,

In contrast to the fast reaction on which the atomic bomb is working, controllable chain reactions can be obtained using "slow" neutrons with natural uranium. This usable power can be controlled by means of organs called "control rods" which have a strong adsorption for neutrons. It is easily possible to keep the intensity of the pile steady at any desired level by moving the rods in and out of the pile with automatically controlled devices.

There is no practical limitation to the temperature at which energy can be produced by chain reactions, perhaps being as high as  $1,000,000^{\circ}$  C in the case of the atomic bomb. As for costs, Dr. Fermi said 3,000,000 tons of coal, equivalent in energy content to 1 ton of uranium, cost \$8 million. Uranium and coal would be competitive at a price of \$4000 a lb for uranium. Before the war, uranium cost \$2 a lb.

Large central station atomic power plants are envisioned by Dr. Fermi in 20 to 30 years. In fact, \$2,500,000 already has been provided for an experimental electric atomic power plant at Oak Ridge, Tenn., which will be constructed under direction of the Monsanto Chemical Co., St. Louis. "There is definitely a technical possibility that atomic power may gradually develop into one of the principal sources of useful power," Dr. Fermi said.

Other speakers at the forum foresaw remarkable forward steps in the next few years in the fields of transportation, communications, chemistry and medicine.

### Machine Design Group of ASME To Meet in Detroit

First technical session of the newly formed Machine Design group of the American Society of Mechanical Engineers will be held June 17, during the semiannual meeting of the society in Hotel Statler, Detroit.

The program will include the following speakers and topics: H. F. Ross,

### Calendar of Meetings . . .

- May 21-22, American Steel Warehouse Association: Convention, The Plaza, New York. Headquarters are at 442 Terminal Tower, Cleveland 13.
- May 23, American Iron & Steel Institute: Fiftyfourth general meeting, Waldorf Astoria Hotel, New York. George S. Rose, 350 Fifth Ave., New York, is the institute's secretary.
- May 23-June 2, Mid-America Exposition: Industrial exhibit of postwar home and commercial products, Public Hall, Cleveland. Headquarters are at 226 Public Hall, Cleveland.
- May 27-29, National Association of Purchasing Agents: 31st annual convention and exhibition, Stevens Hotel, Chicago. Association headquarters are at 11 Park Place, New York 7.
- May 29-31, Machinery Dealers' National Association: Annual meeting, Claridge Hotel, Atlantic City, N. J. R. K. Vinson, 20 North Wacker Drive, Chicago 6, executive director.
- June 1, Eastern Enameler's Club: Meeting, Southern Hotel, Baltimore. Headquarters of the club are at 5601 Eastern Ave., Baltimore 24.

June 2-7, Society of Automotive Engineers:

United Shoe Machinery Corp., Beverly, Mass., "Application of Tables for Helical Spring Design;" A. W. Meyer, Brown & Sharpe Mfg. Co., Providence, R. I., "High-Speed Chain Developments;" and W. E. Horenburger, Elastic Stop Nut Co. of America, Union, N. J., "Evaluating Self-Locking Nuts for Industrial Equipment."

### SAE Meeting Planned at French Lick, Ind., June 2-7

Survey of engineering requirements for future development of automotive transportation and industrial applications of war-developed techniques will feature the program of the summer meeting of the Society of Automotive Engineers at French Lick Springs Hotel, French Lick, Ind., June 2-7.

SAE General Manager John A. C. Warner, announcing the tentative program for this, the first summer meeting to be held since before the war, said that 20 sessions have been scheduled and that the "Golden Jubilee" celebration will also be held.

### Electroplaters To Meet In Pittsburgh, June 17-20

The 33rd annual convention of the American Electroplaters Society will be held June 17-20 at Hotel William Penn, Pittsburgh. Scheduled on the program will be two groups of papers, one on "Organic Coatings and Finishes," and the other on "Continuous Strip Plating."

Arrangements have been made to inspect several continuous strip plating operations during the convention.

Semi-annual meeting, French Lick, Ind. John A. C. Warner, 29 West 39th St., New York 18, secretary and general manager.

- June 3-5, American Gear Manufacturers Association: Annual meeting, The Homestead, Hot Springs, Va. Newbold C. Goin, Empire Bldg., Pittsburgh 22, executive secretary.
- June 3-6, American Society of Mechanical Engineers: Aviation Division meeting, Los Angeles. C. E. Davies, 29 West 39th St., New York 18, secretary.
- June 3-6, National District Heating Association: Annual meeting, The Cavalier, Vhrginia Beach, Va. John F. Collins Jr., 827 N. Euclid Ave., Pittsburgh 6, secretary-treasurer.
- June 7, Blast Furnace & Coke Association of the Chicago District: Meeting, Lincolnshire Country Club, Crete, Ill. W. T. Deveney, 3500 S. Pulaski Rd., Chicago 23, secretary.
- June 7, Electrochemical Society, Pittsburgh Section: Meeting, Mellon Institute of Industrial Research. Richard Rimbach, 1117 Wolfendale St., Pittsburgh 12, secretary.
- June 10-12, American Society of Heating & Ventilating Engineers: Semiannual meeting, to be held at Mt. Royal Hotel, Montreal.

### High Alloy Steel Castings Price Control Suspended by Government

OPA action applies to types of castings used in heat-treating, chemical plant and oil refinery equipment. Excess production capacity expected to meet all anticipated demand and to prevent any excessive rise in prices

SUSPENSION of price control on high alloy steel castings, which are used as component parts of industrial equipment, was announced last woek by the Office of Price Administration.

The action, effective May 13, covers types of castings which are used in heattreating, chemical plant and oil refinery equipment, where because of their heat, corrosion and abrasion resistant qualities, their use cuts costs.

OPA explained that continued price control over these castings would be a greater administrative burden than possible benefits warrant. Moreover, the price increases that may follow due to recent substantial increases in labor costs for some producers will have little or no effect on the cost of living or business costs. This is true because the industry's production capacity is greater than necessary to meet all anticipated demands and will help avert an excessive price rise. In addition, some castings are now selling below ceiling prices and there is no danger that the suspension will divert manpower from more essential production, the agency said.

OPA also made two minor changes in its regulation covering exemption and suspension from price control of machines, parts, industrial materials and services (Supplementary Order No. 129) as amended by amendment 13. The changes correct a previous error by placing steel and nonferrous ship and marine castings, previously suspended from price control, under the proper heading in the suspension action.

### Cooper-Bessemer Head Says More Efficiency Required

Price decontrol recently granted by the Office of Price Administration to the diesel engine and compressor manufacturing industries places Cooper-Bessemer Corp., Mt. Vernon, O., in an advantageous position to achieve unprecedented production provided its employees cooperate to bring increased production efficiency, Gordon Le Febvre, president and general manager, told employees recently.

"The first thing we must do," Mr. Le Febvre said, "is to make up our minds that we must increase our production efficiency to the point where we can get our prices down to a competitive level.

"We cannot continue to contribute to the spiral of inflation by charging higher prices because you workers demand higher wages while production continues to decrease."

He said that to increase the company's prices by the same percentage as labor costs, which were up 40 per cent before the recent 18<sup>1</sup>/<sub>2</sub> cent increase, would automatically ruin the company's chances in a highly competitive market.

### UNIT LABOR COSTS

Unit cost of labor increased nearly 50 per cent since January, 1941, according to the Bureau of Labor Statistics. Latest figure is for February, 1946, and labor rates then were climbing rapidly. When figures are compiled for subsequent months the increase will be well over 50 per cent.

The BLS "straight-time hourly earnings," for "all manufacturing industries" follow as of January, 1941, to date:

January,	1941		cents	per	hour
January,	1942	75.1	cents	per	hour
January,	1943	81.9	cents	per	hour
January,	1944	87.7	cents	per	hour
January,	1945	92.0	cents	per	hour
January,	1946		cents	per	hour
February	, 1946	98.2	cents	per	hour

The BLS plans a field study to ascertain the extent to which wages increased during and since the war.

### Revision of Federal Steel Specifications Deferred Pending Action by Private Groups

REVISION of federal steel specifications will be deferred until such bodies as the Society of Automotive Engineers and the American Iron & Steel Institute take action on postwar standard specifications for civilian purposes. That is the present attitude of the Federal Specifications Board's Metals Committee.

The Metals Committee now has the



DEFENDS SURPLUS SALES: Lt. Gen. E. B. Gregory, head of the War Assets Administration, answers charges of alleged inefficiencies in surplus property sales during testimony before the Senate War Investigating Committee. NEA photo

following four projects under way: 1-It is working on a set of federal specifications covering sheets, plate and tubing in a number of magnesium alloy compositions; 2-it has initiated work on a federal specification for magnesium alloy sand castings which probably will be based on the existing Army-Navy aeronautical specification; 3-it is working on a version of the federal specification covering nonferrous rods for use in gas welding; 4-it has started work on revision of the electrode specification.

### Four Months Ingot Deficit More than 11 Million Tons

Steel ingot output in April declined, increasing the already large 1946 deficit, bringing the decrease from the first four months of 1945 to 11,212,087 net tons, according to figures by the American Iron & Steel Institute.

Cumulative output for four months this year is 17,648,616 tons, against 28,-860,703 tons in the like period last year. This decline is directly a result of strikes.

April production was 5,876,998 tons, compared with 6,507,047 tons in March and with 7,291,926 tons in April, 1945. The April rate of production was 77.7 per cent of capacity compared with 83.3 per cent in March and with 92.8 per cent in April, 1945.

### GOVERNMENT CONTROL DIGEST

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

#### OFFICE OF PRICE ADMINISTRATION

High Alloy Steel Castings: Effective May 13, castings which are used in heat-treating, chemical plant and oil refinery equipment, where because of their heat, corrosion and abrasion resistant qualities, their use cuts costs, have been suspended from price control. (OPA-T-4501)

Abrasive Products: Effective May 10, manufacturers of artificial abrasive grain and pro-ducers of other abrasive products have been given interim price increases of 22.3 per cent and 24.2 per cent, respectively. Abrasive products include coated, bonded and natural stone abrasives, diamond tools including core bits, dies, dressing tools, shaped tools and wheels. Artificial abrasive grain is abrasive grain produced from aluminum oxide, silicon carbide and similar materials. Resellers of these products may increase their prices by the same per-centages as their net invoiced costs are increased by the action. (0-623; RMPR-136; OPA-T-4517)

Non-Jeweled Watches, Spring Wound and Electric Clocks: Effective May 13, manufac-turers' ceiling prices on "non-jeweled" watches (they may contain from one to seven jewels), spring wound clocks and electric clocks were increased 20.5, 17 and 15 per cent, respectively. (0.14; Sec.-1499.159e; MPR-188; OPA-6468)

Subassemblies, Accessories and Parts: Parts made for use in or with products listed in the recent consumer hard goods decontrol order were removed from price control, effective May 13. Parts affected are suspended or

### STEEL INGOT PRODUCTION STATISTICS

Based on reports by companies which in 1944 made 07.0% of the open hearth, 100% of the bessemer and 86.7% of the electric ingot and steel for castings production

C. C.		—— E	stimated	Product	ion-All C	ompani	es		Calculated weekly	Num-
	-Open Hi	earth-	-Besse	emer—	Elec	tric	To	otal	produc-	ber
	Mak	Per cen	t	Per cen	it	Per cer	it	Per cen	t tion all	of
	tone	IO	Net	10	Net	of	Net	of	companies	weeks
1946	conta	capac.	tons	capac.	tons	capac.	tons	capac.	Net tons	in mo.
Feb	3,528,090	51 1	207.512	47.4	136.452	29.2	3,872,054	49.6	874.053	4.43
Mar	1,300,944	20.9	25,905	6.6	65,668	15.6	1.392.517	19.8	348,129	4.00
let at-	5,946,698	86.2	363,949	83.1	196,400	42.0	6,507,047	83.3	1,468,859	4.43
Ann	10,775,732	53.8	597,366	47.0	398,520	29.4	11,771,618	51.9	915,367	12.86
10 m	5,347,964	80.0	285,779	67.4	243,255	53.8	5.876.998	77.7	1.369,930	4.29
1945 Jan	244				Contraction (1)		and in case			
Feb.	6,468,815	90.5	379,062	76.0	358,346	77.3	7,206,223	88.8	1,626,687	4.43
Mar.	6 007 077	92.4	347,227	77.1	339,520	81.1	6,654,589	90.8	1,663,647	4.00
1st ofr	10 921,311	96.9	398,351	79.8	382,237	82.4	7,707,965	95.0	1,739,917	4.43
Ann	19,364,034	93.3	1,124,640	77.6	1,080,103	80.2	21,568,777	91.6	1,677,199	12.86
May	6,541,097	94.4	372,952	77.2	377,877	81.4	7,291,926	92.8	1,699,750	4.29
June	6 100 000	93.2	402,100	80.6	386,075	83.3	7,451,752	91.8	1,682,111	4.43
2nd atr.	10 222 040	88.5	379,807	78.6	333,217	74.2	6,842,290	87.1	1,594,939	4.29
Ist ble	19,003,940	92.1	1,154,859	78.8	1,097,169	80.6	21,585,968	90.6	1,659,183	13.01
July	00,697,974	92.7	2,279,499	78.2	2,177,272	80.4	43,154,745	91.1	1,668,139	25.87
Aug.	6,318,463	88.6	381,832	76.7	286,713	61.9	6,987,008	86.3	1.580.771	4.42
Sept.	5,171,925	72.3	_347.088	69.5	217,363	46.9	5,736,376	70.7	1,294,893	4.43
3rd atr	16 008 740	10.1	352,847	73.2	195,156	43.5	5,983,361	76.3	1,397,982	4.28
9 mos	55 000 000	79.9	1,081,767	73.1	699,232	50.9	18,706,745	77.8	1,424,733	13.13
Oct	33,823,720	88.3	3,361,266	76.5	2,876,504	70.4	61,861,490	86.6	1,586,192	39.00
Nov.	2,146,370	72.0	242,122	48.5	209,290	45.1	5,597,782	69.0	1,263,608	4.43
Dec.	5,512,000	81.5	358,664	74.2	201,866	44.9	6,201,380	78.9	1,445,543	4.29
4th atr.	16 310 040	11.4	343,266	68.9	192,704	41.7	6,058,799	74.8	1,370,769	4.42
Last hir	22 000 0049	76.9	944,052	63.8	603,860	43.9	17,857,961	74.2	1,359,053	13.14
Total	00,205,795	78.4	2,025,819	68.5	1,303,092	47.4	36,564,706	76.0	1,391,881	26.27
	11,933,769	85.5	4,305,318	73.3	3,480,364	63.7	79,719,451	83.5	1,528,950	52.14
FOR 10	HE									

For 1945 percentages are calculated on weekly capacities of 1,614,338 net tons of open hearth, 12,658 tone of bessemer and 104,640 tons of electric ingots and steel for castings, total 1,831,636 hessemer 5,874 000 tons, electric 5,455,890 tons. For 1946 percentages are calculated on weekly capacities of 1,558,041 net tons open hearth, 3,849 net tons bessemer and 105,491 net tons electric ingots and steel for castings, total 1,762,381 hessemer 5,154,000 net tons, electric 5,455,800 tons.

exempted from price control according to whether the finished article for which they were made have been suspended or exempted. Sensitized paper used by photographers in developing films also was exempted by this order. (A-29; SO-126; OPA-T-4500)

Internal Combustion Engines: Ceiling prices for all high-speed portable internal combustion engines and equipment increased 15.5 per cent, 13. (MPR-136; OPA-T-4523)

effective May 13. (MPR-136; OPA-T-4523) Electric Motors: Manufacturers of electric motors have been granted price increase factors over present base period prices of 27 per cent for fractional horsepower motors and 16.5 per cent for integral horsepower motors, effective May 13. Increase for fractional horsepower motors replaces a 9 per cent increase granted Oct. 1945. (MPR-136; OPA-T-4522) 16,

Trucks and Motorcycles: Manufacturers of trucks and motorcycles have been provided with four methods of computing new ceiling prices, effective May 18. Price control has been suspended over school buses, airport limousines and station wagons with a seating capacity of more than 10 persons and over self-propelled and trailer types of fire apparatus. (MPR-610; SO-129; OPA-T-6479) Copper Wire: Two schedules of manufac-

turers' ceiling price increases for copper wire, copper-alloy wire and copper-clad wire were effective May 8. The first schedule applies to all manufacturers on May 8 and the other schedule grants larger percentage increases to producers who have granted wage increases since Feb. 1, or who at any time gave a general wage increase not less than the maximum advance authorized by the National Wage Sta-bilization Board. The second schedule of increases also applies to any manufacturer who has not been asked for a general increase in wages since Feb. 1, 1946. The percentage increases in the schedules are, respectively, as follows: Wire rods, 2 and 3.14; bare and tinned wire and strand sold to insulators, 6.5 and 10; bare and tinned wire and strand sold to others, 7.5 and 12; weatherproof wire and cable, 11 and 17.5; magnet wire, including Litz wire, 11 and 17.5; all other insulated wire and cable products (copper, copper-alloy and copper-clad) including replacement cord sets but ex-cluding armored or BX cable, type R and type RH wire and nonmetallic sheathed cable, 11.5 and 18. (MPR-82; OPA-T-4509) Armored Cable: Manufacturers of armored

cable have been given an interim price in-crease averaging about 14 per cent over present maximum prices, effective May 8. (MPR-82; OPA-T-4508)

#### CIVILIAN PRODUCTION ADMINISTRATION

Manufactured or Mixed Gas: Rationing plan to curtail use of gas when coal stocks of gas-producing utility declined to a three-weeks supply was issued on May 9. First, utility will reduce or discontinue deliveries to customers purchasing gas under contracts permitting the supplier to interrupt deliveries; second, utility will reduce deliveries to commercial and industrial consumers except for certain specified essential services; third, utilities will reduce gas to these services except hospitals and power, gas, communication, water, sewage and sani-tation systems; last, utilities will reduce deliveries to all remaining consumers to the extent and manner it deems necessary. (U-12; CPA-363)

Prefabricated Houses: Authority over manufacture of prefabricated houses under the Veterans' Emergency Housing program has been transferred by the Civilian Production Administration to the National Housing Agency. (PR-33: CPA-LD-81)

### Atomic Energy Act Sought To Spur Research, Establish U. S. Policy

Bill included in Senate's calendar of "must" measures, but desire of Congressmen to get home to repair political fences seen as threat to early action. Bill would afford basis for forming International Atomic Development Authority

S.1717, "the Atomic Energy Act of 1946," has for two reasons been included in the classification of "must" hills to be acted on by the Senate before it adjourns for the summer.

One reason is that research work in the field of atomic energy has been lagging and military and administration leaders fear other nations may overtake us in this field. During April the War Department's Manhattan Engineer District revived its activities by preparing to construct, through the agency of the University of Chicago and a number of co-operating universities, the first uranium pile designed to produce usable atomic power. But no real progress in research work is expected until such time as a national atomic energy policy has been formulated.

The other reason-and the more important one-is that a national policy in regard to atomic energy must be established before action can be instituted toward establishing an international Atomic Development Authority as agreed to last November by President Truman. The administration recently completed its initial international approach in the form of a 61-page report issued by the State Department as the result of labors by a committee headed by Under Secretary Dean Acheson, The authors of the report are: David Lilienthal, chairman of the TVA; Dr. J. R. Oppenheimer, who was in charge of the Los Alamos plant; and three industrialists, Chester I. Barnard, Charles A. Thomas and Harry A. Winne. Mr. Winne is a vice president of the General Electric Co. At present, the "Acheson-Lilienthal" report is called a "working paper" for review and revision after a national policy has been set.

Just when S. 1717 may be called up is not yet clear since the Senate has an extremely busy calendar. Scheduled for early action is extension of the OPA, due to expire June 30. Other bills in which some senators are deeply interested and which may be called up are the House-passed Case bill and the bill to establish a National Science Foundation. Anxiety of Congressmen to get home to repair political fences may result in delaying action on S. 1717. If the Atomic Energy Act of 1946 is called up, it should be approved by the Senate without too much debate. The bill is fortunate in having had unanimous approval of the Senate Special Committee on Atomic Energy. It has approval of leading scientists who worked on the Manhattan Engineer Project and developed the atomic bomb. It has no foes in the Senate as far as is known.

S.1717, introduced and sponsored by Sen. Brien McMahon (Dem., Conn.) would establish a Federal Atomic



SEN. BRIEN MCMAHON

Energy Commission with five full-time members; all of them civilians. It would have authority over every phase of development within the United States. One of the main features of the bill is that it provides for government production and ownership of fissionable materials.

"We are dealing here with a problem unique in the history of the world—and its solution requires extraordinary measures; this is a pretty broad authority to give the government, but after we had thought the problem through on the basis of all the facts, the committee decided there was no other way of handling it," explains Senator McMahon.

"Atomic energy," he adds, "belongs to all the people. We gambled \$2.5 billion on it when we had our backs to the wall. It should be developed for the benefit of all the people. We believe that atomic energy may revolutionize our entire economic life, so that a maximum of supervision by the govcriment is needed. Furthermore, atomic energy is vital to our national defense. We can't take chances on its getting out of hand.

"Under our bill, only the government will be entitled to hold patents for the production of atomic energy or atomic weapons. Our bill is designed to remove the possibility of profit from atomic warfare. There may be some private patents on the peacetime use of atomic energy, but they will be licensed by the Atomic Energy Commission and made available to everyone on a royalty basis . . The bill tries to retain an incentive to inventors, insofar as is consistent with military security and the public welfare. But the public is protected against a patent monopoly."

Military requirements will be fully met, Senator McMahon believes, by the provision of a Military Liaison Committee of Army and Navy representatives. With this committee the commission would consult on all matters relating to military uses of atomic energy. It is worthy of note that the War Department has given its approval to the idea of overall civilian control, with this special Military Liaison Committee advising the civilians on the military aspects.

### Dr. Condon Supporting Bill

Among scientists actively supporting the bill is Dr. Edward U. Condon, head of the National Burcau of Standards. He spent a great deal of time in assisting the Senate Special Atomic Energy Committee prepare the bill. He emphasizes the extent of the letdown in atomic research since V-J Day and points out that more than three-fourths of the leading nuclear scientists employed on the Manhattan project are gone.

Dr. Condon has no sympathy with the concept that a lot of secrecy is necessary to safeguard our position on atomic energy. "Security by concealment," he says, "is no security; it leads into a blind alley." The real security, he says, lies in achievement. Only through actual achievement, he says, can we maintain leadership in atomic research. Dr. Condon shares with the committee members the view that "we must try to work out a system of international co-operation and protection so that scientists everywhere can exchange basic information and work together for the common \_ood.

The State Department's Acheson-Lilienthal proposal would extend to the international field the same licensing pro-

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stops — bucket makes complete revolution dumping sand in hopper - whereupon the unit returns to loading station. All this operation occurs automatical-

This is just another of the many automatic systems designed by American MonoRail Engineers using the American MonoTractor. Let us tell you more about this rubber wheel drive unit. An engineer will con-

supplied with fresh core sand at all times.

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89

visions as are in S. 1717. As explained by Herbert S. Marks, secretary of the Secretary of State's Committee on Atomic Energy, the authors of the Acheson-Lilienthal report quickly reached the conclusion that it would not be practical simply to outlaw the atomic bomb and depend on a system of international policing or inspection for enforcement.

First, as Mr. Marks sums up the intent of the Acheson-Lilienthal report, an international agency would own, or have managerial control over, all significant sources of uranium and thorium, the abundant minerals that have the peculiar properties required for development of atomic energy; the international agency would be the only agency in the world that could legally own and operate such plants. But the scheme has a provision which would attract individual nations and private enterprise into developing atomic energy for beneficial purposes. Nations and individuals, under proper safeguards, would be licensed to undertake specific development work-as putting atomic energy to work in ship propulsion and other power plants. Mr. Marks says that in his opinion it will take several years at least to perfect the contemplated international control, and that the work cannot be begun until we have formulated our national policy on atomic energy. Speed in enacting such a policy is essential, he points out, in launching a program that will prevent an international atomic armament race.

#### **Bill Provides Federal Policies**

S. 1717 has 20 sections, of which the principal ones cover general federal policy, organization to carry out the policy, terms for conducting research under federal assistance, the policy covering production of fissionable materials, the terms of control of materials, military applications of atomic energy, lawful uses of atomic energy, general definition of international arrangements to which the United States may become a party, the control of information, control of patents and inventions, etc.

The most important feature of the bill from the standpoint of industry is Section 11, on "Patents and Inventions." For a quick understanding, the following digest prepared by Senator McMahon will suffice:

"No patent will be issued for any discovery or invention useful solely for the production of fissionable materials or the utilization of fissionable materials or atomic energy for military weapons, but the commission will compensate for such invention or discovery. If the invention or discovery is also useful for other than military purposes, a patent will be issued



POLITICS: Leaders of three independent political action groups met in Washington recently to decide how they will work together to win election of "more progressive" congressional candidates this fall. Shown, left to right: CIO President Philip Murray; Frank Kingdon, chairman of the United Citizens PAC; Harold Ickes, executive chairman of the Independent Citizens' Committee of the Arts, Sciences and Professions; and Sidney Hillman, chairman of the CIO-PAC. NEA photo

for those nonmilitary purposes only. "Where the invention or discovery relates to the utilization of atomic energy for nonmilitary purposes and a patent is issued the commission may declare it affected with the public interest in which case persons licensed by the commission may use the patent upon payment to the patentee for such use. Commission is authorized to purchase, take or condemn and make compensation for any invention or device useful solely in the production of fissionable materials for military weapons.

"The commission shall designate a compensation board, the duty of which will be to determine reasonable royalty fees and make awards for any inventions or discovery useful in the production of fissionable material.

"Provisions are set up whereby any person aggrieved by the action of the board relative to any award or royalty fee may obtain a review of such action in the Court of Appeals for the District of Columbia."

No feature of the bill has aroused more discussion among scientists, and among informed industrial men, than that relating to control of information. During the hearings conducted by the Senate Special Atomic Energy Committee many scientists indicated in their testimony that the secrecy thrown about their work for the Manhattan Project was of a kind to prevent necessary interchange of information. Many of them told news reporters in private that they had been subjected to unwarranted espionage by Army officers, and that they did not propose to engage in similarly restricted projects in the future.

Hence, the following digest, by Senator McMahon, of Section 10, is of wide interest:

### Disclosure Carries Heavy Penalty

"The bill provides, using in general the language of the Espionage Act, that whoever disseminates restricted data with intent to injure the United States or with intent to secure an advantage to a foreign nation, shall be punished by a fine of not more than \$20,000 or imprisonment for not more than 20 years, or both.

"Whoever disseminates restricted data with reason to believe that it will be utilized to injure the United States or to secure advantage to a foreign nation, shall be punished by a fine of not more than \$10,000 or imprisonment for not more than 10 years, or both.

"Restricted data, as used in the act, means all data concerning the manufacture or utilization of atomic weapons, the production of fissionable material, or the use of fissionable material in the production of power, but shall not include any data which the commission from time to time determines may be published without adversely affecting the common defense and security.

"The bill therefore establishes the outside limits of the offense, giving to the commission the power to reduce these boundaries by withdrawing items of information as conditions warrant. This recognizes the fact that the type of information to be safeguarded will necessarily change with time. These provisions are supplementary to all existing laws."

Senator McMahon further digests the sense of the license provisions in Section 11 of the bill as follows:

"The manufacture of equipment or devices utilizing fissionable material or atomic energy or the use of fissionable material or atomic energy with or without such devices is subject to licensing by the commission. However, no such license may be issued until Congress has had a period of 90 days in which to consider a report on the economic and social effects of such a license which the commission is required to file with Congress.

#### **Monopolies** Prohibited

"When issued, licenses must be made available for periods of one year or less to all applicants who can meet, among other items, safety standards. It is expressly prohibited to use the licensing provisions to promote private monopoly or to otherwise interfere with free competitive practices. It is also provided that power produced as a by-product of the production of fissionable material, may be transferred to other government agencies, or sold to public or private utilities under contracts providing for reasonable resale prices.

"It was the intent of the committee, in framing these licensing provisions, to enable the Congress and the commission to direct the development of atomic energy with some reference to the profound effects it may have on our economic system or on the international political situation. It was also intended that these provisions promote free competitive enterprise and discourage private monopoly in the utilization of atomic energy."

### Contract Settlement Work Rapidly Nears Completion

The Office of Contract Settlement has nearly completed its work and is ready to go out of business June 30, according to a report for the quarter ending Mar. 31.

In recommending its own dissolution the OCS suggested that its unfinished work be turned over to the Office of War Mobilization & Reconversion, of which OCS now is a part.

### RFC Finances Plant To Synthesize High-Octane Fuel from Natural Gas

New company will use American adaptation of German Fischer-Tropsch process. Expect to produce 78-80 octane gasoline at cost of 4 cents a gallon. Capacity of plant at Brownsville, Tex., will be nearly 6000 barrels daily

TO HELP launch a new industry in this country-that of synthesizing lowcost high-octane gasoline from natural gas-the Reconstruction Finance Corp. has agreed to loan up to \$9 million at 4 per cent to a new organization known as Carthage Hydrocol Inc. The company has capital funds of \$10 million of which it is to retain \$1 million as operating capital. Approximately \$7.6 million of these funds will be used for initial plant construction, with the RFC contributing the next \$7 million. After these funds have been spent the company and the RFC will finance the remaining cost on a 50-50 basis, with the RFC total not to go above \$9 million.

Construction of the plant will be directed by Hydrocarbon Research Inc., an engineering firm which has developed an American adaptation of the German Fischer-Tropsch process in a pilot plant at Olean, N. Y. Essentially the process consists of converting natural gas to a mixture of carbon monoxide and hydrogen by partial combustion with oxygen, followed by a catalytic reaction to produce liquid hydrocarbons. In addition to erect-



#### DR. ALLEN T. WATERMAN

On leave from the Yale University Department of Physics, Dr. Waterman heads the scientific branch of the planning division of the Navy's Office of Research and Invention. He will play an important role in shaping and steering the Navy's research program, described in STEEL, May 13, page 70, and in linking the Navy's activities with those of civilian scientific personnel ing the plant and furnishing the "knowhow," Hydrocarbon Research Inc. has a contract to furnish Carthage Hydrocol Inc. with continuing services over the next 15 years.

The plant will be on a 200-acre site five miles from Brownsville, Tex., on the Brownsville Ship Channel which feeds into the Gulf of Mexico. Operating under royalty-free patents, the plant will have daily capacity for 5869 barrels (42 U. S. gallons) of premium gasoline, 1164 barrels of synthetic diesel oil and 70,000 pounds of alcohol. Two nearby producers have entered into contracts to supply the natural gas requirements of the company over the next 17 years.

Texas Co., which is a stockholder to the extent of \$3,778,125, has been given first consideration as buyer of the synthetic gasoline; it proposes to use this product as a sweetener for low-grade gasoline.

The cost of natural gas, as set by the contracts, will be 4 cents per 1000 cubic feet the first five years, 6 cents over the next five years, rising to 7 cents in the final seven years of the contracts. The company estimates that during its first 10 years of capacity operation it will produce 78-80 octane gasoline at slightly more than 4 cents a gallon; this cost is arrived at after crediting the disposal of diesel oil production at 31/2 cents per gallon and alcohol at 1 cent per pound. The net cost includes operating costs, interest charge on the RFC loan, 6 per cent on original capital from stockholders, and amortization of the RFC loan. It is expected that the premium-grade gasoline to be produced for the most part will bring around 6¼ cents per gallon from the Texas Co. and other large prospective buyers.

### Industrial College To Serve All Armed Forces

The Army Industrial College, charged with the training of officers to cope with problems of wartime procurement and industrial mobilization since 1924, will be known henceforth as the Industrial College of the Armed Forces.

The change results from the increasing participation of the Navy in the activities of the institution.

### RUSSIAN STEEL

# Kuznetsk Works Capacity Slated To Be

THE American-designed Kuznetsk Iron & Steel Works in the industrial heart of Siberia, and reportedly Russia's third largest steelworks, is scheduled for expansion that will increase production in 1950 by 50 per cent over 1946.

The Kuznetsk works was started in 1930 under the first five-year plan of the Russians. A contract for four blast furnaces of 800-ton capacity, 12 open hearths of 125-ton capacity, four coke oven batteries, a blooming mill, structural mills, rail mill, and other facilities was let to the Freyn Engineering Co., Chicago, in 1930. Total ingot capacity of the mill as originally planned was 1,000,000 tons of ingots. Later, certain

## Increased 50% by 1950

American-designed plant in heart of Siberia expected to play important role in Soviet postwar development. Trades coking coal for iron ore with Magnitogorsk works, 1400 miles to the west. Makes wide variety of products

additions were made, including one known open hearth, to increase capacity. Exact figures on the works' capacity today, however, are held secret by the Russians.

The Kuznetsk works were started about the same time as the large Magnitogorsk works designed by Arthur G. McKee & Co., Cleveland. The plan was to haul coking coal from the rich deposits in the Kuznetsk basin to Magnitogorsk,

1400 miles to the west, and to haul iron ore from Magnitogorsk to Kuznetsk. Both are on the Trans-Siberian Railway.

The accompanying photographs of the Kuznetsk works are from Sovfoto and show the postwar operation of the works. During the war, the works contributed substantially to the production of Russian armaments and munitions, and with-





General view of the Kuznetsk Iron & Steel Works, where nearly 100,000 workers are employed. The works is reported to be the third largest in Russia





Roman Belan, director of the works, and his executive board get together every week in the director's office to thrash out production problems



May 20, 1946

Structurals and other products ready for shipment from the Kuznetsk Iron & Steel Works

> Panteleimon Lozovoy, an engineer at the Kuznetsk plant, reads STEEL in a club for technicians and management officials. Forcign periodicals and technical magazines are in great demand at the club

in five months after the war's end had completely reconverted to peacetime production, according to Russian sources. Production now exceeds the prewar rate, the Russians say.

The works makes practically all types of products. During the war, production of the blast furnaces is reported to have been increased 12-15 per cent by the introduction of the use of oxygen obtained through a new cheap process developed by the Russians.

During the past year, a new coke oven battery has been installed, which has solved the problem of uninterrupted gas supply for the open hearths and rolling mills and provides a sufficient amount of coke for the blast furnaces.

Power and engineering departments of the enterprise have been considerably expanded. Old turbines have been recon structed, and two new ones have been installed.



Blast furnace department at the Kuznetsk works. During the war, productivity of blast furnaces was raised 12 to 15 per cent by use of oxygen

### A LITTLE DOES A LOT

The Spanish built their colossal Armada to smother England by sheer weight. But Drake, with a scratch fleet of nondescript ships, and some brains, reduced the Armada to an unpleasant memory. Not only in warfare can a little do a lot, intelligently applied. Today a little molybdenum is doing a lot to improve the strength and toughness of good cast iron. The foundry man's market is broadened and many a user's production headaches relieved. Practical working data is available on request.



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



Willys-Overland plans new light 6-cylinder car. Twenty-one million dollar expansion program to be laid before stockholders May 29. Provides for purchase of gray iron foundry of Wilson Foundry & Machine Co. at Pontiac

### DETROIT

IT DID not take James D. Mooney, new president of Willys-Overland at Toledo, O., long to get things really popping at the Ohio company after taking over the reins from C. E. Sorenson, whose position today remains pretty much of an enigma. One of the first important moves made by Mr. Mooney, at least as far as the industry and the public were concerned, was an incisive and scholarly speech before the Society of Automotive Engineers in April. Here he examined "economic forces and their effect on the automotive industry," taking the stand the industry had become sterilized by overemphasis on styling and merchandising procedures and was getting away from its true economic base of sound engineering progress.

Throwing out this challenge, Mr. Mooney went on to predict far-reaching changes starting at once and based on a reawakening of the nation to vital necessity of the automobile plus the economic pressures of postwar years. It is not too difficult to read into this the development of entirely new passenger cars, engineered far beyond anything yet built in terms of performance and value—and not glamor and glitter—and priced at a level to magnetize the pocketbooks of millions who even now are coming to realize the former \$1000 car is going to cost them \$1300 or \$1400.

### May Participate in New Field

There was nothing particularly new in Mr. Mooney's prediction, for long before he made it General Motors and Ford had started engineering work on just such cars, but his remarks pointed to the participation of Willys-Overland in this new field. In fact, prior to the time Mr. Mooney became associated with the company, Mr. Sorenson and his associates were scouting around for body manufacturers and other suppliers to furnish components for a new 6-cylinder passenger car to supplement the line of Willys Jeep vehicles. It was just that Jim Mooney, with his long success in economic planning, export markets and related fields, seemed able to focus attention more sharply on the subject, to the obvious advantage of Willys.

mirrors of **motorr** 

Second step in the Mooney program was the unfolding of a plan before company directors on May 11 for a \$21 million expansion program, to include the introduction of the aforementioned 6cylinder cars and purchase of the gray iron foundry of Wilson Foundry & Machine Co. at Pontiac. Under terms of the expansion program, the company would produce its own engines, from original castings to finished power plants, and install expanded body stamping, and as-

Auto	nobil	e Produ	oction
Passenge	er Cars and	and Truck Canada	s—U. S.
Tabulated	by War	d's Automoti	ve Reports
		1946	1941
January		121,861	524,073
Februar	· · · · · ·	83,841	509,332
March		140,777	533,878
April .		249,181°	489,856
Week e	nded:		
April	27	64,620°	108,165
May	4	67,060°	130,610
May	11	70,225°	132,380
May	18	65,000°	127,255
°Preli	minary.		

sembly lines, painting and trim facilities at Toledo, with a view to eventually building 300,000 cars a year.

To the blueprints for such a juicy outlook, directors readily assented, and stockholders approval, slated for May 29, likely will be but a formality. From the brief information on the proposal released to newspapers, it appears to involve expenditure of \$3.7 million for the Pontiae foundry which has always had close ties to Willys-Overland as will be explained later, another \$14.3 million for machinery, tooling and expansion of the Toledo plant, probably to construct body manufacturing facilities, another \$2.3 million for purchase of lands and buildings at the present plant now owned by the Willys Real Estate Realization Corp. and finally \$700,000 for new machinery and assembly equipment at a Los Angeles plant which will be reopened to meet demands of the West Coast and Orient.

Obviously some important new financing is called for, but considering that Kaiser-Frazer raised \$54 million in a matter of hours through two stock issues, there should be little difficulty on this score. Plans call for the authorization of 250,000 shares of preferred stock, of which 155,000 shares, bearing dividends not to exceed \$4.50 yearly, and convertible to common, would be issued shortly.

Common stock would be increased from 2,850,000 to 4,100,000 shares. With rights exercisable for about two weeks, the common stockholders are expected to be offered the privilege of purchasing one share of new preferred for each 16 shares of common now held, and one share of common stock for each eight shares now held (Willys last Tuesday sold at \$23). A banking group headed by Kuhn, Loeb & Co. is said to be planning to underwrite the preferred offering.

The impending change in corporate structure, and possibly management, of Wilson Foundry & Machine Co. has been a topic of conversation in this area for many weeks, although the company officially denied the fact as recently as May 2. The company has had a long, albeit at time erratic, history as a supplier of automotive castings. It was started back in 1914 after purchase of the plant and property by Dave R. Wilson and his late brother, D. B. Wilson, from the Flanders interests-the same Flanders family of E-M-F fame. The two Wilsons prior to that time had been associated with Oldsmobile, and later with Ferro Foundry & Machine Co.

A heavy production program was begun, principally to supply castings for the Willys-Knight automobile. Gray iron, aluminum and bronze were melted, output of the former having run at one time as high as 550 tons per day, and aluminum up to 120,000 pounds per day, bronze around 5 tons daily. Some of the initial work was done in a tent erected outside the plant, pending construction work.

Dave Wilson left the plant about 1933

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READY FOR INSPECTION: Ford-Ferguson tractors at the end of assembly lines in the Highland Park, Mich., plant of Ford Motor Co., await final inspection

to take over direction of Willys in Toledo, retiring from the position several years ago and now spending his time in California. Meanwhile, W. O. Leonard, his father and others took over control of the foundry in 1937 through the Empire Securities Corp., operating it during the war years, mainly as a source of castings for the Jeep engine. Presumably the present operating management will continue, although in recent weeks the works manager and a research engineer have left. There is apparently some stock connection between Empire Securities Corp. and Willys-Overland.

Wilson Foundry currently is producing engine blocks for Continental Motors to be used in engines for the Frazer automobile, whose birth is causing considerable labor pains at Willow Run. The Pontiac Foundry also supplies Jeep engine castings for Willys, and has undertaken production of two items somewhat foreign to the foundry game. One is a 21/2-horsepower single-cylinder engine for powering bicycles, the design of a California company, the other an aluminum garage door. During the war a \$1.5 million modernization program was carried out under DPC loan, involving a new core room, molding lines and changes in melting equipment. This installation still is being operated and negotiations are proceeding with RFC leading to its purchase by the company.

The first engines for the forthcoming Willys 6 will be machined and built by Hupp Motor Car Corp., according to trade reports. The unit is described as providing 148.5 cubic inch displacement with SAE rating of 21.6 horsepower, giving 70 brake horsepower at 4000 rpm. The 4-cylinder Jeep engine, in contrast, provides 134.2 cubic inch displacement, 15.6 SAE horsepower and 60 brake horsepower at 4000.

Willys also has plans for a new allsteel station wagon, 1-ton truck, pickup and sedan delivery style commercial car models, presumably on the Jeep chassis, all of which have been delayed in getting started because of inability to obtain bodies from Hayes Mfg. Co., and by strikes in suppliers' plants.

What may be the tipoff on Chrysler's eventual entry in the low-price light-car field could be contained in the announcement the corporation has purchased the former Graham-Paige plant on West Warren Avenue to the tune of \$2,750,000. Built in 1927, the plant includes 46 acres of property and administrative, manufacturing, 7 engineering and power plant buildings with over a million square feet of floor space. Vacated by Graham-Paige last November when operations were transferred to Willow Run, the property was being leased to the RFC for storage of surplus equipment, at a rental fee of \$500,000 yearly, with renewal options.

Announcement of the sale came from Graham-Paige, with not a word being heard from Chrysler as to what eventual manufacturing might be centered there. During the war, Chrysler leased about half the plant for production of airframe sections of the Martin B-26 and Boeing B-29, while G-P used the balance for manufacture of amphibious tractors and aircraft engine connecting rods. Conceivably, if Chrysler were planning introduction of a new light car through its Plymouth Division, to meet the competition of the forthcoming Ford, Chevrolet and Willys models, the Warren Avenue site would be a logical location, since it is handy to the corporation's DeSoto plant and does not involve a move out of Detroit, which the Chrysler management has never too strongly favored.

Five body colors and six combinations of upholstery colors have been chosen for the Frazer cars, frames for which are now on Willow Run assembly lines. Delays in receiving shipments of parts and body components have somewhat deferred original schedules which called for 500 completed cars this month. Finishes will be synthetic baked enamel, the first several thousand in solid colors and two-tone combinations later. All painting work will be done at Willow Run.

Kaiser-Frazer Corp. has souped up its six-cylinder engine for the Kaiser car from 85 to 92 horsepower, according to H. C. McCaslin, vice president in charge of engineering.

New nitrocellulose lacquer automobile finishes, called duco metalli-chromes, were displayed by DuPont chemists and engineers here on May 8. A deeperglowing luster is claimed for the new material by virtue of a greater degree of translucency of the films and the use of an aluminum flake in the lacquer instead of aluminum powder. Reasons for the enhanced translucency are said to be the extremely fine particle size (around 2 microns) of the pigments and the development of a new pigment material—ferric hydroxide.

#### New Duco Colors Available

The original duco finish, now used on many makes of cars, was developed in 1923 at DuPont laboratories in Parlin, N. J., where the metalli-chrome finishes also were perfected. Solution of technical problems was completed by 1940 and since that time the finishes have been undergoing durability tests which have exceeded expectations. More than 200 grays, greens and browns comprise the new "family of finishes" and they are now available in quantity. Conceived primarily for automobiles, they should be applicable to a wide range of other consumer metal products.

Final termination of the Willow Run bomber supply contract—largest in the AAF book—has been announced, with valuation approximating \$2.6 billion and covering construction of the giant plant and airport for the production of 8685 four-engine B-24 bombers. Job of winding up the contract was complicated by the fact more than 10,000 purchase orders were involved.

### DESIGNING for Disessenteebe DIE CASTING

### LETTERING

In designing die castings, keep in mind that lettering, numerals, trade marks, diagrams or instructions can be cast on the surfaces.

Raised, rather than debossed engraving should be specified, since it is less costly to cut a design into a die than to make a raised design on the die surface. If, however, the engraving cannot project above the surface of a casting, debossed engraving can be achieved by using raised engraving on a removable panel set into the die.

The electric meter adapter box shown here is an excellent example of the utilization of engraving on a zinc alloy die casting. A wiring diagram has been cast on the interior—and lettering on the exterior—of this casting. The two surfaces on which the raised engraving appears are parallel to the die parting and, therefore, the engraving does not interfere with ejection of the casting from the die.

Additional data on engraving will be found in our booklet "Designing For Die Casting." To insure that you will get the most from your die casting dollar, ask us-or your die casting source-for a copy of this booklet.

The New Jersey Zinc Company, 160 Front St., New York 7, N.Y.



DESIGNING FOR DIE CASTING

DIE CASTING ALLOYS

### ACTIVITIES

### Production Line For Journal Boxes Installed by SKF

Installation will produce enough units to equip 1250 to 1500 new passenger cars annually

A PRODUCTION line for the manufacture of railway journal boxes, urgently needed in the postwar modernization program of the carriers, has been installed at Philadelphia by SKF Industries Inc.

The installation, according to William L. Batt, president, will produce enough journal boxes to equip between 1250 and 1500 new streamlined passenger cars annually. Railroads now have on order 2391 passenger cars, according to the American Railway Car Institute.

Automobile manufacturing techniques, with heavy materials being moved by automatic handling devices, have been adapted to the new rail equipment program, according to Mr. Batt.

Mr. Batt explained the new journal boxes which support the weight of the car are used in conjunction with spherical roller bearings on railway car wheel axles to enable trains to start more easily and comfortably and to operate at higher speeds with increased safety and lower maintenance costs. He said that bearing and box assemblies, were first introduced in the American railway field by SKF engineers 34 years ago. Using techniques developed during the following years, they now have been tested and improved to the point where they are regarded as standard equipment by leading car and locomotive builders.

Production of the journal boxes already has begun, and will be stepped up and co-ordinated as rapidly as possible with manufacture of the accompanying spherical roller bearings which have already reached substantial levels in the company's two main plants.

### New Nonferrous Foundry Organized in Brooklyn

Parkway Foundry & Machine Corp. has been organized by Emile C. Mathis, president, Matam Corp., Long Island City, N. Y., and Amicus Most, general manager of the old Parkway Foundry Co., New York. The new company, which will produce nonferrous castings by the sand, permanent mold and centrifugal methods, is located in a new plant at 59 Paidge Ave., Brooklyn, N. Y.



William L. Batt, back as president of SKF Industries Inc. after wartime service in Washington, inspects a new installation in Philadelphia for the manufacture of journal boxes for railway cars

### BRIEFS....

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

Steel & Tube Division, Republic Steel Corp., Cleveland, has appointed Edgar T. Ward's Sons Co., Pittsburgh, as distributor for mechanical tubing in northern New Jersey, eastern New York, Connecticut and western Massachusetts.

Carpenter Steel Co., Reading, Pa., has opened a Buffalo warehouse at 1390 Michigan Ave. to handle tool and stainless steel.

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United States Rubber Co., New York, has announced that natural rubber production on the company's plantations in Malaya is expected to reach 50 per cent of capacity by the end of 1946.

Norge Division, Borg-Warner Corp., Chicago, has completed negotiations for purchase of the Air Products Inc., Chattanooga, Tenn., plant from War Assets Administration. The plant will be used to produce hermetic compressor units for household and commercial refrigeration devices.

Lindsay Corp., Chicago has begun construction of a one-story plant and two-story office building in Melrose Park, Ill. Production at the new plant of steel and aluminum structures is expected to begin in July.

Penflex Sales Co., division of Pennsylvania Flexible Metallic Tubing Co., Philadelphia, has published a bulletin, printed in English, French, Spanish and Portuguese, describing its line of flexible

metallic hose and couplings.

Laramie Machine Works Inc., Chicago, has sold its property and factory building at 5229 West Cermak Rd. to Western State Bank, Cicero, Ill., as trustee, for \$72,000.

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Bohn Aluminum & Brass Corp., Detroit, has leased the Bohn plant No. 24 at Adrian, Mich., from the government. The company will expand production of aluminum window sash and trim at the plant.

North American Philips Co. Inc., New York, has appointed Dixon X-Ray & Electronics Co. Inc., Houston, Tex., as Texas distributor for its line of electronic products and transmitting tubes.

Davis & French Inc., Detroit, has been organized as manufacturers representatives by Marvin W. Davis and Charles E. French. The firm is located at 7376 Grand River, Detroit 4. Its representation includes International Detrola Corp., Machinery Division and Commercial Welding Division, Elkhart, Ind., and Progressive Industries Co., Detroit.

Santa Fe Railway, Chicago, has organized Santa Fe Skyway Inc. to engage in contract air transportation.

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Luria Bros. & Co. Inc., Reading, Pa., has moved its Chicago office from 310 South Michigan Ave. to Suite 1210, 100 West Monroe St., Chicago 3.

Davey Compressor Co., Kent, O., has appointed the following as dealers: C. A. Lippincott & Bro. Co., Morristown, N. J.; Jones-Rogers Co., Cleveland; Phillips Machinery Co., Richmond, Va.; Phillips Machinery & Tractor Co., Baltimore, and Alexandria, Va.

Pittsburgh Gear & Machine Co., Pittsburgh, has been acquired by Lou Mervis and associates, and operations will continue without interruption.

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B. F. Goodrich Chemical Co., Cleveland, has announced an expansion program which will more than double manufacturing facilities for Geon polyvinyl resins.

Westinghouse Electric Corp., Pittsburgh, has integrated the facilities of Westinghouse Air Conditioning Division

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with B. F. Sturtevant Co., purchased last year, and the two affiliates will operate at the Sturtevant main plant at Hyde Park, Boston.

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Kellett Aircraft Corp., North Wales, Pa., has announced plans to double its wartime peak production and has leased from War Assets Administration the 420,000 sq. ft. plant in North Wales which had been operated by SKF Industries Inc.

Actna - Standard Engineering Co., Youngstown, has opened an office at 1714 Oliver Bldg., Pittsburgh 22.

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Pittsburgh Corning Corp., Pittsburgh, has plans to build two plants at Sedalia, Mo., for production of glass block and a cellular glass insulating material. Estimated cost of the expansion is \$2 million.

### Oldsmobile Servicing and Repair Facilities Expanded

The most far-reaching and complete service program ever set up by Oldsmobile dealers is now in full operation, according to D. E. Ralston, general sales manager of the General Motors division. Contemplated and begun before the war, expansion and modernization of Oldsmobile service departments have resulted in facilities which are now providing service for the greatest number of cars in the division's history. Almost twice as many repair operations are now being performed as were before the war.



WELDING SUPPLY ASSOCIATION OFFICERS: L. O. Schneiderwind, Omaha, Nebr., president of the National Welding Supply Association, addresses a recent meeting of the group in Dayton, O. At left is George H. Ohmer, secretary for the convention

### Machine Tool Firm Completes Reconversion

Monarch company holds open house in observance of return of production wholly to peacetime basis

COMPLETION by Monarch Machine Tool Co., Sidney, O., of its reconversion to peacetime production of engine lathes was marked recently by an open house, with 8000 people from Sidney and neighboring communities in attendance.

Among special exhibits was a display of war trophies, a graphic reminder of the travels and adventures of the approximately 250 World War II veterans now back on their jobs with Monarch. Another exhibit that commanded considerable attention was a barrel filled to capacity with silver dollars. A placard above the barrel read, "Monarch does not pay its employees in silver dollars. If it did, last year's payroll would have taken 176 barrels of silver dollars just like this."

A continuous program of entertainment, enlivened for youngsters by the presence of professional clowns imported for the occasion, lent a festive air as Monarch employees showed their families and friends through the plant.

The Monarch plant, moved to Sidney from Detroit in 1909, has since been expanded a score of times. From a floor area of less than 10,000 square feet, the combined buildings which compose today's plant have a floor area of more than 200,000 square feet.

In the prewar year of 1939, Monarch sold about \$3½ million worth of lathes and lathe accessories. Employment was 471. Today's employment, stabilized at about 1000, presages a volume of business correspondingly greater than before the war, the company said. A number of new turning machines for the postwar market were announced recently.

### Barium Steel Merger with Central Iron Approved

Stockholders of Barium Steel Corp., New York, have approved completion of the merger with Central Iron & Steel Co., Harrisburg, Pa., steel plate producer, according to J. A. Sisto, chairman of the board. Barium acquired majority control of Central Iron & Steel in March, and the Central stockholders approved the merger in April.

### WEST COAST

## U.S. Steel's Geneva Bid Supported

Western States Council favors government acceptance of Steel corporation's offer. Sees such as eliminating necessity for government subsidies

#### LOS ANGELES

WESTERN States Steel Council, representing 100 chambers of commerce in the 11 western states last week announced its support of the United States Steel Corp.'s bid for the government's steel mill at Geneva, Utah, and informed the War Assets Administration of its action.

The statement to the WAA was presented by Committee Chairman Kenneth T. Norris, president, Norris Stamping & Mfg. Co., Los Angeles. It stated that the acceptance of the U. S. Steel Corp. bid "would do most to aid western steel development and would dispose of the plant in accordance with the soundest possible policy of turning over government-built mills to private ownership without the necessity for subsidies."

The committee's statement asserted that analysis of other bids showed their inadequacies. Major objections to other bids were lack of operating organizations, requirements for additional government loans, lack of clarity on some proposals and lower actual cash offers.

The U. S. Steel bid, made through its subsidiary, Columbia Steel Co., was popular because of the company's pricing policy statement, the committee's recommendation averred, that policy being founded on a Geneva basing point instead of an eastern point.

Copies of the steel committee's statement have been sent throughout the West by Harold W. Wright, general manager of the Los Angeles Chamber of Commerce and council president.

With thousands of jobs in unskilled categories going begging, 129,246 persons, mainly in these labor classifications, collected \$2,494,447 in Los Angeles county the first week in May in the form of state unemployment compensation.

Numerically, the jobless total in the county is higher than was ever reached before the outbreak of war in 1941. It is also higher than at any time since compensation laws became effective.

J. R. Wade, field representative for the California Department of Employment in southern California, released tables placing the total jobless inside the Los Angeles city limits at 44,362 persons.



SURPLUS: Scores of large spools of specialized ship cable, now at Todd Shipbuilding Corp. yards, Los Angeles, have been offered for sale as surplus by the War Assets Administration. So far, it has been spurned by commercial concerns as it does not conform to standard specifications. If not sold, it will be stored by the Navy for ultimate use in repairs

Drawing compensation inside the city were 15,362 veterans, of whom 1698 were women.

Wade disclosed that "most of the county's skilled workers are filling jobs. Those receiving compensation averaging \$19.30 per week are virtually 100 per cent unskilled workers."

Nonveterans may collect unemployment compensation for a maximum of 23.4 weeks on a basis of wage-earning credits. Veterans are entitled to receive compensation for 52 weeks.

Payments began in 1938. The lowest number of persons to receive compensation since then was a weekly average of about 6570 in August, 1944, a figure that, however, covered the entire state.

The maximum number of persons collecting the state monies was in the week ending Feb. 21, 1946, when 219,578 throughout California were paid for being unemployed.

Wade's analysis repeated what was said many months ago.

"A lot of people," he declared, "won't work unless they get the same wages paid during the war. They won't adjust themselves to lower brackets.

"Of course, we cannot force people in-

to 'any old job,'" he added. "A worker is supposed only to take a job that fits the one lost, as nearly as possible.

"The average maximum benefit a jobless person can receive is \$83.83 a month and this means that he or she must come into our offices each week, stand in line, wait until he or she is cleared for job availability by the U. S. Employment Service and then collect the check."

It was brought out that since the plan went into effect in January, 1938, California employers have contributed \$695,-441,675 to the fund. Workers have given \$302,127,044 in the same period. With interest, fines and penalties added to this, the grand total contributed by all management and labor groups is \$1,-052,907,384.

In all, jobless workers have received \$343,520,143 from the state fund, about \$40 million more than all workers have contributed.

### Boeing Plans New Type 24-Passenger Transport

### SEATTLE

Boeing Airplane Co. has announced approval of proposed expenditure of \$31/2

million for planning and tooling of a newtype 24-passenger transport to be built at the Wichita, Kans., plant. This craft. known as the little brother of the 80passenger Boeing Stratocruiser, powered by two 800-hp Wright Cyclone engines, will go into quantity production at the Kansas plant.

Material shortages continue to hamper Boeing operations here, about 1000 employees to be laid off within 30 days in addition to 347 previously dropped for the same cause. The situation is aggravated by transportation difficulties due to the coal strike.

### Auto Parts Warehouse in California Nears Completion

Chevrolet's new service parts warehouse, located on Van Nuys boulevard, in Van Nuys, Calif., is nearing completion and is already being used, A. Culbertson, Chevrolet's zone manager, has announced.

Although work remains to be done on some portions of the building, replacement parts are already being received, and when completely stocked the warehouse will carry more than 25,000 parts. ranging in size up to car frames.

The new warehouse will be operated as a master warehouse, replacing the old one which was operated as a zone warehouse carrying a limited number of parts.

### Most War-built Aluminum Plants On Coast Expected To Be Active

Major portion of capacity seen placed in operation in two to three months by private interests. Only one installation, Olin plant at Tacoma, appears destined to remain inactive. Heavy demand for metal indicated

### SAN FRANCISCO

WITHIN the next two to three months, a major portion of the Pacific Coast's war-built aluminum capacity will be put into operation by private interests, a proportion considerably larger than had been expected a year ago.

At present, the high rate of production is partly due to shortages of other materials; that is, demand for aluminum probably is at an abnormal rate now because other metals, such as steel and copper, are insufficient to meet full requirements. It is possible, of course, that new uses for the light metal will increase in coming years to permit a continuation of the high output rate.

Nearly all of the West Coast's postwar operating capacity now is centered in the Pacific Northwest because of the low power rates available there from government hydroelectric projects. Five of six wartime plants in the Northwest now are assured of operation, at least for the next few years. Only one installation, the small Olin plant at Tacoma, appears to be destined for inactivity the reason is that expensive equipment and methods have raised its production costs above selling prices.

During the war the Pacific Northwest's aluminum capacity rose to 38 per cent of the national total. In the months following end of wartime demand, operations dropped to about 20 per cent of U. S. capacity. However, with the plants now getting back into production the rate will rise again to around 35 per cent of the national aggregate.

With the entry of Permanente Metals Corp. (Henry Kaiser and associates) into the Northwest's aluminum picture, the plants there now are in three hands, Reynolds Metals Co., Aluminum Co. of America and Permanente. All of the government-owned plants have been taken over on lease arrangements. For that reason the Northwest's aluminum prospects must be considered as being on a trial basis.

The Spokane, Wash., plants leased by the Kaiser interests (Henry Kaiser is one of five principal factors, and all are former members of the famous Six Companies Inc.) are the Trentwood and Mead mills. The Mead plants have a full capacity of 216 million pounds of aluminum a year. There are six potlines with 128 pots to each line. Under its lease, Permanente requests that five of the six potlines be put into shape for operation as soon as possible.

Permanente's other leased plant is the Trentwood rolling mill with an annual capacity of 288 million pounds of sheet, plate and strip. Planned goal for output at Trentwood is 24 million pounds a month.

Reynolds Metals Co. has two plants in the Northwest, the Troutdale lease near Portland and its privately-owned threepotline plant at Longview, Wash. The latter has a capacity for producing 72 million pounds of aluminum annually.

Aluminum Co. of America's plant at Vancouver, Wash., which has been in continuous operation since 1941, has been producing about 180 million pounds annually. The plant expects to continue at a full rate.



UNIONS PICKET NAM MEETING: One hundred pickets from the Maritime union's convention in San Francisco paraded before the Palace Hotel, where a meeting of the National Association of Manufacturers was being held, protesting NAM's stand against continuance of price control. NEA photo

Frank L. Wiegand Jr. has been appointed general attorney, Oil Well Supply Co., Dallas, Tex. Mr. Wiegand will continue also as secretary of the company.

Francis X. Wiget has been elected secretary, Blaw-Knox Co., Pittsburgh. For the past five years, Mr. Wiget has been a member of the company's law department, and in addition to his new duties, he will continue as assistant general counsel of the company. J. E. Mc-Williams, with the company 26 years, has been appointed purchasing agent, Blaw-Knox Division, succeeding the late Walter Nuttall.

John H. Prout, formerly with Harris-Scybold-Potter Co., Cleveland, has joined the Detroit office, Acme Steel Co., Chicago. The Acme company recently acquired the Morrison Stitching Machine Division from Harris-Seybold-Potter Co., and Mr. Prout's 17 years' experience with wire stitching machines will continue to be available.

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J. E. Butler has been elected comptroller, Columbia Steel Co., San Francisco, succeeding C. T. Redmond, resigned. Mr. Butler previously was comptroller of the Geneva Steel Co., Provo, Utah. Before his Geneva assignment, he was assistant comptroller of the Columbia company.

George Bottcher has been named construction engineer, Allegheny Ludlum Steel Corp., Brackenridge, Pa. He has been serving since 1940 as a member of the company's engineering staff.

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E. G. Hardig, sales executive of the National Tool Co., Cleveland, has been appointed sales representative in the Michigan territory with headquarters in Detroit. With the company 15 years, Mr. Hardig has served since 1943 as general sales manager. Returning to Detroit, he will represent several allied lines in addition to National Tool.

R. E. Nelson, previously assistant manager, Porter Process Division, H. K. Porter Co. Inc., Pittsburgh, will be in charge of sales at the company's newlyopened St. Louis district office. He will represent the company and its subsidiaries.

Howard Fogg has been appointed art consultant, American Locomotive Co., New York. Mr. Fogg, who served more than four years with the Army Air Forces, has been assigned to produce railroad art for advertising and sales activities of the company.

-o-Charles R. Ince has been appointed manager of metal sales, St. Joseph Lead Co., New York, and Dwight Marshall, assistant manager. Also announced is the return of Malcolm Bonynge from service with the Navy. Mr. Bonynge also is assistant manager.

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J. W. Sheffer has been apointed general improvement engineer, to be in charge of the Improvement Division, American Car & Foundry Co., New York. E. A. Watson is assistant general improvement engineer. H. F. Schwarting has been named general electrical engineer and will have headquarters at St. Louis.

I. A. Capizzi, labor relations attorney, Ford Motor Co., Dearborn, Mich., has submitted his resignation, effective July 1, to devote his entire time to private law practice.

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B. W. Rogers has been appointed Akron district representative, Hammond Iron Works, Warren, Pa.

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C. J. Merritt, recently released from the Army, is to be in charge of research and design on gas heating equipment, Consolidated Industries Inc., Lafayette, Ind. Prior to his Army service, Mr. Merritt spent several years with Surface Combustion Division, General Properties Co. Inc., Toledo, O.

Paul W. Heasley has been elected assistant treasurer, Graham-Paige Motors Corp., Detroit. He formerly held a similar position with Triumph Industries Inc., Elkton, Md.

F. Gordon Sporr has been appointed secretary-treasurer and David B. Grant, assistant sales manager, Empire Tool Co., Detroit. Mr. Sporr formerly served in a similar capacity for Snyder Tool &



MAJ. JOSEPH P. SOMERS

Engineering Co., Detroit, and Continental Motors Corp., Muskegon, Mich. Prior to service with the Navy, Mr. Grant was Michigan<sup>\*</sup> sales director of Empire Tool Co.

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Maj. Joseph P. Somers, recently discharged from the Army, has joined the Philadelphia sales office, Wyckoff Steel Co., Pittsburgh. Major Somers was with the Army for more than four years, serving 18 months overseas.

Max J. Schulte, formerly vice president and general manager, Rawlplug Co. Inc., New York, is now associated with M. S. Chapell & Associates, New York.

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Dr. John F. Gall has been appointed assistant research supervisor, Pennsylvania Salt Mfg. Co., Philadelphia. He will assist in the co-ordination of experimental activities of the company's research and development department, Research Division.

Charles W. Hamilton has been appointed sales development manager, Douglas Aircraft Co., Santa Monica, Calif. Howard L. Wheeler is assistant manager of the sales development group which also includes Ralph C. Burholt.

Donald L. Colwell, Chicago district manager, National Smelting Co., Cleveland, recently was awarded the distinguished civilian service award, highest civilian recognition of the Navy Department. From May 15, 1943 to Oct. 11, 1945 Mr. Colwell served as chief of the Conservation Division, Production Branch, Office of Procurement and Material.

Globe Steel Tubes Co., Milwaukee, announces the following appointments: Gilbert H. Krohn has been appointed manager of sales, Detroit district office,



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JUSTA PUSH AND THEY LOCK TO STAY



Start Speed Nut with thumb and finger.



Push down over stud with countersunk tool.



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If you assemble plastic or die cast parts, the use of Push-on Speed Nuts will enable you to eliminate expensive inserts, tapping and threading operations. Just zipping a Push-on Speed Nut over an unthreaded, integrally molded stud will give you a vibration-proof fastening with a spring steel bite that stays put. • Use Push-on Speed Nuts for fastening plastic or metal name plates, knobs, handles, trim strips, medallions, dials, bezels, grilles and scores of other parts that must be fastened quickly and inexpensively. Holds equally well over rivets, wires, nails and tubing. • You can do it faster, better and cheaper with a Speed Nut or Speed Clip Give us your assembly details today and we will send you samples to fit your job. A cost analysis doing it the Speed Nut way will amaze you.

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THESE COSTLY **OPERATIONS** ELIMINATED!



No more inserts in plastics.



No more tapped holes in plastics.



No drilling and tapping in die castings

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May 20, 1946

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KEITH J. HARRIS

succeeding Arthur A. Loeffler, who is retiring after more than 25 years with the Globe company; Willard C. Christianson, who has been serving as assistant to the vice president in charge of sales at Milwaukee, has been transferred to the company's Chicago office as sales agent, Mr. Krohn's previous position; Frederick K. Krell has been appointed sales service supervisor succeeding Mr. Christianson.

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Keith J. Harris, secretary-treasurer, Ross-Meehan Foundries, Chattanooga, Tenn, has been elected vice president in addition to his present title. Herbert L. Suplee, assistant sales manager, has been named vice president in charge of sales. Mr. Harris has been associated with the company since 1926, serving first as auditor. He was elected secretary-treasurer in 1942. Mr. Suplee, who joined the company in 1935, has served as assistant sales manager since January, 1945.

M. G. Sedam recently was appointed vice president in charge of research and production, Alloy Rods Co., York, Pa. Mr. Sedam has been associated with the company since 1943 as director of research.

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Philip J. Lekniskey, who recently resigned as assistant treasurer and purchasing agent, Braeburn Alloy Steel Corp., Braeburn, Pa., has become associated with the Bedford Tool & Forge Co., Bedford, O., as office manager. Grant A. Grader formerly vice president in charge of sales, Crucible Electric Steel Co., Homestead, Pa., now is sales manager of the Bedford Tool company.

Edison General Electric Appliance Co., Chicago, announces the following appointments: District sales managers. H. L. Cushing, Dallas, Tex.; W. R. Hall, Boston; S. J. Houston, New York; D. H. Risher, Charlotte, N. C.; and W. A. Sum-

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mers, Buffalo. Sales promotion managers, L. O. Braun, eastern region; W. W. Gibbs, southern region.

Harold B. Newell has been named budget director, Manufacturing Division, Crosley Corp., Cincinnati. For the past two years he served as comptroller of Kaylon Inc., New York.

G. K. Thornton has been appointed advertising manager, Scovill Mfg. Co., Waterbury, Conn. Before joining the company in 1945, Mr. Thornton served as manager of the promotional department, Cuno Engineering Corp., Meriden, Conn.

S. B. Applebaum, H. L. Tiger, and Norman E. Brice are organizing the Liquid Conditioning Corp., New York, which will carry on a general business in the field of water conditioning. All three are former executives of the Permutit Co., New York.

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John K. Light has been appointed field engineer in charge of the new Hartford, Conn., district office, Arcos Corp., Philadelphia. He will be assisted by Charles B. Culbert.

J. J. Schmidt has been appointed superintendent, Landis Machine Co., Waynesboro, Pa., succeeding J. G. Harper.

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C orge L. Bladho.m has been appointed special representative, Iron & Steel Products Inc., Chicago. Mr. Bladholm recently was released from the Army.

James S. Adair, New Orleans, has been appointed sales representative, Hendrick Mfg. Co., Carbondale, Pa., and will handle the company's products in Louisiana, southern Alabama, and the gulf counties of Mississippi. Feemster & Striger, Jackson and Tupelo, Miss., will



PERRY G. JEFFERSON

represent the Hendrick company in the remainder of Mississippi.

Perry G. Jefferson has been appointed traffic manager, Fairbanks, Morse & Co., Chicago, replacing Joseph W. Elliott, who is retiring from that position after 23 years with the company. Mr. Jefferson has been associated for many years with the Canadian Pacific Railroad, his most recent position being district passenger representative and traveling freight agent with headquarters in Dallas, Tex. Mr. Jefferson will have offices at the Fairbanks company headquarters in Chicago. V. H. Peterson succeeds John W. Barriger HI as manager, Railroad Division. Mr. Barriger resigned that position to become president, Monon Railroad. Mr. Peterson, prior to joining the Fairbanks, Morse company a month ago, had served as assistant to the president and manager of the New York office, Baldwin Locomotive Works, Eddystone, Pa.

Philip C. Nase has been appointed sales representative, New Jersey territory, Advance Pressure Castings Inc., Brooklyn, N. Y.

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Dr. Jan Teppema has joined International Plastic Corp., Morristown, N. J., as director of laboratory operations. Since 1943, Dr. Teppema had served as chief chemist, B-B Chemical Co., Cambridge, Mass.

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R. B. Willett has been appointed personnel manager of the new tire and mechanical goods plant in Uitenhage, South Africa, of the Goodyear Tire & Rubber Co., Akron. During the war Mr. Willett was in charge of production planning at plant D, Goodyear Aircraft Corp. Henry Watts, purchasing agent, and Henry Brundage, operations manager, also members of the South African fac-

## Need Answers about Shearing

What tolerances are recommended Shear Blades? on blades for shearing E-S Type 304 Stainless? Can we use the same blades on E-S Type 316?

Fine Perforating? What is the smallest diameter hole that can be accurately punched in 30-gage E-S Type 302 sheet, and what is the minimum spacing that will not tear between perforations?

Clearance for Blanking? What die clearance should we use for blanking 6-in. circles in No. 7gage E-S Type 410 plate?

Will E-S Type 430 break out when Die Changes? stamped? Can we use the same dies in stamping E-S Type 430 that we use in stamping E-S Type 347?

Clean Slitting?

Anneal to Trim? After spinning E.S Type 304 bowls, we want the edge soft enough for trimming and corrugating, without a second anneal. Is this possible?

ask

Eastern

In slitting and drawing small

louvres in E-S Type 321 Stainless, the metal sometimes strings across the slit. How can we overcome this?

Questions like these are "duck soup" at Eastern. Many of the answers are given in the big new catalog, "Eastern Stainless Steel Sheets," but if you have a specific less, be sure to ask Eastern...where your JMLCo-E-BI

guestion about cutting or shearing Staininquiry is welcome.

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for the answer when Stainless is the

question



tory organization, are now in Uitenhage. V. L. Follo, to serve there as plant manager, will depart for South Africa in another month.

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Charles W. Perelle, formerly vice president in charge of manufacturing, Consolidated Vultee Aircraft Corp., San Diego, Calif., has been elected president, Gar Wood Industries Inc., Detroit, succeeding Glen A. Bassett, retired.

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Richard C. Hunt and Carl von Ammon have been appointed assistant advertising managers, Ekco Products Co., Chicago, and will work under James N. Krohne, advertising director of the company. Mr. Hunt was discharged recently from the Army and Mr. von Ammon has just completed three years with the Navy.

N. E. Meyer has been named sales engineer, Wilson-Snyder Mfg. Division, Braddock, Pa., Oil Well Supply Co., and he will have charge of the division office in New York. Mr. Meyer joined the Wilson-Snyder firm 18 years ago.

Irving C. Manst has been appointed to the West Coast sales engineering staff, Foote Bros. Gear & Machine Corp., Chicago. He will be located at the company's office in Pasadena, Calif. --0-

Thomas M. Fallon has been appointed advertising manager, Dravo Corp., Pittsburgh, succeeding Fred C. Cole, who has resigned to take up new duties in Philadelphia. Mr. Fallon joined Dravo in 1943 as assistant advertising manager, and he is succeeded in that position by Edward P. Pearsall.

Matthew R. Rosse has been named export manager, Colorada Fuel & Iron Corp., Denver, including all that company's divisions and subsidiaries. Mr.

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Rosse has been export manager, Wickwire Spencer Steel Division since 1943, previously having been associated with American Chain & Cable Co., Bridgeport, Conn. Mr. Rosse will continue to have offices in New York. Jerry Sabin has been named director of advertising for all divisions and subsidiaries of the Colorado Fuel & Ircn Corp., maintaining offices in Denver.

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Norman E. Thompson, production manager for eastern plants, Rheem Mfg. Co.. New York, has been promoted to production manager for all the company's plants. His promotion frees W. E. Curran for wider administrative activities as chairman of the company's newly-created management committee.

---C. C. McDermond has been appointed representative of the Welding Fittings Division, Tube Turns Inc., Louisville, in Venczuela and Colombia, South America. C. T. McCoy has been named assistant to Mr. McDermond, and they will have their headquarters in Apartado No. 331, Maracaibo, Venezuela.

James A. Clark has been named to the operations staff, Vanadium-Alloys Steel Co., Latrobe, Pa. For the past four years Mr. Clark has served with Army Ordnance.

Edward R. Williams and David P. Williams, who have been president and vice president, respectively, of Vulcan Mold & Iron Co., Latrobe, Pa., are no longer connected with the firm.

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Harvey B. Wallace, president, Wheel Trueing Tool Co., Detroit, and president, Adamant Tool Co., Bloomfield, N. J., has been elected president of the newlyformed Industrial Diamond Association of America. Other officers of the association include: First vice president, I. J. Meade, vice president, U. S. Indus-



MATTHEW R. ROSSE



HARVEY B. WALLACE

trial Diamond Corp., New York; second vice president, Charles J. Koebel, president, Koebel Diamond Tool Co., Detroit. A. D. Leveridge, formerly chief, Diamond Dies Section, War Production Board, Washington, has been named executive director as well as secretarytreasurer.

Lambert J. Wischerath has been appointed assistant to the president, Buflovak Equipment Division, Buffalo, Blaw-Knox Co. James J. Beyser has been named assistant general manager.

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Samuel S. Auchineloss has joined the Pinspotter Division, Buffalo, American Machine & Foundry Co., as vice president and director of installation and services.

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Lloyd Kramer recently joined Biad Powder Metallurgy Co., Pittsburgh, as metallurgist. George Pearlman has become associated with the company as production manager.

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G. T. Bovee has been elected controller, Consolidated Vultee Aircraft Corp., San Diego, Calif.

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C. E. Bales, vice president, Ironton Fire Brick Co., Ironton, O., has been appointed to the labor-management relations committee, National Association of Manufacturers.

Walter C. Burns, San Francisco, has been appointed district sales manager, Mechanical Goods Division, United States Rubber Co., his territory including northern California and most of Nevada.

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Fred W. Herman, chief engineer at the Long Beach, Calif., plant, Douglas Aircraft Co., Santa Monica, Calif., has been appointed plant manager, succeeding A. C. Wallen. Mr. Wallen has been transferred to the Santa Monica plant as production manager where he will serve under G. A. Huggins, plant manager.

Don A. Gilbert has been appointed district sales representative for Ohio, with offices in Cleveland, W. S. Rockwell Co., Fairfield, Conn.

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Edwin L. Hobson has been appointed to the sales staff, Plastic Division, Springfield, Mass., Monsanto Chemical Co. Mr. Hobson, recently discharged from the Army, previously had served as a sales engineer, Bakelite Corp., New York.

Gordon W. MacKinney has been named assistant manager of the installations de-

### MEN of INDUSTRY



FERDINAND W. ROEBLING III

Who is vice president in charge of engineering, John A. Roebling's Sons Co., Trenton, N. J., STEEL, May 13 issue, p. 82.

partment, Propeller Division, Caldwell, N. J., Curtiss-Wright Corp., Buffalo. Mr. MacKinney has been associated with that division since 1942.

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Wynn C. Winkler, has been named chief refrigeration engineer, Parts Division, Reynolds Metals Co., Louisville. Before joining the company, Mr. Winkler served in a similar capacity with Brunswick-Balke-Collender Co., Chicago.

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C. G. Thomas, chairman, Thomas Steel Co., Warren, O., has announced his retirement. C. H. Lewis, who was elected president of the company in 1945, succeeds Mr. Thomas as chairman and E. M. Barber has been elected president. Mr. Barber joined Thomas Steel a year ago as executive vice president, previously having been vice president, Columbia Steel Co., San Francisco, and assistant to the vice president, United States Steel Corp.

### OBITUARIES ...

Vere B. Edwards, 56, since 1934 president of Dravo Corp., Pittsburgh, died May 8 while attending a meeting of the executive committee of the corporation at its Neville Island plant. Mr. Edwards joined the corporation 34 years ago as a junior civil engineer.

Milo C. Firestone, 64, treasurer, Hill-Acme Co., Cleveland, died recently in that city. He was with the company 42 years.

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Edmund D. Barry, manager of industrial relations in New York until his retirement in 1943, Universal Atlas Cement Co., New York, a United States Steel



CLARK W. KING

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

Other officers of the Thomas company are: W. F. Rummell, vice president of sales; H. A. Mantell, vice president of operations; A. B. Walker, treasurer, and W. D. Khonle, secretary.

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Albert O. Vogel, who has been assistant to the president, Vilter Mfg. Co., Milwaukee, has been appointed general sales manager of the company. Erich J. Kocher has been named chief engineer; W. H. Hartman, credit manager; and Denald F. Ahlswede, production control manager.

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E. S. Wilkoff has been elected president, Youngstown Steel Car Corp., Niles, O. William Wilkoff, formerly president, was elected chairman of the board. Other officers elected are: A. E. Wilkoff, executive vice president and secretary; L. C. Wilkoff, vice president and treasurer; Harold Beil, assistant secretary. Mr.

subsidiary, died in Alameda, Calif., May 6.

Bernhard C. Ziegler, 62, since 1911 active head of West Bend Aluminum Co. Inc., died at West Bend, Wis., May 6. Mr. Ziegler was one of the founders of the company.

Bruce Haines, 64, chairman, E. E. Souther Iron Co., St. Louis, died recently in that city. Mr. Haines became president of the company in 1933. He retired from active participation in the business in January.

Archibald A. Forrest, 70, former first vice president of Remington Typewriter Co., now part of Remington Rand Inc.,

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Buffalo, died May 7 at Rye, N. Y. He retired in 1929.

Emanuel Woodings, 73, chairman Woodings Verona Tool Works, Verona, Pa., died in that city May 8. Mr. Woodings served as president of the company 25 years.

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Louis H. Scrre, 62, president, Seaboard Oil Co. Inc., Bridgeport, Conn., died May 9 at his home in Danbury, Conn. Mr. Serre also was New England sales supervisor, Jenkins Bros., Bridgeport.

John E. Kordenbrock, 72, for the past 47 years a demonstrator for Lodge & Shipley Machine Tool Co., Cincinnati, died recently in that city.



J. L. McBRIDE

Who is purchasing agent for southern California, Bethlehem Pacific Steel Corp., Los Angeles, noted in STEEL, May 6, p. 128.

Beil also was elected a member of the board succeeding the late H. L. Zeve.

William D. Todd, assistant to the president, Aetna-Standard Engineering Co., Youngstown, has been placed in charge of the company's newly opened office in the Oliver Building, Pittsburgh.

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Herbert H. Roosa has been appointed sales manager, Manzel Bros. Co., Buffalo. For the past ten years, Mr. Roosa has been associated with the sales department of Niagara Machine & Tool Works, Buffalo.

Ralph C. Berg has been appointed production manager, Le Roi Co., Milwaukee. He has been with the company for three years and his most recent position was that of assistant plant superintendent.



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Carl

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By FREMONT F. RUHL United States Graphite Co., Saginaw, Mich.

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3A

Rings, seals, bearings, disks, blades and other parts, pressmolded and baked at 3000°F, stand up under extremes of speed, temperature and pressure, yet possess virtues of strength, hardness, self-lubrication and light weight

CONDITIONS of high speed, high temperatures, or high pressures—in combination with or without chemicals—in modern mechanical installations may offer challenging problems to designers and users of seals, bearings, and similar functional parts. Only a few engineering materials can meet these exacting demands. A lesser number can meet them with the added mechanical virtues of light weight, strength, self-lubrication, and extreme hardness.

One material that fills all these requirements is Graphitar, produced by United States Graphite Co., and chemically nothing more than carbon as carbon and graphite. Particles are mixed with a hydrocarbon bond, to a formula prescribed by particular mechanical requirements, and ground to a fine powder which is molded under high pressure. The parts thus formed are baked in a controlled atmosphere furnace at temperatures up to  $3000^{\circ}$  F.

Because its substance is powder, which must be forced into a die, rather than metal or plastic which will flow freely in a fluid state, carbon-graphite presents shape restrictions which usually can be overcome by design consideration. In general, it may be said that intricate shapes should be avoided wherever possible.

It is pertinent to add here that the material after molding must be properly machined in order to insure obtaining the mechanical strength, high finish, and other desirable properties with which this product has become identified. Parts improperly machined may fail in certain installations. For this reason the company maintains a completely equipped and manned machine shop in which parts are produced to the precise specifications most favorable to dependable and efficient performance.

Maximum sizes of parts fall within the following ranges: Rings 13¾ in. OD by 10 in. ID by ½ in. thick; blocks 12 in. long by 4 in. wide by 4 in. thick; disks 12 in. diam by ½ in thick; and plugs 6 in. diam by 4 in. long. These limitations are subject to the characteristics of each of the 24 grades of carbon-graphite available.

Its composition and the manner in which these elements are processed give the product many unusual and serviceable characteristics which can be and are being utilized throughout industry. In hardness, for example, it has a Shore scleroscope rating ranging from 50 to 100, most grades being grouped with the

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Fig. 1 — Representative carbon-graphite parts, made with hydrocarbon bond according to specific formulas for mechanical requirements

Fig. 2—(a) Wearing ring; (b) lantern ring; both widely used in centrifugal pumps handling steam, water, hot oil, trichloroethylene, caustic soda and other solutions

Fig. 3—(a) Rotary pressure joint seals installed; (b) before installation. Free-floating, these rings form bearing and seal surfaces between stationary, rotating members

Fig. 4—(a) Sump pump guide bearings; (b) darkened areas alongside pump shaft are Graphitar guide bearings

Fig. 5—Water-metering disk of carbon-graphite. It is chemically inert, non-warping, easily machined, and light enough to record a small head of liquid

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75-100 range. This quality makes it especially practical for use as rings, seals, cylinder liners, bearings, and similar parts subject to constant friction. Representative parts are illustrated in Fig. 1.

Fortifying this hardness, and of particular value in a frictional installation, is Graphitar's self-lubricating quality. This is best brought out through high finishes generated on bearing surfaces. For non-lubricated use, it has a low coefficient of friction. A high rate of heat dissipation, plus good wearing qualities, gives long life to product.



Fig. 7—Successful operation of a well-known automotive air-brake system depends upon carbongraphite blades installed in compressor as shown here. Spring pressure holds blade against cylinder. Blades give low wear, low friction and high output up to 100 psi, at 200°F, and 1300 fpm

Fig. 8—Held in synthetic rubber ring, Graphitar seal ring seals on lapped metal nose-piece of metallic bellows to hold hot kerosene in a torque converter. Will not gall ar leak under 100 psi, at 350°F and 1000 fpm Where there is a need for further reduction of friction, however, any liquid will serve as a lubricant—water, kerosene, etc.—and is easily supplied through the product's porous structure. Depending on grade, it will absorb fluid up to 10 per cent by volume. Porosity is controlled during forming to produce bearing material of slightly porous structure and seal material of varying degrees of nonporosity.

From this self-lubricating quality, augmented by controlled porosity, derived one of the earliest applications of carbon-graphite, an automotive clutch release bearing which operates throughout the life of the installation with only one lubrication. Today's typical clutch release bearing of this material, shrunk fit in metal retainer, withstands bearing pressures from 240 to 285 lb total load. Metered lubrication is supplied through Graphitar's controlled porosity from a lubricant reservoir.

Another outstanding characteristic is resistance to chemicals. Only very highly oxidizing reagents in hot and concentrated form can react to destroy it. Dry grades should be used on equipment handling chemicals. Carbolic acia. Freon (11 & 12), nitroglycerine, glacial acetic acid, sodium chloride, lye, chloroform, menthol, and isopropyl ether are only a few of the many chemicals against which Graphitar is proof. A more complete list appears in the table.

Graphitar is exceptionally light in weight, approximating 1 oz per cubic inch. Lighter than magnesium, it has an additional utility in aircraft and in other installations where there is a premium on weight reduction.

One of the most valuable properties of carbon-graphite is its compressive strength, which ranges from 18,000 to 37,000 psi. A recent application of this high resistance to crushing force is its use as cores in metal castings. Cooling metal shrink fits the carbon-graphite core which is then machined for bearing. Cores up to 6 in. diam have been successfully shrunk fitted and machined in this manner.

This application emphasizes another dominant Graphitar (Please turn to Page 165)



# HUCKING Machine

... operates automatically to attain high-speed production on castings, forgings and tubing parts up to 12-inch diameter. Designed for all-carbide tooling

SINGLE spindle automatic chucking machine has been developed for heavy duty, high production machining operations on castings, forgings and tubing parts up to 12 in. diameter. This Acme-Gridley Chuck-Matic specializes in straight, internal or taper boring, form turning or form boring, external turning, forming, facing and chamfering.

Reduction of setup time is made possible by innovations incorporated into design of machine. A single chuck holds work, only two slides need to be tooled, slide tools are mounted in an easily accessible position, machining cycle may be interrupted for resetting tools during set-up and cams controlling working and clearance cycles of tools are placed for easy setting.

The manufacturer, National Acme Co., Cleveland, states that only a rudimentary machining knowledge is necessary to operate this machine. Work is loaded into machine by opening air-operated chuck jaws by depressing foot pedal on floor and jaws are closed by releasing pedal. Spindle is started by pushing in safety locking spring plunger with left hand and pulling lever S (see illustrations) with right hand. Use of both hands in starting keeps operators hands out of machining area.

When cut is finished, slides recede, spindle stops, and coolant flow (Please turn to Page 163)

Fig. 1 (top)—Overall view of Acme-Gridley chucking machine showing operator in position in front of machine within easy reach of control panel and levers and chuck control pedal on floor. Lever marked R reverses slides

Fig. 2 (center)—Close-up of chuck, cross and compound slides. Variable speed gears are in case above and to right of spindle. Lever F starts and stops feed. Lever S is safety locking spring plunger for safe starting

Fig. 3 (bottom)—Rear view showing main drive motor mounted above spindle shaft. High and low speed cam disk is shown in lower center of machine to left of high speed slide clearance motor

UCK-MATIC

# TAILORING 18-8

Various properties of stainless steel are investigated by Ryan Aeronautical to find best formula for high-temperature exhaust manifold equipment and one amenable to forming, gas, arc and resistance welding and other fabricating processes

TREMENDOUS expansion of aircraft production, necessitated by the demands of the war, brought with it a wealth of knowledge concerning the fabrication and use of

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By WILSON G. HUBBELL Chief of Metallurgical Section Ryan Aeronautical Co. San Diego, Colif.

all industrial materials. In the process of providing the actual production requirements for building airplanes, the aviation industry acted as a huge experimental laboratory. The industry was transformed from a hand method, shop-type of manufacturing to an assembly line, mass production system. In making this change, every method of assembly and type of material was investigated to ascertain its value. Results have been achieved in the field of research which would not normally have been developed in less than 15 or 20 years.

One of the important materials which has emerged from this war with a "shining" reputation is stainless steel. Undoubtedly, a major part of the impetus back of the present wide use of stainless steel is the continual increase in the power of aircraft engines. Stainless steel is one of the few metals which have provided a completely satisfactory material for the transference of the high temperature exhaust gases from large aircraft engines. This task had to be performed in order to pave the way for further expansion of horsepower ratings. The industry has learned something about stainless steel in the course of meeting the problem. Because Ryan Aeronautical Co. is one of the largest users of stainless steel sheet stock and small diameter stainless steel electrodes, a close study has been made of the properties of this metal by Ryan laboratories.

Although there are over two dozen varieties of stainless steel, all of them possess one characteristic in common: A high resistance to corrosion and oxidation. In order to be used in the exhaust manifold equipment of a high-powered aircraft engine, stainless steel must not only have this property but must maintain it at temperatures from approximately

Fig. 1—(a) Weld seam of stainless steel flange weld. Porosity is evident in this weld of titanium stabilized type 321. (b) Weld seam of flange weld made on type 347. columbium stabilized stainless. No porosity evident 1200° to 1400° F. The exhaust gases range in temperature from 1650° to 1800° F. However, heat transfer through the body of the stack to the cooling air outside

is rapid enough so that the exhaust manifold operates at the lower temperature. Also, every effort must be made to obtain stainless steel which will readily lend itself to forming, gas, arc, and resistance welding and other fabrication processes.

Some of the work performed by our laboratory, in order to determine the most desirable formula for the stainless steel we use, may prove of general interest. Three groups were tested. One was in the "as-received annealed" condition in which the sheet undergoes a stretcher leveling operation for removal of a certain amount of waves and buckles which result from the final annealing heat treatment at the mill. The second sample was in the "annealed" condition without the stretcher leveling operation. Other samples were investigated in the "work-hardened" condition. The chemical composition and physical properties of the groups were as shown in Tables I and II.

The various specimens were mounted in crosssection, polished, and etched. They were examined microscopically and photomicrographs were taken. Examination showed that Group I contained the largest grain size, Group II had slightly smaller grains, and Group III, the smallest. Group II contained the least number of free ferrite particles with Groups I and III having increasingly more.

The annealed specimens were annealed by air quenching from 1980° F. This resulted in a slight number of precipitated carbides which were dis-(Please turn to Page 136)

Fig. 2—A short-radius curvature section of a stainless steel part showing wrinkles which result when task is attempted with stainless possessing insufficient ductility

Fig. 5—Heat treating furnace and loading apparatus used to anneal stainless parts which have become work-hardened by forming operations Fig. 3—Closeup of typical forming process; observational tests of formability were conducted in machines of this type where metal is pressed into die by pressure of a dropped punch

Fig. 4—Drop hammer department of Ryan Aeronautical where flat stainless steel sheets, which have been cut to patterns, receive their first forming operation

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

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X-RAY BEAM

DIFFRACTED RAYS

FILM

## Measurements for INDUSTRIAL PROCESSES

Success of modern large scale industrial process is intimately associated with the development of precise and reliable control instruments. Some of the newer electronic instruments aiding industry today are briefly described in this the first of a two-part article

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**P**ROCESS instrumentation and chemical engineering have come a long way in the past decade. Consider for a moment how difficult it would be to conduct pilot plant developments or operate the great continuous processes of the chemical industry without precise, reliable measuring instruments which automatically and continuously indicate and record vital data. The industry's debt to instrumentation is high. Conversely, instrumentation is equally indebted to the industry, because instruments are designed and developed to meet process needs. Instrumentation and processing are so interrelated, so interdependent, that it would seem logical that instrumentation should be regarded by chemical engineers as a unit operation, along with distillation, evaporation, crushing, and others.

Instrumentation has outgrown its swaddling clothes and no longer can be summarized in terms of mercury thermometers, pressure gages, flow meters, and the like. The utilization of electronic principles in industrial measurements has launched instrumentation into a new era.

#### **Electronic Potentiometers**

The increasing application of the self-balancing recording potentiometer to chemical processing has been brought about largely by the advent of basic improvements in the detecting and rebalancing mechanisms employed. One improvement is a direct result of using electrical means, other than the conventional galvanometer, for detecting changes in the measured variable. Further improvement has resulted by replacing the cyclic rebalancing mechanism with an electronically controlled motor which continuously rebalances the indicating or recording system to correspond to changes in the measured variable.

The detecting and rebalancing means used in one type of electronic potentiometer are illustrated schematically in Fig. 2. Briefly, the direct current millivoltage created by the thermocouple is changed to an alternating current voltage of proportional magnitude in a converter. The converter is essentially a flat metal reed oscillating between two contacts connected to the opposite ends of the primary winding on an input transformer. The unbalanced direct current voltage is impressed across the converter and the center tap of the primary winding on the input transformer. As the reed moves from one contact to the other, any unbalanced direct current voltage will cause direct current to flow first in one direction through one-half the primary winding, then in the opposite direction through the other half. This action generates an alternating flux in the input transformer core which, in turn, induces an alternating voltage on the transformer secondary.

The action of the converter is related to the alternating current supply voltage by the energizing coil which is excited by the alternating current supply voltage through a stepdown transformer. The reed is polarized by a permanent magnet and, therefore, is actuated by the energizing coil to oscillate in synchronism with the alteruating current supply voltage. The reed closes one contact to the transformer for

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Fig. 1—Geiger-Muller tubes count the quanta of x-ray energy reflected from a sample. Courtesy North American Philips Co. Inc.

Fig. 2—Schematic diagram of detecting and rebalancing means used in one type of electronic potentiometer. Courtesy Brown Instrument Co.

Fig. 3—Film type x-ray spectrometer utilizes a collimated, monochromatic beam of x-radiation which is directed on the prepared specimen. A diffracted beam emerges, the angle of which is dependent upon the angle of incidence with the crystal plane, and registers on a photographic film

Fig. 4—Diffraction film patterns of catalyst samples. (A) Poor sample, sharp lines indicate grain growth and large particle size.
(B) Good sample, film indicates small particles with large surface area

Fig. 5—Units comprising a recording x-ray diffraction spectrometer. Courtesy North American Philips Co. Inc. one-half the supply voltage cycle and the other contact for the other half, making one complete oscillation for each cycle. The direct current flowing in each half of the transformer primary winding, therefore, will create an alternating voltage in the transformer secondary of the same frequency as the supply voltage. This alternating voltage is amplified in voltage and power to where it will actuate a two-phase balancing motor.

If there is an unbalance between the slide wire voltage and the thermocouple voltage, the balancing motor functions to rebalance the two voltages by moving the slider on the slide wire. The direction in which the motor turns is determined by a definite phase relationship between the alternating current supply voltage and the amplified alternating current thermocouple voltage. This relationship depends, of course, upon whether the measured variable is increasing or decreasing in magnitude.

This principle in potentiometric measurement has brought about higher speed of operation, greater sensitivity and accuracy of measurement, and better reproducibility. Consequently, research laboratory investigations, pilot plant operations, and processing in the chemical industry can be performed under closer supervision and control. In addition to temperature, such process variables as pH, high vacuum, spectrographic quantities, rotative speeds, and mechanical strain are particularly





adaptable to measurement with this type of continuously balancing potentiometer.

Higher indicating and recording speeds, down to approximately 4 sec across scale for many of these instruments, have brought about the first really adequate means for measuring multiple temperatures. Instruments indicating, with speed and precision, as many as 48 separate temperatures permit scanning of a chemical unit operation as has never been done before. To plot data on a unit of operation where it is often necessary to know the temperatures at many intermediate points is but a matter of a few minutes. New processes are being aided in their development through the practicability of obtaining operating data quickly and efficiently.

Greater sensitivity of measurement has been accomplished through improvements in the rebalancing mechanism. In most cases, positive detection of changes as small as three-hundredths of 1 per cent of full scale is realized. On a pyrometer calibrated from 0 to 300° F, for example, this sensitivity will allow consistent measurement of changes in temperature as low as nine-hundredths of one degree.

The advantages of higher speeds of operation and greater sensitivity of measurement are multiplied in automatic control. It has been shown that in automatic control any increase in the speed of measurement will result in a considerable increase in the speed at which the measured variable will be returned to the desired value. This fact is true, since the period of cycling of a process under control is about four times the total lag of the system. If this lag is reduced by employing a faster means of measurement, then the process will stabilize much more quickly.

The advantage of low measuring lag is easily noted in the automatic control of processes where the total lag is small, such as in the control of blower air temperatures. In some cases it has been found that, if the measuring lag is reduced to a minimum by employing the newer electronic types of potentiometers, proportional or throttling control may be replaced by the simple type of onoff or two-position control.

On those processes which have a relatively large total lag or large heat capacity, such as heat exchangers, an instrument with a high sensitivity of measurement is of great advantage to automatic control. For example, in controlling temperatures associated with heat exchangers, changes in load and other unpredictable variations in processing cause the controlled temperature to deviate slowly from the desired value. The newer types of potentiometer controllers, which enable speedier response to small changes, apply a corrective action much sooner and reduce the deviation of temperature from the desired value.

The use of electronic and electro-mechanical components has virtually eliminated the multiplicity of moving mechanical parts common to previous potentiometers. Longer life is attained because of reduced wear on fewer moving parts. Reproducibility is also improved as a re-

(Please turn to Page 133)

Fig. 6-Partial view of x-ray spectrometer

Fig. 7—Typical x-ray diffraction pattern obtained with high-speed recording potentiometer





Performance records show over 2,000,000 cuts were made with nippers shown here—in constant use since 1939—before it was decided there was no point in keeping a record. Pliers, still in action, are used for rapid cutting various size springs formed of music wire ranging in diameter from 0.004 to 0.0625 in. at the Bridgeport, Conn. plant of Underwood Corp. Unusual service provided is due to four Carboloy cemented tungsten carbide inserts set into jaws of tool. Middle section of both upper and lower jaw is of steel. The two steel portions are advanced beyond the carbide so when nippers are closed there is some 0.0015-in. clearance between facing inserts. The hard metal blanks never touch one another when cutting



EXTRA THIN BEARINGS: Two bearings of angular and four point contact designs with inside diameters of 30½ and 31 in. utilizing ¾ and 7/16-in. balls, respectively, are manufactured by Kaydon Engineering Corp., Muskegon, Mich. To overcome lack of stability during machining and grinding, pot chucks and plugs were used. These high carbon steel races, only 0.750-in. wide, were heat treated in special fixtures to prevent distortion. Inside and outside diameters were ground to a tolerance of plus or minus 0.001-in.

REUSABLE HOSE COUPLINGS: Hand assembly of flexible hose lines is possible with these 2-piece safety-seal couplings developed by Resistoflex Corp., Belleville, N. J. Coupling nut is threaded onto hose with wrench. Coupling shell compresses hose end, but double-bell shape of nut allows hose to flex without cutting. Heavy body of fitting prevents crushing or distorting of line By BEN F. HUNTER Consulting Engineer Honan-Crane Corp.\* Lebanon, Ind.



Bright future foreseen for sulphur-bearing oils and greases in metalworking industry. Metallic sulphides formed by EP lubricants used for gears minimize galling and scuffing. Better grades noncorrosive to metals

WHEN the hypoid gear made its appearance some few years ago, engineers soon learned they were confronted with a lubricating problem new to industry. The steel worm and steel gear, high pressures and high rubbing speeds were so severe that no known lubricant would provide satisfactory lubrication under normal operating conditions. Tests conducted by various laboratories indicated that sulphur added to the proper viscosity mineral oil would prevent galling or scuffing of the steel worm and the steel gear under the most severe conditions.

With the adoption of the hypoid gear by the automotive industry, sulphur-bearing hubricants soon made their appearance under the brand name of "extreme pressure" or "EP" hubricants.

The addition of sulphur to certain lubricating oils was new to petroleum technologists. Prior to the development of EP lubricants of this type, the efforts of refiners were to remove sulphur from lubricants, based, no doubt, on the generally accepted theory that lubricants containing sulphur were corrosive to metal, particularly in the presence of water.

The first EP lubricants that appeared on the market were corrosive to certain metals. The original specifications covering EP lubricants called for definite corrosive properties, since it was generally assumed that antigalling and corrosion properties perhaps were closely related. Approximately 1 per cent of sulphur is the maximum amount that can be combined in a straight mineral oil. This amount was insufficient to provide the proper antigalling or antiwelding properties for EP lubricants. Other compounds with which sulphur could be combined in larger quantities, such as lead-naphthanates, lead-oleates, fatty oils, etc., were perfected and were added in proper amounts to mineral oils of the correct viscosity with the result that a highly satisfactory, noncorrosive, EP lubricant could be made.

It is perhaps unfortunate for industry that the original EP lubricants were corrosive to metals, since this belief too generally exists today and has prevented more general and widespread use of these lubricants.

#### Noncorrosive to Metals

It can be stated with assurance that the better grades of EP lubricants marketed today are noncorrosive to metals, including the highly polished surfaces of ball and roller bearings. This fact is supported by the millions of automobiles, trucks, and tractors in service throughout the world in which EP lubricants have been used for more than 10 years for the lubrication of hypoid gears and the antifriction bearings supporting them, with bearing or gear failure seldom encountered.

During the past few years, the lubricants have found their way into industry and are being recommended in certain instances for the lubrication of industrial equipment. However, full appreciation of their advantages and more general use throughout industry are yet to come.

The manner in which entrained sulphur in EP lubricants functions is not too generally understood but may be summed up as follows: "Sulphur in varying percentages is chemically combined with certain selected compounds in such a manner that it is stable, noncorrosive, or inactive at normal temperatures. In service, the EP agents or additives in extreme pressure lubricants may be regarded as dormant, possess or impart no greater load-carrying properties than the lubricant with which they are combined, until a temperature approximating 400° F is encountered at some point in the equipment being lubricated. When temperatures approximating 400° F are reached, the sulphur becomes active with the metal with which it is in contact, forming metallic sulphides which minimize or prevent galling or scuffing of the rubbing parts."

Antigalling or antiwelding lubricants might be more expressive than the terms "extreme pressure" or EP lubricants.

Many equipment manufacturers and operators have been, and still are reluctant to recommend or use extreme pressure lubricants generally throughout industry, no doubt, as the result of the corrosive tendencies of the first or original EP lubricants. However, during the past few years, some of the more progressive operators in our major industries have disregarded the theory that these lubricants are corrosive to metals, even in the presence of water, and have adopted EP lubricants for the lubrication of steel mill machinery, generally operated under the most severe conditions with outstanding results.

Today EP lubricants (sulphur bearing types) both oils and greases, are being used for the lubrication of:

- (a) Reduction gear drives
- (b) Pinion stands
- (c) Roll table bearings and gears
- (d) Roller bearings (roll-neck bearings)
- (e) Plain roll-neck bearings (Morgoil and Mesta)
- (f) Worm gear speed reducers
- (g) Helical, herringbone, and spur gear speed reducers
- (h) Travelling crane gears and bearings, etc.

Application of the EP lubricants for such equipment includes circulating systems, bath lubrication, centralized greasing systems or hand application, as the case may be.

With the development of the continuous rolling mills came the circulating oiling system, by which lubricating all from a centralized storage tank (frequently of several thousand gallons capacity) is delivered under pressure to all parts to be lubricated. Gravity oil lines return the lubricating oil to the centralized system for recirculation.

In such elaborate circulating oiling

<sup>\*</sup>Subsidiary of Houdaille-Hershey Corp.

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REVERE MILL PRODUCTS Sheet . Roll . Strip . Plate . Rod . Bar . Shafting . Piston Rod . Tube . Pipe . Lock-Seam Tube . Extruded Shapes . Drawn Shapes . Rolled Shapes . Forgings . Welding Rod . Electric Welded Steel Tube systems it is impossible to prevent contamination of the lubricating oil with varying percentages of water, dirt, scale, iron oxide, etc., which accelerate oxidation and decomposition of the lubricating oil with the resultant formation of emulsions, sludges, and deposits. Centrifuges, settling tanks, screens, and various types of filtering systems are frequently employed to remove water and contaminants.

Such systems are effective to a greater or lesser degree, but eventually the lubricating oil becomes so contaminated that it forms permanent emulsions or sludges, necessitating the removal of the oil, cleaning the system, and replenishing with new oil. The life of the lubricating oil in such systems varies within limits according to the severity of service and the amount of contamination. Under such conditions of service, the best grades of the proper viscosity, highly filtered, straight mineral oils are recommended and generally used.

EP lubricants or compounded lubricants, due to their emulsifying characteristics, are considered unsatisfactory for services where contamination from water, perhaps as much as 10 per cent per day or week, is encountered.

The discovery of a chemical emulsion breaker by chemists now makes it pos-

sible to use EP oils in circulating systems subject to contamination of water.

The "emulsion breaker" is harmless to the lubricating oil or to the equipment for which the oil is used as a lubricant and is comparatively inexpensive. When added to the lubricating oil in quantities of from ½ to 1½ gal per 1000 gal of lubricating oil and thoroughly mixed with the oil, it will effectively break the most stubborn or permanent emulsions so that entrained water will be completely dropped out in from 24 to 48 hours when held at rest and maintained at a temperature of about 180° F.

#### Layer of Emulsion Formed

As the lubricating oil drops its water, entrained solids (iron oxide, silicon, dirt, etc.) are likewise dropped, forming a viscous layer of emulsion on top of the water. After the water and solids have settled out of the oil, they can be drained from the tank and the clean oil again placed in service.

The emulsion breaker is equally as effective with EP lubricants as it is with the highly filtered straight mineral oils, thus making possible for the first time the use of EP oils in circulating systems subjected to contamination of water.

When this discovery was made, a



RIGGING "KNOW-HOW" COUNTS: While being relined recently, above 150-ton ladle car used at the Hamilton, O. plant of American Rolling Mill Co.—to carry molten pig iron from the blast furnace—toppled from its tracks into a pit 15 ft below track level. Using plant equipment, combined forces and "know-how" of plant riggers, roundhouse and transportation crews, after a 3-day "push", placed the huge, bulky bottle back on the track major steel company placed EP oil in the circulating system of a large rolling mill where approximately 10 per cent water per week entered the oiling system. EP oils in this system have been in service for several years under close observation by both operators and chemists. Results:

- (a) Gear life and bearing life have been materially improved.
- (b) No corrosion encountered.
- (c) Life of the EP oil unpredictable. (The oil is still in service and in good condition. The required amount of makeup oil is added from time to time.)
- (d) Complete separation of water and solids is still possible, indicating perhaps no complete oil change will be necessary.

In systems where the emulsion breaker is to be used, two storage tanks are necessary, one for circulation and one for maintaining the oil at rest, permitting the water and solids to drop out. Minor percentages of the emulsion breaker are lost with the water and solids and it has been found necessary to add additional quantities of the emulsion breaker from time to time (from 1 pt to 1 qt per 1000 gal of oil) to maintain the rate and completeness of separation of the water and solids during the rest period.

Value of the emulsion breaker to the steel industry, metalworking industry, and industry in general is obvious, as it enables industry to free its lubricating oils of water and solids at a negligible cost, which heretofore has been impractical or impossible with existing equipment. It also makes possible the extended use of EP lubricants, enabling industry to take full advantage of prolonged machine life and reduced maintenance cost made possible by their use.

EP lubricants have been in service for the past several years in some 4000 conventional worm-gear speed reducers employing steel worm, bronze gear, and anti-friction bearings.

#### Worm Gears

In general, worm gears consist of a steel worm meshing with a bronze, or similarly softer metal, gear. The lubrication of the worm gear unit has always been regarded an exacting lubricating problem due to high pressures and high rubbing speeds between the worm and gear teeth and the thrust bearings of the worm shaft, which must take a load equal to that transmitted to the gear.

For years the preferred lubricant for worm gears has been a compounded steam cylinder oil. Compounded steam cylinder oils are viscous, residual petroleum oils compounded with some 4 to 12 per cent of fatty oil. The fatty oil most generally used is lard oil or tal-

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tinuous FAM WELDER

Automatic welding done by electric arc submerged in granular flux

CONTINUOUS longitudinal seam welding with great savings in time formerly consumed in loading, tacking, adjusting and clamping is possible with the new Berkeley welder, shown here, developed by Penn Tool & Machine Co., Danville, Ill. Preformed tubes are fed into one end of the machine and emerge at the opposite end with seams welded. One section follows another and welding operation is continuous.

According to Penn Tool, the machine can be operated by unskilled labor, does not produce fumes. In addition, protective clothing is not required by the operator attending it. Welding is by means of an auto-

matic electric arc submerged in granular flux. A uniform x-ray quality

low oil, or a mixture of both. The theory supporting the recommendation of compounded cylinder oils is that the high viscosity mineral oil is required to withstand the loads, and the fatty oil to improve its "oiliness" or lubricating properties.

Compounded cylinder oils have proved a satisfactory lubricant for worm gears except where extreme loads, temperatures, speeds, or shock loads are encountered. The worm and/or gears are usuweld that requires no finishing is obtained at speeds from 50 to 250 ipm, depending upon thickness of metal being welded, the company states.

Neither electrode feeding mechanism, welding rod, or flux are Penn products. A choice of several manufacturers of each is available to the user. Electrode feeding mechanism is made by Westinghouse, General Electric, Lincoln, Una or Linde.

The company, currently, manufactures six models varying from 84 to 120 in, long, 54 to 96 in. wide, and 60 to 108 in. high for welding tubes from 4 to 21 in. diameter. Each requires additional length both front and back to permit operation. Additional height also is required for wire reel and flux hopper.

ally enclosed in a metal housing and lubrication is accomplished by the worm or gear dipping in a bath of oil. In certain designs, intended for operation under the most severe conditions, lubrication is accomplished by a circulating system in which the lubricating oil, by means of a pressure pump, is delivered to the desired points. Coolers to control oil temperatures are employed in many instances with circulating systems. Cast steel or cast iron gears, as well as steel worms, may also be used where speeds, loads, temperatures, etc., are net too severe. Antifriction bearings, ball or roller, are becoming widely used, especially with the smaller size units. In all cases however, except in the most extreme cases of design, the bearings, either antifriction or plain, are lubricated with the same oil as the worm and gear.

Many reduction gear units employ the worm gear in combination with helical, herringbone, or spur gears, enclosed in a single housing and lubricated with the same oil, either by dipping or a circulating system. Compounded steam cylinder oil is generally recommended for this type of unit, since the lubricant for the worm gear influences the selection.

Extreme pressure lubricants of good quality are ideal lubricants for worm gears; and when these facts become more generally known and proved throughout industry the general use of "extreme pressure" lubricants for worm gears may be expected and industry may profit by uninterrupted service and reduced maintenance cost.

The viscosity of extreme pressure lubricants for worm gear units should be the same as the viscosity of the compounded cylinder oil recommended and used. Their life in a worm gear unit will vary with the severity of service and temperature conditions but should be the equal of compounded cylinder oils. The economy resulting from the lubrication of worm gears with extreme pressure lubricants warrants serious consideration by operators of worm gears.

#### **EP** Greases

During the past few years, manufacturers of lubricants have perfected a new type, high melting point, water resistant, calcium soap base grease with EP or antigalling properties equal to that of EP oils. Grease lubrication by means of the centralized automatic grease lubricating systems has been widely adopted throughout industry during the past several years.

The new high melting point, water repellent, calcium soap grease promises much for grease lubricated bearings where water contamination is a factor. The melting point of the newly developed calcium soap base greases is considerably higher than any previous standard. The EP properties of these new greases make them ideally suited under heavy loads, high temperatures, or water contamination conditions. Performance records of the new high melting point, EP calcium soap base greases indicate their future widespread use throughout industry for the lubrication of both plain and antifriction bearings.



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Automatic Machining

... of valve guides and similar parts is done on lathe with carbide tools

COMPLETELY automatic operation, a double-end drive with distinct advantages of its own, and an automatic rotary loading mechanism are the distinguishing features of a new lathe for turning valve guides and similar parts.

In the machine illustrated, an IMP tool built by Seneca Falls Machine Co., valve guides which have previously been bored to size are placed in a loading chute and fed by gravity into openings in the rotary loader. The loader indexes the pieces to the proper position where they are automatically picked up by the continuously revolving spindles of both machine heads. Slots in the rotary loader are slightly larger than the rough parts, thus permitting sufficient clearance for them to revolve while held between centers.

The drive to both spindles is by pulleys and V-belts from a splined jackshaft extending along the rear of the machine. The advantage of the doubleend drive is said to be two-fold: First, as the picce is driven from both ends, much coarser carriage feeds are possible, thereby considerably increasing production; and second, inasmuch as both spindles are driven, there is no wear, on the revolving centers.

HEADSTOCK DRIVE

The outside diameter is turned to size with one or two tools mounted on the front slide. The piece is automatically ejected at the end of the cut, when both spindles are backed off, thereby releasing the finished turned piece which remains in the loader until indexed into the unloading chute. The rotary type loader insures complete control over the rapidly revolving pieces, eliminating danger to the operator or damage to the parts. Parts are completely stationary by the time they reach the discharge chute.

Parts may be turned to size with a single carbide tool, or rough and finish turned in the same operation with two separate carbide tools, as shown in the tooling layout. In this case the carriage cam has two separate feeding angles having a ratio of 2:1. As a general rule, the part is rough turned with a feed of 0.030-in, per revolution of the spindle, and a feed of 0.015-in, is used for the finish turning operation in this method. The finish turning tool begins cutting after the roughing tool has been relieved from the work, thereby insuring close concentricity between the bore and the finish turned diameter.



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#### **Temperature Range of**

By R. A. GRANGE and H. M. STEWART Research Laboratory United States Steel Corp. Kearny, N. J.

Martensite formation

Upper limit of martensite range and often the proportion of martensite that forms on cooling are facts needed for isothermal quenching and martempering. Method for calculating Ms from chemical composition also explained

MANY steel parts will crack if quenched directly into a bath near room temperature, but not if quenched at a temperature just above the range where martensite forms and then allowed to cool slowly to room temperature. This latter procedure, which is the basis for such modern hardening techniques as "martempering" and "isothermal quenching", may entail some sacrifice in depth of hardening but very little, if any, intensity of hardening. In planning such treatments, it is necessary to know the upper limit of the martensite range, and often desirable to know the proportion of martensite that would form in cooling to any lower temperature; furthermore, the tendency of a particular steel to crack when quenched is unquestionably associated with the temperature range of martensite formation, and consequently knowledge of this range aids in selecting the optimum composition for a given application.

These and other considerations led to a study of martensite formation in fourteen carbon and low-alloy steels; the resulting data may be directly used in the following ways: (1) For selecting the lowest quenching temperature at which no martensite will form; (2) for selecting the highest quenching temperature at which virtually all martensite will form, thereby avoiding quenching to an unnecessarily lower temperature with attendant danger of cracking; and (3) in producing a mixture of tempered martensite and bainite, which in high carbon steels has been found to possess somewhat better ductility than tempered martensite, yet does not require the prolonged transformation time necessary for a completely bainitic (austempered) structure.

The temperature range of martensite formation can be determined by thermal analysis, measurement of change of volume or length during continuous cooling or by the metallographic technique first described by Greninger and Trioano in 1939 and since used by others; this latter method was employed by the authors. A small specimen which has been heated to form austenite is quenched into a liquid bath (low-melting lead alloy) and maintained at a previously selected temperature (T1) and for a time just sufficient to insure that it has cooled throughout to this temperature. After this timed quench, a certain proportion of martensite will have formed provided T<sub>1</sub> is low enough, but if the specimen is removed from the bath and allowed to cool to room temperature this initial martensite will ordinarily not be microscopically distinguishable from that formed subsequently during cooling to room temperature. Therefore, further heat treatment is required in order to permit estimation of the proportion of this initial martensite as follows:

From the first bath, the specimen is quickly transferred, without cooling below  $T_1$ , to a second metal bath maintained at a higher temperature  $(T_2)$  and held there for a short time, after which it is quenched in brine. In this second bath any martensite that had formed on quenching to T<sub>1</sub> is tempered, while the austenite remains unaltered but subsequently transforms to martensite during the final quench to room temperature; consequently the final structure is entirely light-etching martensite if T<sub>1</sub> was such that no martensite had formed on quenching to this temperature, entirely dark-etching tempered martensite if T<sub>1</sub> was so low that all the austenite had transformed to martensite in the initial quench, or a mixture of the two if  $T_1$  was in the range where only part of the ausenite transformed to martensite in the first quench.

For each steel,  $T_1$  was varied at intervals of 10° to 20° F throughout the martensite formation range. The quenching time in the bath at  $T_1$  was, ordinarily, 3 sec. The temperature of the second bath  $(T_2)$  was constant for any one steel, but varied for different steels in accordance with the isothermal behavior.  $T_2$  was chosen for each steel, after examination of its isothermal transformation diagram, at a level where there is a decided "bay" in the beginning line.

#### **Results of Heat Treatment Observed**

After heat treatment, the percentage of dark-etching tempered martensite in each specimen was estimated. The first tempered martensite needles to appear are relatively large and seem to show a preference for ausenite grain boundries. Since the needles appear not to grow appreciably once they have formed nor to cross one another, it is impossible to completely fill the space with such needles, and therefore later ones must necessarily become ever shorter as smaller and smaller interstitial volumes of austenite are trapped between previously formed larger needles of martensite. The last austenite to transform appears to exist in small angular areas which disappear entirely only after cooling to a temperature disproportionately far below where ninety-odd per cent had transformed. Hardness measurements proved useful as a check on the microscopic observations and especially helpful in the lower carbon steels which were tempered at 1200° F or higher.

Results are summarized in the table in which the percentage of martensite is listed for each 25° F change in temperature. In general, the curves obtained by plotting the observed percentage of martensite against quenching temperature  $(T_1)$  are all similar in shape and differ principally in position on the temperature scale. They indicate that equal increments of martensite are not formed on cooling through successively lower equal temperature intervals; on the contrary, a greater temperature change is required to form the first 10 per cent of martensite than to form the second 10 per cent. As the proportion of martensite approaches 100 per cent, the curves appear to become asymptotic; it is doubtful therefore, if a particular temperature

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can properly be designated as representing the precise end of martensite formation.

In any steel, quench cracking is likely to be worse when austenite grains are large than when they are small; from this it might be inferred that large austenite grains, all other things being equal, transform to martensite over a lower temperature range than small austenite grains. Therefore, martensite formation in the SAE-1065 steel was studied after ausenitizing at 1500° F (No. 6 austenite grain size) and at 2000° F (No. 2 austenite grain size), the carbides being completely dissolved in austenite in either case. The resulting data show that this difference in austenite grain size has no effect on the proportion of martensite formed at any corresponding temperature.

In practice a hypereutectoid steel such as SAE-52100 would rarely, if ever, be quenched from a temperature high enough to dissolve all the carbides. When undissolved carbides are present in austenite, subsequent martensite formation is shown to be entirely unlike that in the same steel after heating to dissolve all carbides. In SAE-52100 steel austenitized at 1500° F, martensite formation is virtually complete at the temperature at which it has just begun in the same steel austenitized at 1950° F. Actual composition of austenite just prior to quenching, and not overall composition of the steel, governs martensite formation.

#### Relation of Ms to Carbon Content

Effect of carbon content in lowering Ms is well recognized and established by a large amount of experimental data, most of which, however, apply to carbon steels which contain manganese and silicon as well as impurities. Digges, however, determine Ms by thermal analysis for each of six iron-carbon alloys ranging from 0.28 to 0.80 per cent carbon, and Greninger, by using both thermal analysis and the metallographic method, for four iron-carbon alloys ranging from 0.19 to 0.85 per cent carbon. Drawing a straight line through their their plotted data, which agree remarkably well, shows that within the

limits 0.2 to 0.85 per cent carbon each additional 0.1 per cent increment in carbon lowers Ms by  $65^{\circ}$  F. The straight line extrapolates to  $1025^{\circ}$  F at 0 per cent carbon, and Ms for pure iron-carbon alloys may therefore be computed by the formula:

Ms (°F) =  $1025 - 650 \times \%$  Carbon This formula is probably valid for carbon content up to 0.85 per cent, that is for hypoeutectoid alloys. This limitation does not interfere with the practical usefulness of the formula since most commercial steels contain less than 0.85 per cent carbon; when they contain more carbon, the carbides will not ordinarily be completely dissolved in austenite in commercial hardening, and hence overall carbon content could not be substituted in the formula in any case.

#### Effect of Individual Alloying Element Upon Ms

Silicon: On the basis of published results it is concluded that silicon, in the amount present in commercial grades of hardenable steel, has no effect upon Ms. For iron-carbon-silicon alloys, there-

			ESTIMA	LED PERC	(Arranged	l in order o	of decreasir	ng Ms te	mperatur	e)	NG TEM	FERAIG	JAES		
Ms—°F 99% Mart. (°F)	SAE 4130 710 550	NE 8630 690 540	SAE 4640 640	SAE T1335 640 450	SAE 4140 640 425	SAE 5140 630	SAE 3140 630	SAE 6140 620	NE 9442 620 410	SAE 2340 580	SAE 4340 550 330	SAE 1065 525 330	0.9%C 420	SAE 1950F 290 below 32	52100• 1550F 480 235
Range Ms/99%M (*F) Quenching Temp.—*F T <sub>1</sub>	160	150	150	190	215	170	190	160	210	180	220	225	245	more than 250	245
725 700	0 1	0													
675 650 625 600	15 50 80 92	1 30 65 90	0 2 12	0 1 7	0 2 15	0 1 7	0 1 — 6	0 2	0 2	0					
575 550 525 500 475 450 425 400	97 99	96 98 99	35 70 92 98 99	30 70 85 93 97 99	40 70 85 94 97 98 99	30 70 90 96 98 99	20 50 88 95 97 98 99	23 60 85 95 98 99	12 40 70 85 94 97 98 99	1- 7 30 60 85 94 98 89	- 0 0+ 5 15 40 70 85 92	0 0+ 3 00 25 50 72	0 2		0 1 10 33 55
375 350 325 300											95 98 99	87 95 98 99	8 18 37 62	0	68 73 86 92
275 250 225 200													78 88 95 98	1 4 10 25	97 98 99
175 150 125 100													99	45 65 80 85	
75 50														90 92	

"All carbides were not in solution in SAE52100 austentized at 1550° F; in other steels, including SAE-52100 austenitized at 1950° F; essentially all carbides were dissolved in austenite.

fore, Ms may be computed by the empirical formula

Ms (°F) =  $650 \times \%$  Carbon  $- 0 \times \%$ silicon (2)

Manganese: No data are available for pure iron-carbon-manganese alloys, but Ms has been measured in many plain carbon steels (which, of course, contain a significant percentage of manganese) and in a few manganese steels. Neglecting the possible effect of small amounts of impurities, the lowering of Ms due to manganese may be calculated in each case by subtracting the measured Ms from the Ms calculated by formula (2) for the same composition without manganese. It is concluded that each 1 per cent manganese lowers Ms by 70° F: therefore, for plain carbon and carbonmanganese steels, Ms may be calculated by the formula

Ms (°F) =  $1025 - 650 \times \%$  carbon - 70 × % manganese (3)

Nickel: From a survey of available data, it is concluded that each 1 per cent nickel lowers Ms by 36° F.

Chromium and Molybdenum: Published data which reveal the effect of chromium or molybdenum upon Ms are few and, particularly in the case of molybdenum, are in disagreement. Consequently, Ms was measured for each of a series of chromium steels and of molybdenum steels. All steels were austenitized at 2000° F to insure complete solution of chromium or molybdenum in austenite. In each steel, the effect of chromium, or molybdenum was estimated by subtracting the measured Ms from an Ms for that particular steel composition, without chromium or molybdenum, calculated according to formula (3).

The data for chromium steels, unlike corresponding data for manganese or nickel, do not lie on a straight line which extrapolates to zero. The curve indicates that small percentages of chromium are proportionally more effective in lowering Ms than larger percentages; consequently, the effect of chromium cannot be expressed by a simple factor in an empirical formula. However, it is within the range 0 to about 1.5 per cent, which includes the chromium content of most commercial low-alloy steels. It is concluded that each 1 per cent of chromium lowers Ms by approximately 70° F.

The data for molybdenum steel are even more difficult to analyze than those for chromium steel. For the present, a compromise and tentative curve has been drawn; just as in the case of chromium, it is indicated that small percentages of molybdenum are proportionally more effective than larger ones in lowering Ms. The curve, as drawn, is a straight line in the range 0 to 1 per cent molybdenum (the range which includes commercial low-alloy steel) and 1 per cent molybdeum lowers Ms by 50° F.

#### Estimation of Ms from Chemical Compositions

Assuming that the individual effect of each alloying element is additive when two or more are present and that the effect of impurities and small amounts of elements not to be considered have no significant effect on Ms, it is possible to write a single empirical formula, as follows:

 $\begin{array}{l} Ms \ (^\circ F) = \ 1025 \ - \ 650 \ \times \ \% \ C \ - \ 70 \\ \times \ \% \ Mn \ - \ 36 \ \times \ \% \ Ni \ - \ 70 \ \times \ \% \\ Cr \ - \ 50 \ \times \ \% \ Mo \ (4). \end{array}$ 

This formula makes it possible to calculate the approximate Ms in any carbon or low-alloy steel whose composition is known, subject to the following limitations: (1) The carbon content must be within range 0.20 to 0.85 per cent (the formula may be found to apply to lower carbon, but only steels containing carbon within the specified range were



considered in its development); (2) the chromium content must be less than about 1.5 per cent and the molybdenum content less than about 1 per cent; for a steel containing a higher percentage of either of these two elements, the curves for chromium and molybdenum respectively, may be used for substituting a value in the formula; (3) all carbides (therefore carbon and alloying elements) must be dissolved in austenite.

When formula (4) was applied to the fourteen steels whose Ms was measured, the calculated Ms was usually higher than the measured Ms by about 25° F. This difference may be due to error in some of the factors in the formula, or it may be that impurities such as phosphorus and the small amounts of other alloying elements present in commercial steels, while having as individuals a small effect, may combine this relatively constant error. Inasmuch as this analysis is empirical, and designed to permit estimation of Ms in commercial carbon and low-alloy steels such as those considered, we feel justified in modifying formula (4) to read:

 $\begin{array}{l} \text{Ms (°F)} = 1000 - 650 \times \% \text{ C} - 70 \\ \times \% \text{ Mn} - 35 \times \% \text{ Ni} \times 70 - \% \\ \text{Cr} - 50 \times \% \text{ Mo (5)} \end{array}$ 

The Ms of each steel measured has been calculated by this revised formula (formula 5) and plotted against the corresponding measured Ms. The correlation is quite acceptable for this typical group of carbon and low-alloy steels, the calculated Ms being in all cases within 20° F of the measured value. In the case of SAE-52100, the calculated Ms was 70° F low; this is because of the carbon content of this steel is above the range in which the formula applies, and it confirms the earlier statement that the lowering of Ms is no longer directly proportional to carbon content above 0.85 per cent. Within the limitations of the formula, as stated above, it would appear that Ms may be calculated with sufficient accuracy for many purposes, and, in the event that Ms is to be actually measured, will serve as a useful guide in planning such measurements.

The results of the present investigation suggest that, in addition to Ms, the temperature at which any given proportion of martensite forms is also essentially dependent upon composition and therefore predictable. It appears that carbon content is the major factor and, upon this basis, an empirical method for predicting the proportion of martensite any desired quenching temperature in any carbon or low-alloy steel is described. The method is only an approximation because the effect of elements other than carbon are not considered because of lack of data at present; nevertheless the agreement with measured data was found to be adequate for many practical purposes.

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#### Improved Measurements

(Concluded from Page 116) sult of the reduction in wear on the unit.

The sturdiness and reliability of the electronic potentiometer has been proved in severe service. The absence of a delicate galvanometer movement and its associated mechanism make an instrument which, in many respects, is more powerful and rugged than the simplest pressure type thermometer.

The cases which follow point to a few of many applications which either are rendered possible through use of the newer types of potentiometers, or which are increased in overall usefulness.

#### **Geiger-Counter X-Ray Spectrometer**

The use of x-ray diffraction by the chemical process industries as an analytical tool to determine the ultimate structure of materials has been employed for several years, for example in (1) the rubber industry—to control the addition of dyes, fillers, and accelerators to the rubber batch; and in (2) the battery manufacturing industry—to select manganese dioxide ores required to impart specific battery characteristics and performance.

Until recently the time and technique required to perform and evaluate an analysis have limited the usefulness of this tool. The development of an x-ray spectrometer which greatly reduces the time required for analysis and which practically eliminates the need for special techniques in performing analyses is principally the result of two achievements in electronics, namely: (1) The Geiger-Muller tube, and (2) the continuously balanced high speed recording potentiometer.

When a finely collimated, essentially monochromatic beam of x-radiation bathes 4 properly prepared sample of material under test, a series of secondary reflected beams emerges. As illustrated in Fig. 3, secondary beams emerge from sample in form of a diffraction cone.

By intercepting these beams with a strip of properly sensitized photographic film, a series of diffraction lines in the form of arcs of concentric circles is obtained (illustrated in Fig. 4). The spacings of the lines is indicative of the materials that are present and the densities of lines are indicative of the relative amounts of each material present in the sample. These lines occur wherever there is reinforcement of reflections from the surface and underlying atomic planes in the material. The phenomenon applies to all crystalline and to many amorphous substances. No two different materials have been found to exhibit the same diffraction pattern and hence identification hy this means is positive.

With the photographic method, con-

siderable time is required (1) to set up the unit and prepare the film before exposure, (2) to expose the film. This varies from 10 min minimum, to 10 hour maximum, and (3) to develop the film after exposure. Once the film is developed, there remains a time-consuming, manual task of measuring the line spacings and evaluating the line densities.

Careful measurements and computations must be made to develop and to apply film shrinkage or extension factors, since the film dimensions are affected during development. Likewise the density of the diffraction lines on the film, versus the actual intensities of the reflected beams causing the lines, is not a linear function. Especially at the end zones. Integrity of results can be expected only for the middle ranges except through the adoption of rather involved timeconsuming end-range techniques.

The photographic film has been replaced by the Geiger Muller tube, illustrated in Fig. 1. This tube actually counts the quanta of x-ray energy reflected from the sample. The tube is prepared with close to 100 per cent efficiency for the characteristic x-ray wavelength used in the spectrometer. In other words, one count is produced for almost every x-ray quantum entering the tube. It is interesting to compare this sensitivity with that of film which requires from 104 to 105 quanta to produce a diffraction line of minimum detectable darkness.

The Geiger-Muller tube is essentially a sealed tube containing an ionizable gas. Energy impinging on the tube causes partial ionization of the gas. The formation of a single ion pair anywhere within the active volume of the counter tube releases a flow of current sufficiently large to operate a relay directly. This current is amplified electronically over a range of 0 to 50 millivolts, which is fed to the high speed recording potentiometer, illustrated in Fig. 5.

In the photographic method, the strip of film is stationary. Where the counter tube is used, however, the tube is rotated about the sample so that it will scan the field of diffraction lines, that is, so that it will be progressively exposed to the various diffracted beams reflected from the sample,

Illustrated in Fig. 6, the counter tube is rotated through 90° of arc by means of a motor-driven scanning arm. This speed of rotation is precisely co-ordinated with the chart speed of the potentiometer to create an exact space relationship of the various intensity peaks and dips from the sample. Ninety minutes are required to obtain a complete diffraction pattern with the high speed recorder. Where an automatic recorder is not used it is necessary to manually position the scanning arm each 0.05°, requiring a total of 1800 positions.

The type of pattern obtained with the electronic recorder is illustrated in Fig. 7. This curve shows the proportions of cuprous and cupric oxides in a marine antifouling paint. The ratio of cuprous and cupric oxides must be held within close limits for optimum results, a difficult problem in the past. By use of the x-ray spectrometer differentiation of the two products and determination of their relative proportions are easily effected.

The continuous high speed operation of the recorder renders it possible to detect almost instantaneously the changes in the secondary radiation from the sample as the counter tube rotates. The fast pen speed of 4½ sec across scale and the high chart speed of 120 in. per hour make it possible to spread out the record, contributing to convenience and accuracy in analyzing diffraction pattern.

TOOL ADJUSTMENT BLOCK: Slot design of this holder facilitates changing tools or angle of tool setting without changing position of tool holder. It can be mounted on either side of holder, using set screws for adjusting either tool in combination tooling. Holder manufactured by Howard Dearborn Inc., Cleveland is easily installed for right or left-hand turning or multiple cutting





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Fig. 6-Typical oxygen-acetylene gas welding operation. Here operator is adding stainless steel to weld zone by use of a filler rod

#### TABLE I CHEMICAL COMPOSITION OF TEST GROUPS Group II Group III Group I Constituent Per cent Per cent Per cent 0.045 Carbon Manganese 0.052 0.060 1.19 1.260.55Phosphorus Sulphur 0.016 0.018 0 017 0.015 0.0240.014 Silicon 0.61 61 Nickel Chromium 18.38 18.1I 49 Columbium 0.75

P	HYSICAL PROP	TABLE II PERTIES OF T	EST GROUPS	
Sample Condition	Property .	Group I	Group II	Group III
Annealed as received	Yield strength	50,000 psi	43,550 psi	42,250 psi
	Ultimate strength	91,800 psi	89,450 psi	94,850 psi
	Elongation in 2 in.	48.0%	48.75%	48.0%
Annealed	Yield strength	47,150 psi	42,650 psi	not taken
	Ultimate strength	90,600 psi	88,900 psi	93,300 psi
	Formability	Fair	Best	Poor
	4 16 1 17 18	TADLE IN	11 1 2 2	

DESIRED STAINLESS STEEL COMPOSITION Constituent Limits

Carbon Manganese Phosphorus Sulphur Chromium Nickel Columbium

> associated in any way with work-hardening.

Less than 0.06, preferably less than 0.05 per cent 1.30 to 1.50 per cent Less than 0.02 per cent More than 10.5 per cent More than 10.5 per cent More than 9 time the swhen center.

More than 8 times the carbon content

B. The rate of work-hardening is largely a function of the nickel-chromium ratio, other factors being con-There is evidence to show that stant. other alloying elements, such as carbon, manganese, columbium, and titanium, have a bearing on forming characteristics.

C. Gain in magnetic permeability of 18-8 as a result of cold working appears to be chiefly a function of the nickelchromium ratio,

D. This gain appears to be associated with directional characteristics.

A special test was conducted to determine whether or not "dead soft," or fully annealed 18-8 stainless steel was more easily shaped or processed than 18-10. In order to make this test, a series of similar cuttings of the most difficult parts to form were made. These groups were shaped in the drop hammers, annealed, passivated, pickled and welded. One set was welded with atomic hydrogen. The results of these tests were:

(1) The "dead soft" 18-8 material reaches the breaking point more quickly than 18-10.

(2) The material has a tendency to wrinkle in one place rather than over a wide area (see Fig. 2).

(3) The wrinkles are easily removed but check the material if allowed to get very sharp.

(4) Scale formation and response to the various welding techniques is

#### Tailoring 18-8

#### (Continued from Page 112)

persed at random throughout the material. Had the quench been more severe, such as that produced by the use of oil or water, this random dispersion of carbides would not have been noticeable. However, as it was, it differed from the "as-received annealed" only in that respect. The work-hardened samples differed from the "as received" in that their grains were elongated to a greater extent in the direction of deformation.

Some of the conclusions resulting from this test are:

(1) Although it is logical to believe that the nickel content has some effect upon the grain size, it does not entirely control it. Other factors, such as methods of operation, probably contribute to grain size.

(2) . The amount of free ferrite is inversely proportional to the nickel content.

(3) The tensile strength is directly proportional to the amount of free ferrite and its distribution,

(4) The forming properties become better as the amount of free ferrite decreases.

(5) An 18-8 stainless steel of high nickel content will have better forming properties than one of low nickel content. The high nickel austenitic stainless will absorb more work than that of low nickel composition. Therefore, for good forming properties, 18-8 stainless steel having a nickel content of 11 to 12 per cent is better than one of 8 per cent.

Following these tests, a group of observational experiments were performed in the plant's drop hammer department (Fig. 4) in order to check the formability of 18-8 stainless steel sheet. Formability ratings were derived from the data on the percentage of parts rejected in a standard production forming operation such as the one shown in Fig. 3, supplemented by information concerning necessity of intermediate annealing, types of failure, etc. Magnetic permeability studies were made with a device which measured in decigrams the force required to remove perpendicularly from the face of a standard test specimen a magnet of constant flux. The observations were these:

A. Formability of 18-8 stainless steel sheet is determined only in part by the "as received annealed" physical condition of the material. Any given sheet of annealed 18-8 is, of course, more easily formed in the first stages than the same sheet if not annealed before forming. However, 18-8, having inherent tendencies toward rapid work-hardening, will present forming difficulties after the first stages even though received in the annealed state. Also, this steel might have "directional characteristics," or a preponderance of grains oriented in the same direction, which present forming difficulties even though the metal is annealed between stages. This difficulty does not appear to be



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similar in all respects to other material tested.

(5) The workability, as obtained from drop hammer experiment results is: 18-10-100 per cent; "dead soft" 18-8-80 per cent. This particular "dead soft" material is, in regard to forming properties, inherently inferior to the 18-10.

(6) It was established that slight differences in percentage of certain alloying elements have a noticeable bearing on loss of ductility and a harmful change in grain structure on coldworking.

These tests were used as a guide in the selection of stainless steel stock for forming aircraft parts.

Analysis of several failures on exhaust manifolds brought to light the fact that nearly all failures in exhaust systems can be corrected by a change or modification in design, as the failures could not be directly attributed to defective material, faulty welding, or other fabrication procedure. It is possible to thin out the metal by excessive working to an extent which would result in a part which, in essence, would be fabricated of a thinner gage material. Associated with this, a survey of the latest research work shows that the creep strength of type 347 is from 30 to 40 per cent greater at a temperature of 1100° F than that of type 321.

Because it was once suggested by the Standard Committee that the aircraft industry adopt titanium stabilized stainless steel as a standard instead of having both columbium and titanium stabilized, the laboratory made a comparison of these two types. The use of litanium or columbium in the formula of stainless steel is, of course, to control the carbide precipitation which lowers the corrosion resistance of the metal. When these metals are added to the chromium-nickel stainless steels, they prevent the formation of the harmful carbides shown in Fig. 7 by forming titanium or columbium carbides which are not harmful. This modification is called "stabilizing."

It has been noticed in numerous exhaust manifolds which have been in service up to as long as 4000 hr, that although carbide precipitation is present in considerable amount, the distribution is not such that rapid corrosion will proceed. The presence of precipitated carbides results in poor resistance to acid solutions but as formed in the stabilized grades, they are resistant to the products of gasoline combustion. In the case of columbium stabilized stainless, the carbides formed are dispersed at random throughout the material as shown in Fig. 7 and form no definite pattern for corrosion to proceed.

#### Titanium Readily Volatilized

It has long been known that titanium is more readily volatilized from fused weld than columbium, with reported losses of titanium as high as 80 per cent. A search of recent literature discloses no refutation of this knowledge, although some sources offer data from limited tests showing that in certain cases a normalized weld of titanium stabilized metal evidenced no intergranular corrosion. Extensive studies have demonstrated that columbium stabilized

Fig. 7—(a) Photomicrograph of a section of unstabilized stainless type 302, showing precipitated chromium carbides distributed along grain boundaries. These carbides form a path for intergranular corrosion to follow. (b) Section of columbium stabilized stainless type 347 showing well distributed precipitated carbides, presumably of columbium type. Carbide dispersion precludes the possibility of them becoming paths for corrosion. X 500 steel welded parts can be used safely without a "stabilizing" heat treatment, whereas titanium stabilized steels should have the benefits of this special heat treatment. Depicted in Figs. 1a and 1b are weld seams obtained, respectively, on titanium and columbium stabilized stainless. Considerable porosity is evident in the weld made on the titanium stabilized steel.

This company performs a large part of its welding operations by direct fusion of turned sheet edges, without welding rod of any kind. The admitted volatilization of titanium in the direct fusion of titanium stabilized sheets would present an objectionable difficulty in this type of operation. We have arrived at two conclusions relative to the characteristics of the two types.

(1) That whenever possible, type 347 should be used for gas welding, as reworks are at a minimum when using this type.

(2) That it is far easier to train a welder to weld type 347 than type 321.

Following these tests, a series of studies was conducted to determine the relative ductility characteristics of columbium and titanium stabilized stainless steels. Ductility is extremely important, because without this quality, we would have the following disadvantages:

- 1-Excessive die staging;
- 2-Excessive breakage;
- 3-Excessive annealing;
- 4-Poor fits resulting in time loss in welding;
- 5-Excessive planishing.

Tests were made of many different heats of columbium and titanium stabilized stainless steel from the various producers. These samples also had different finishes, or surface roughness. It was found that the titanium stabilized stainless steel was superior in ductility to the columbium stabilized product. The formality of type 347, although sli.htly inferior to that of type 321, is



entirely satisfactory for the requirements at hand, and no troubles in forming have been encountered by our production department that can be attributed to the use of columbium in 18-8 steel. Also, it was determined that a finish equivalent to a 2D mill finish was the best for use in drop hammer forming operations. A smoother finish than this does not permit a firm grip by the dies of the metal as the punch strikes the die. Much greater success is experienced if the metal surface is roughened slightly. Further, it was determined that a high nickel-chromium ratio allows for a ductile metal, one which hardens reluctantly while being cold-worked, and one which embodies good welding properties. If the nickel content remains about 10.5 per cent, we may be reasonably sure of a ductile, trouble-free material. We have found that the most desirable formula for this use is as shown in Table III. This discussion of some of the properties of the stainless steel with respect to use in aircraft production has touched upon only two of the many members of the stainless steel family. Within the limits of such an article, no adequate treatment could be made of all of the important characteristics of this promising group of alloys such as: Co-efficient of expansion, heat conductivity, effect of various heat treatments, hardening characteristics, and corrosion resistance.





#### ... eliminates free-hand operation and guesswork on angles by means of a built-in toolholder protractor device

CARBIDE tool grinder incorporating reciprocating action unit shown in photo at lower left that "builds grinding skill into the machine" eliminates guesswork on angles and free-hand operation. Its built-in reciprocating action unit, consisting of a toolholder-protractor arrangement, pivots on a definite fixed center and cannot float. This constant control of tool assures exact angles ground to a lapped finish, even with unskilled operators, and speeds up grinding operations.

Grinder, made by E. F. Hager & Son, New York, grinds tools up to and including 1½ in. sq. Carbide tools for lathes, automatic screw machines, milling cutters, offset tools, spiral reamers, counter-bores and any other carbide-tipped tool within the range of the machine can be ground. A variety of attachments is available for these and other types of carbidetipped tools.

Mechanically maintaining tool in constant motion avoids localized overheating, prevents the carbide tip from splitting and saves wear on diamond wheels, a condition sometimes blamed on the manufacturer of the wheels rather than on limitations of grinding method.

Once tool is clamped in desired position in toolholder and set by protractors for cutting and clearance angles, uniform reciprocating action of tool across rough-grinding diamond wheel produces a keen, durable cutting edge and straight face. Easily adjustable, vise-like toolholder then is slid from roughgrinding wheel to finish-grinding wheel, as shown in photo at upper left, without removing the tool or changing the angular settings, thus enabling accurate finish-grinding. Distances between two ground faces can be held to close tolerances. Operator can control all movements of toolholder without bending or moving from front of machine,

Parallel sides are easily obtained and duplicate tools can be precisely ground and used interchangeably. Lapped finish edge produced on this machine will outlast hand-ground tools.

A specially designed centrifugal pump furnishes a continuous flow of coolant. Flexible tubing enables operator to direct coolant to point where it is needed most to prevent overheating of tool while rapidly removing carbide.





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## ENGINEERING NEWS at a glance

SINCE October of last year; American railroads have added overfire jets with silencers to 263 locomotives, increasing total locomotives thus equipped to 937 engines. The air jets are reported to eliminate smoke by supplying turbulent air into the zone immediately above the fuel, where volatile matter from the coal can best be burned before smoke is formed. The silencer does away with the noisy steam blasts coming away from the steam jets, a recent issue of "Bituminous Coal Research," revealed.

CORROSIVE liquids or gases are handled by a 3-way valve being produced by Grove Regulator Co., Oakland, Calif. It consists of a flexible molded synthetic rubber tube encased within a bakelite body, ports of which are opened and closed at each half turn of a hand wheel. Designed for working pressures up to 250 lb, and maximum temperatures of 150 deg F, the development is said to be especially suited for use in connection with the operation of hydraulic cylinders.

FREQUENTLY, too much importance is given to the thermal conductivity of a material selected for constructing heat transfer equipment, in the belief that conductance of the material is the principal measure in anticipating overall conductance. Films that form on metallic walls when heated to oxidizing temperatures, and films that adhere to metallic walls from heating or cooling gases, have such poor conductance that they make relatively unimportant the thermal conductivity of the metallic wall material through which the heat must pass. Thus, for many heat transfer jobs, the oxidizing characteristics of a material are just as important as its high-temperature mechanical properties, according to "Mechanical Topics," published by International Nickel Co. Inc., New York.

FROM Milwaukee, Ampco Metal Inc. reports its 2275-ton Schloeman hydraulic press for extruding copper-base alloys, said to be one of the largest in the Middle West, is now extruding solid rod, shapes, heavy-walled tubing and wire for peacetime activities. Deliveries of the products, especially aluminum bronze, are being made promptly, the company stated.

CHEST examinations of workers in plant hospitals are made at the rate of 200 to 300 per hour using a chest x-ray unit being produced by North American Philips Co. Inc. The New York concern reports images on the fluoroscopic screen of the apparatus are photographed in miniature size on a roll of film accommodating 350 exposures. If a 70 mm picture indicates the need for a re-examination, the unit also can handle 14 x 17in. plates for the work, the company states.

DURING the war, roughly cut edges of bullet-resistant glass for hombers, which varied from 1½ to 3½ in. in thickness and contained five to nine plies of glass with a strip of clear plastic between each of them, had to be ground accurately before installation. The operation wore out a 16-in. silicon carbide abra-



TERMED a "missing link" in the chain of antifriction bearing evolution, new type of roller bearing recently developed by SKF Industries Inc., Philadelphia, is reported capable of carrying heavier loads at higher speeds and lower temperatures. According to William L. Batt, SKF president, the development, technically a spherical roller thrust bearing, climaxes a 10-year research program to solve the problem of combining in one bearing triple features of high-load capacity, speed and low temperature. The new bearing, he said, is expected to facilitate wind tunnel operation for research into such aeronautical projects as gas turbine and jet propulsion speeds and designs. In addition, it will ease maintenance in electric generators and other high-speed machines.

sive wheel in an average of 4 days cutting at a very slow rate. According to Norton Co. of Worcester, Mass., the situation was remedied by use of an 80grit, metal-bonded diamond wheel which lasted 4 months, making cuts at depths of  $\frac{1}{2}$  in. per pass at a table speed of 90 ipm.

PELLETS composed of aluminum oxide bonded with neoprene are being used by a California company in a tumbling operation for smoothing rough edges of metal stampings, castings and precision-machined parts. According to E. I. Du Pont De Nemours & Co., Wilmingten, Del., the rubber composition in the pellets serves as both a cushioning agent and as a matrix for the abrasive. The rubber composition also is used to line the barrels utilized in tumbling to prevent damage to delicate parts.

ON THE West Coast, Hydro-Aire Inc. reported it expects to go into full production of its new electric wall heater this month with deliveries being made shortly afterwards. The company already is producing floor heaters at the rate of 5 per min. The newer product will be enclosed in a heavy steel casing, designed for fitting flush with the wall. The Los Angeles concern hopes to introduce the product in the nation's home building program.

DISTORTION of trunnion shafts in ladles until binding action makes it difficult and, sometimes, impossible to turn the ladle into pouring position is eliminated in the recently designed all-welded ladles being produced by Whiting Corp., Harvey, Ill. The company reports the trunnions now are welded to channel-shaped members of the ladle in such a manner as to permit air cooling. In addition, bearings of the trunnions of the self-aligning type—are enclosed in shot and dirt-proof housings with shot guards provided for added protection.

AT NEW Wrinkle Inc., Dayton, O., recently, it was learned that Wrinkle finishes are being produced in all standard colors and color combinations instead of just the black and brown colors familiar to many finishers. According to the maker, the postwar one-coat finish has widened its range of applications due to the addition of flexible rubber and resin emulsion bases to the old formulations.

TWENTY per cent nickel-clad steel embodied in the equipment for concentrating sodium sulphide built by Zaremba Co., Buffalo, is still unaffected



trated sodium sulphide after 5 years of service, Lukens Steel Co., Coatesville, Pa., revealed recently. The Zaremba evaporator converts a weak by-product solution to a 30 per cent concentration while its accompanying concentrator reduces this liquor to a finished strength of 60 per cent. Vapor body of the equipment handles 22,000 lb of liquid per hour, it is said.

FAILURES in cast parts due to porosity or pin-hole cracks which are not discovered until after costly time and machine work has been expended may be eliminated by a method of reclaiming the castings developed by Kerklin & Co., Industrial Division, Chicago. According to Kerklin, a leading manufacturer of truck engines saved more than 500 machined engine castings in a few weeks by adopting the method. Latter is said to be effective on practically all metals and alloys, and applicable to mass production techniques to provide added protection for normal castings.

CURING time is cut to 50 per cent in some cases by using the recently developed internal curing insulating varnish being produced by Irvington Varnish & Insulator Co., Irvington, N. J. In addition, the product, referred to as Harvel 912C, provides greater dip-tank storage stability while maintaining favorable electrical and chemical properties, the company reports. RECENT descendent of one of the intricate devices which helped smash the atom is a counter chronograph and interval timer which counts in 100,000ths of a second, currently produced by Potter Instrument Co., Flushing, N. Y., for industrial use.

Original instrument grew out of the need of physicists to count random explosions occuring outside the device during atomic disintegrations. The present counter originates its own pulses at a regular rate of 100,000 per second, it is said.

First adapted from the atomic counter by the War Department to test the velocity of ammunition, the chronograph today is being used by Western Cartridge Co., Division of Olin Industries Inc., to make both velocity and accuracy tests with a single bullet, a feat reported to have been impossible previously.

The bullet, enroute to the target, starts the chronograph by passing over a photoel-ctric cell. This starts the counting, which is halted when the bullet passes over a second photocell at a specified distance beyond.

"Brain" of the counter is an electroniccounting circuit which counts at "lightening" speed. Circuit uses only the figures I, 2, 4 and 8 in appropriate combinations to record the number of counts, and each figure is represented by a tiny neon bulb. Present counter also has provisions for four individual columns to time in hundredth, thousandths, ten thousandths and hundred thousandths of a second.

#### Suppressing Gas Leaks on

## **BLAST FURNACE TOPS**

Escape of gas around gage rod opening, bleeders, large and small bells, hoppers, and gas seal doors at top of blast furnaces has long been a source of inconvenience when undertaking repair and inspection programs. Author recommends practices that serve to relieve adverse conditions



By E. A. ANDERSON Blast Furnace Division, South Works Carnegie-Illinois Steel Corp. Chicago

ESCAPING blast furnace gas may cause asphyxiation if the concentration becomes excessive and even in relatively minor amounts will retard work to such a degree as to reduce the quality and quantity of work. Flue dust carried by escaping gas creates a nuisance and deposit which must be cleaned away. The sand-blasting effect of dirty gas will wear away exposed surfaces, while the gas itself accelerates the deterioration of equipment. And finally, escaping blast furnace gas creates the possibility of an explosion.

The common sources of gas leaks, together with suggested remedies, are as follows:

Uptake Bleeder Valves: Excessive wear and cutting by escaping gas may be reduced by hard surfacing and machine grinding both the valve and valve seat. If violent slipping should occur in the furnace, the valves should be opened several times to blow out any lodged material from the valves.

Small Bell Rod: When the hinged method of bell suspension is used, leakage between the small bell rod and the large bell rod is difficult to avoid. When a rigid bell connector is used a packing gland can be applied successfully.

Small Bell and Bell Scat: Use of a new small bell seat made in one solid section with a wall thickness of 2<sup>1</sup>/<sub>4</sub> in. instead of the former pair of half-sections eliminates the possibility of seams opening.

Gas Seal Doors: A new door assembly suspended at one point in the center by a hinged yoke and fastening tightly with a single key bolt has proved effective in reducing leakage.

Gas Seal Ring: A specially designed cast iron seal ring is made in two half circle segments to accommodate two rings of graphite asbestos packing. This ring contains cast fins, against which the packing rests, so that the gas may exert a pressure on the packing. By lubricating this packing with grease at its point of contact an effective gas seal is obtained. Details are shown in Fig. 1.

Large Bell and Bell Hopper: Maintaining level alignment of the bell hopper and distance between the bell beams and deck ring assures good seating, which suppresses gas leakage. Stockline Rod: Use of a 1½ in. diameter plow steel cable as a

Fig. 1-Assembly of small bell seat gas seal ring

Fig. 2—Details of stockline rod syphon

• The trend is strong toward use of carbon for blast furnace linings. Why? Just consider the valuable advantages of this basically different kind of lining material—



#### Lasts indefinitely!

A properly-installed carbon block lining in a blast furnace should last indefinitely. This results from the remarkable physical properties of carbon: no melting point, low thermal expansion, highly resistant to thermal shock, not wet by molten metals, immune to metal and slag attack, mechanical strength maintained at high temperatures.



#### No Salamander!

Years of experience with carbon linings bears this out. Consider what a saving this feature, alone, Can mean to you.



#### Fast, easy to install!

One carbon block can take the place of from 50 to 1000 nine-inch firebrick, depending upon the size of the block. Overall installation time is thus greatly reduced. Interior of hearth lining looking toward iron notch. Blocks may be of any size desired up to 24x30x180 in.

#### Economical in long run!

Operating experience is proving that carbon linings are definitely more economical in the long run... as is evident from the features outlined at left.

#### Get more details:

Engineers at National Carbon Company, Inc., will be glad to supply you with full available information on all phases of installing a carbon lining. Write today **to Dept. ST.** 



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Blast Furnace Linings!

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### NEW! Rough and Finish Turn Crankshaft Bearings in One Chucking

#### WICKES Combination Model CH-4 Automatic Center Drive Lathe

VICICES BROZ

Specially designed for high production of automotive and similar crankshafts, this new Wickes Combination Model CH-4 Automatic Rough and Finish Turning Hydraulic Center Drive Lathe accurately performs all turning prior to hardening or finish grinding on all main line bearings and ends of cranks. The machine is completely automatic in operation, rough turning the bearings first with divided tools both front and rear and then automatically shifting the finishing tools into position and finish turning complete with divided tools both front and rear. One operation of chucking, locating and handling of the crankshaft is therefore eliminated. All latest features such as power operated loading and unloading devices, synchronized variable speed and feed mechanism, power locking chucks, etc. are available. It will pay you to submit your crankshaft machining problems to us. We build a complete line of crankshaft turning equipment.

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/TEEL
rod permits a small split gland to be used in the base where the rod enters the furnace. This gland, being only 1/32-in. larger than the cable, greatly reduces gas leakage.

By connecting a steam syphon onto the side of the stockline rod base, gas leaking normally through the gland is bypassed into a 2-in. pipe which exhausts over the top of the furnace bleeders. Less steam is required to operate this syphon than is normally used to purge the section between the two bells. The absence of gas leaking from the stockline rod gland permits men to work freely around the top of the furnace without fear of escaping gas. Details are shown in Fig. 2.

Timing of Bells: Periodic inspection of the timing mechanism governing the Opening and closing of the bells is essential as a precaution against possible gas leaks.

Top Machinery Joints: To avoid leaks, it is essential that all joints be carefully cemented with asbestos wicking and a good grade of cement when top machinery is being installed, either during

# Yield Point and Ductility Decisive In Nonferrous Flash-Butt Welding

YIELD point and ductility of metal to be welded are criterions in deciding what current, time and pressure to use in flash butt welding either ferrous or nonferrous metals, according to Dr. I. A. Oehler, director of metallurgy and research, American Welding & Mfg. Co., Warren, O., first speaker at the annual conference of the Cleveland section, American Welding Society, May 10.

Under direction of Dr. Ochler, the company in recent years has been doing a great deal of work on flash welding of aluminum and brass, as well as many types of steels. From welding steel tank turret rings, it was only a step to flash welding the endless turret rings of extruded aluminum sections for the B-29. In this work a much shorter welding cycle and upsetting at maximum speed were necessary. Operation steps up from 2 cycles at beginning of upset to 40 cycles at completion. Dr. Oethler said tests of the metal in the weld zone showed that it met minimum physical property requirements for the parent materials, as specified in the annealed condition.

As an indication of the range of American Welding's activities, the speaker said that company had repeatedly and successfully joined dissimilar rings of SAE 11:20-30-40, 18-8, Monel and high chromium-bearing steels. He stated that its high electrical resistance and low thermal conductivity, with melting point close to that of steel, made Monel behave in flash welding like an 18-8 stainless steel. In this work, company employs the same principles and setup as for stainless, a higher forging or offset pressure being needed. Monel, according to Dr. Oehler, is much more susceptible to burning than steel. Time of flashing is from 2 to 100 cycles with current cutoff closely controlled.

In working with brass and some

bronzes, thermal differentials of the metals determined success cr failure, the speaker said. Some heat treating after welding was necessary.

Dr. Ochler said he believed porosity can be controlled by upset forging, regardless of the materials being used. The same machines used in ferrous welding are employed in flash welding other metals. Slides and movies illustrated the talk.

Second speaker on the afternoon technical program was Dr. C. B. Voldrich, supervisor of the Welding Research Division, Battelle Memorial Institute, Columbus, O., whose discussion of Hydrogen in Metal Arc Welds" disclosed some hitherto unpublished information on cellulosic versus low-hydrogen (lime-coated) electrodes.

Studies of underbead and toe cracks in the welds of many types and grades of steel-including NE 8620-25-30-35-40-45 and SAE 4130-have led to the hypothesis that chemical composition of the steels to be welded in a protective hydrogen atmosphere greatly affects their weldability; that chemistry restrains cracking of many steels; that dispersion of carbides in and around the weld zone permits escape of entrapped hydrogen which causes cracking, and that storage after welding and temperature conditions during storage are of influence. Dr. Voldrich inferred the low hydrogen electrodes generally were preferable for effective prevention of cracks. Battelle has conducted some experiments toward controlling porosity by surrounding the hydrogen arc with a bath of carbon monoxide. Results, he said, were promising.

The technical meeting concluded with a discussion of the "Future in Mechanical Gas Welding", by Harold O. Jones, machine welding specialist for Air Reduction Sales Co., New York. Mr. Jones traced with the aid of moving pictures new construction or after relining.

In view of the fact that some of these defects are not entircly eliminated, the preceding remedies and practices improve a portion of the equipment to some degree. A few of the proposed solutions are still in the experimental stage and deserve continued investigation.

Condensation of paper presented before the Blast Furnace and Coke Association of the Chicago District, Del Prado hotel, Chicago, March 26. It was awarded third prize in the blast furnace section of the fifth annual techrical papers contest sponsored by the association.

recent developments in tube mills for making butt-welded tubing from ½-in. to over 2 in. in diameter. Improvements in roll design and arrangement, in methods of preheating, and in disposition and function of gas flame tips for heating the abutting edges have taken place concurrently with arrangements for stepping up speed of the machines from 75 to 100 to 200 to 300 fpm and even higher speeds. One-quarter inch condenser tubing for refrigeration is now being produced at the rate of 204 fpm, Mr. Jones said.

# Electrodes For High Tensile Steel Offered

Applicable to a variety of welding applications involving high tensile steels, two new groups of Murex electrodes are being manufactured by Metal & Thermit Corp., New York. One group of four AWS grades has an AWS-ASTM XX10 coating for use on direct current with reverse polarity. The other group of four has AWS-ASTM XX13 coating for alternating current—direct current use with straight polarity.

It is claimed that these electrodes provide a wide range of balanced mechanical properties making it possible to select weld metal very closely matching any high-strength steel in strength and ductility. Mechanical properties are derived from graduated alloying contents of chromium and molybdenum.

# Booklet Contains Data on Drills, Drilling Practice

A new booklet, "Drills and Drilling Practice" contains detailed information on all phases of drilling, going into type of drills, coolants, material to be drilled, drill shanks, drill speeds and speed cutting, among other pertinent subjects. The 54-page booklet, published py National Automatic Tool Co. Inc., Richmond, Ind., is available at fifty cents per copy.

# INDUSTRIAL EQUIPMENT

# **Milling Machine**

Cincinnati Milling Machine Co., Cincinnati 9, announces a line of Hydromatic milling machines with high spindle speeds for high speed carbide milling. Of bed-type construction, with automatic table feed cycles and infinitely variable hydraulic table feeds, machines are built in plain and duplex styles and in twelve sizes with table traverse from 24 to 90 in.

Each machine has a heavy headstock, heavy spindle carrier castings, heavy spindle and drive with wide faced gears and large shafts and bearings. Bull gear on spindle provides a fly-wheel effect desirable in high speed carbide milling. All gears, including pick-off gears, are spiral, bevel or helical.

Heavy overarm casting has built-in unit which arrests vibration at outboard end of arbor, reducing need for supplementary support. Spindle speeds are in seven ranges, the highest group ranging from 164 to 1220 rpm for small spindle carriers, 137 to 1000 rpm for medium spindle carriers, and 110 to 820 rpm for large spindle carriers. Each range has eight speeds.

Electrical controls are built into a compartment in right hand headstock. Compartment door has disconnect switch which must be in off position to open door. Motor automatically stops when motor compartment door is opened.

With exception of several oil cups, all lubrication is automatic, being of pressure or splash type.

Hydraulic start and stop spindle rotation by means of a lever which releases pressure that engages and disengages spindle drive clutch. Leveling jacks are built into base for ease in maintaining alignment.

Steel 5/20/46; Item No. 9406

# **Center Drill**

A new center drill said to prevent breakage and work spoilage by virtue of its design is now offered by Howard H. Heinz Inc., 318 Boulevard building,



Detroit. The drill tip diameter is larger than body of tip section, providing clearance behind tip, and permitting long wear period before walls of tip actually touch hole produced by tip.

Only a narrow section of a work-piece drilled with this drill is engaged. It has a highly-finished surface and a great



load-carrying capacity, with a never changing center.

The center drills, called Hy-Co, are available in eight sizes with body diameters ranging from ½ to ¾-in., and lengths from 1¼ to 3½ in. All drills are double-ended type AB high-speed steel. Steel 5/20/46; Item No. 9247

# **Stitching Machine**

Higher speeds in fastening metal to metal and other materials to metal is now possible with the S-13-E steel stitching machine announced by Bostitch



Inc., East Greenwich, R. I. Able to stitch cold rolled steel sheets of 0.060 to 0.070 in. thick, the machine operates without punching or drilling holes.

All operations are performed at once, with no heat to distort metal. The automobile industry currently uses the stitcher to advantage for tacking strips of upholstery, weather-stripping and insulation to fenders, running boards.

Several types of standard equipment are being offered to handle material of different shapes. Special adapations can be made to meet unusual requirements. Steel 5/20/46; Item No. 9165

# **Universal Timer**

Gralab, a new timer to meet all timing requirements of varied operations is announced by Gray Laboratory Mfg. Co., 43 West Apple street, Dayton. Operating on 110 v, 60 cycle current, it is suited for laboratory, test, and manufacturing use.

Any equipment may be plugged direcly into the timer which will control

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 152.)

# **18,000 TON Die Forging Press**

# WILL TEAM UP with R-S FURNACES



Lessnag as the horizon-who logged die forging poses for the word, now in proceed of intelligence at Wynes. Gordon, When this pose is completed at the ond of this year, assessment of the interpet of the second second second forer than any second on the second large forgings forer than any second on the second large forgings for the second of Resonance of Namese Company for wholly enned in budiety of Wynes. Gordon Produce Company for the second of Resonance to Answer Company for there is a particular and to industry security for experitances in particular and to industry security for experimention in and for the development and production of light metal foregings. This means to our alreach industry reduced weight which, in turn, means increased payload and greater performance for American planes ... And for industry in scenario-complete sease all megnetion, and aluminon foregrea.



This, the largest die forging press in the world, will make available larger magnesium and high strength aluminum alloy forgings than any yet made.

Wyman-Gordon Products Corporation selected four R-S Furnaces for the heattreatment of work to be turned out by this mammoth press.



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# 3 R-S Continuous Convection Type Forging Furnaces 1 R-S Covection Type Heat-Treating and Aging Furnace

This is another instance of selection due to R-S designing ingenuity, rugged construction and dependable performance.

FURNACE DIVISION R-S PRODUCTS CORPORATION Manufacturing Engineers

# INDUSTRIAL EQUIPMENT

making or breaking of circuit. If equipment, connected directly to timer, uses in excess of 75 w, a relay having a 110 v coil may be connected externally.

The timer gives an audible signal at end of a preselected time. This may be seconds or minutes, up to 1 hr. Steel 5/20/46; Item No. 9276

# **Tool Processing Tank**

A new portable 1-gal plastic coating melting tank for protective coating of plugs, gages and carbide tipped tools is announced by Aeroil Products Co.,



West New York, N. J. It is said to allow great savings due to elimination of heatup time delays.

Called the Midget-6, it features a onepiece inner vat of heavy, warp-proof, cast-aluminum of high heat conductivity. Thermostatic controls automatically maintain heat at required temperature. *Steel* 5/20/46; *Item No.* 9282

# **Center-Tap Resistor**

Techtmann Industries Inc., 828 North Breadway, Milwaukee, announces a new type center-tap resistor developed by Regan Engineering Corp. It consists



of a core, machined from a solid piece of steatite, upon which is wound a helical resistance wire element. Center and end taps are half-straps clamped to core, assuring mechanical rigidity independent of support by the resistance element.

Tap assembly employs brass nuts and bolts and stainless steel lock washers, all zinc and chromate dip plate for protection against rust and fungus growths. A burned-out ccil may be replaced by removing two nuts without disturbing connections or supporting assembly. *Steel* 5/20/46; *Item No.* 9317

# **Power Press**

Operations such as production straightening, forcing, bending, riveting, push broaching and pressing on gears, are handled faster and easier on the new No. 106 flexible power press developed by General Mfg. Co., Detroit.

Having a capacity of 15 tons, the new press features a semisteel box column for maximum rigidity. Its table is movable in 3 in. steps to provide 10 different openings from 9 to 36 in. Full



standard stroke of the ram is 9 in., however, each individual stroke length, as well as pressure appllied, may be varied at will by operator through a foot-pedal control.

Power exerted by press ram is proportional to pressure applied on the foot pedal. Ram stops and reverses from any position as soon as the foot pedal is released.

Sicel 5/20/46; Item No. 9164

# Saw Attachment

An attachment that converts manually operated metal cut-off saws to full automatic operations is announced by Machine Specialties, 4029 North Kedzie avenue, Chicago. Called the Saw-Matic, it is sold as a complete unit, ready installation.

It consists of pull-up device, viseclamp mechanism, saw-lifting and lowering device and a length control valve. Unit will cut metal any length from  $\frac{a}{18}$ -in. up automatically.

Consistency in length of cut to 0.010-

in. is achieved by a friction pull-up device and a sensitive valve. Change from automatic to manual saw operations can be made by turning hand valve on the air line. The automatic attachment will operate from as little as 60 lb of compressed air.

Steel 5/20/46; Item No. 9274

# Magnetic Disk Brake

A new magnetic disk brake, for use on applications up to 100-hp motor-driven loads is announced by Stearns Magnetic Mfg. Co., Milwaukee. Simplified design provides easy replacement of any



part where necessary without disturbing the brake assembly.

This new and larger size, designated as series 1300, is being made in floor or motor-mounted types, and for either alternating or direct current. Steel 5/20/46; Item No. 9253

# Gear-Type Coupling

Coupling Division of John Waldron Corp., New Brunswick, N. J., announces its new series A gear-type coupling designed for a much larger maximum bore



to permit its use where smaller size couplings are required.

The all steel coupling now in production, has a dust proof, oil tight, identical externally-geared hub that keys to shafts. It is enclosed by a one-piece sleeve that functions as a single rigid unit. It also

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 152.)

# Quict... Long Wearing ENGINEERED BY ILLINOIS TOOL

Having designed and made hobs for producing all types of gears in practically every industry, our engineers are ready to help you solve such important problems as tooth design, proper checking procedures and machining methods.



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OTHER DR. D.

MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

# INDUSTRIAL EQUIPMENT

compensates for misalignment without adding stress to shaft or bearings.

Coupling is being made in standard, heavy duty, marine, mill motor, floating shaft, jordan, shear pin, oil collector and cut-out types.

Steel 5/20/46; Item No. 9279

# **Pressure Switch**

A diaphragm pressure switch showing a sensitivity of 1/100 in. of water on stationary applications is announced by Acrotec Co., White Plains, N. Y. The instrument may be adjusted by means of two knobs to any pressure value desired. A draft gage may be connected in parallel with the pressure switch to accurately determine pressure.

Steel 5/20/46; Item No. 9163

# 1200-Ampere Welder

A new 1200-amp welder composed of two 600-amp variable voltage generators, close-coupled to an ac induction motor equipped with motor control is announced by Lincoln Electric Co., Cleveland, for



use with company's Lincolnweld process of automatic metallic shielded are welding. Unit is of arc welded steel, dripproof construction and ready for connection to power source.

Motor is of the squirrel cage induction type arranged for Y-Delta starting. Connection is for 220, 440, or 550 v, three or two phase, 60 or 50 cycles. Both generators are excited from same exciter, controlled from same rheostat and driven from same motor. These welders are used for automatic welding only.

Designated as SA-1200, the new welder weighs 3200 lb.

Steel 5/20/46; Item No. 9319

# **Conveyor Screw**

Lee Spring Co., 30 Main street, Brooklyn, N. Y. is offering conveyor blades formed from a ribbon of carbon, stainless or alloy steels, bronze or other materials. Screw consists of a band,



wound edgewise and pitched to form a helix for welding to conveyor shafts.

Features are: Light weight and maximum delivery volume, because of smaller shaft diameter and absence of fillets; labor-saving, because only the shaft is machined, instead of the complete, heavy worm.

Assembly consists of sliding shaft

through center and welding the two pieces together.

Steel 5/20/46; Item No. 9307

# Wire Rope Clamp

Making possible loading in excess of the tensile strength of the rope used, a new wire clamp called Cable-Ox has been developed by the Nunn Mfg. Co., 2125 Dewey avenue, Evanston, Ill. to secure wire rope in its many applications in industry.

The clamp incorporates a wedging action in its component parts. The unit is of alloy steel, cadmium plated for weather protection. It is easily assembled by unskilled labor and may be readily dis-



assembled for the tightening of stretched lines or other uses, resulting in important savings of time and money. It is made in all standard sizes from  $\frac{1}{16}$  to  $\frac{3}{4}$ -in. and can be used for hoisting, hauling, drilling, guying, and control cables. Steel 5/20/46: Item No. 9198

# **Recessed Head Screw**

A new mechanical principle is applied to the screw and screw driver manufactured by Challenger Screw & Tool Corp., Trenton, N. J.

The non-tapering driver bit is universally mounted in the end of the driver shank which drives the screw. The new screw can be driven with any standard screw driver. The replaceable driver bit is self-aligning and self-centering in this new recess head. Latter is a double-clutch head which automatically receives the

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Mail to: STEEL, Engineering Dept.-1213 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.)

# MAC SURFACES ....

these examples of actual production should interest you!

A Forty-eight cast iron pump bodies, 6 inches diameter, are ground per hour, removing .012 inch of metal to limits of +.0003 inch -.0001 inch.

**B** Seventy-two cast iron ball bearing spacer rings 3 inches to 5 inches diameter are ground on both ends per hour, removing .025 inch of metal from each end, to limit for parallelism of .0002 inch.

**C** Fifteen alloy steel plates, 24<sup>1</sup>/<sub>4</sub> inches x 5<sup>8</sup>/<sub>8</sub> inches and <sup>1</sup>/<sub>32</sub> inches are ground per hour, removing .015 inch of metal from each side, then finish grinding the first side removing .010 inch of metal, a total of .040 inch from the two sides, to limits of  $\pm .00075$  inch.

**D** One semi-steel swivel table for Shaper is ground in one hour and thirty-five minutes, grinding six sides, removing 1/8 inch of metal from each side. These tables are finish ground from rough castings 15½ inches x 16 inches x 16 inches to limits of  $\pm .005$  inch for dimensions and finished table must be square within .0015 inch in 16 inches.

E 150 alloy steel pump plates, 2% inches x 1% inches x 1/2 inch, are ground per hour on both sides, removing .009 inch of steel from each side, to limits of  $\pm .00025$ inch.

F 109 forged, nickel steel airplane engine cams, 10% inches x 8% inches x % inch are ground per hour on both sides, removing from .040 inch to .060 inch of metal from each side to limits of  $\pm .001$  inch.

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

The Blanchard No. 18 Surface Grinder

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Grinder

OU MACHINE

bring your problems to, The BLANCHARD MACHINE COMPANY LANCHAR

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



-INDUSTRIAL EQUIPMENT-

four non-tapering wings of the driver bit. driving the screw without reaming the recess or destroying the driver point by sippage.

Steel 5/20/46; Item No. 9143

# Oxygen Analyzer

A new automatic continuous analyzer for indicating and recording oxygen content of a gaseous mixture is announced by Bailey Meter Co., 1050 Ivanhoe road, Cleveland, for application to boiler furnaces, kilns, metallur-



gical furnaces, glass tanks, chemical and petroleum processes. It provides graphic analysis almost instantly, and is responsive to changes of 0.05 per cent oxygen. Sustained accuracy is said to be within 0.25 per cent.

In operation, a continuous gas sample is mixed with vaporized liquid fuel and burned on catalyst-filament which reaches a temperature proportional to the oxygen content. Filament resistance is function of temperature and simple resistance bridge is connected to null balance electronic recorder, which may be calibrated in excess air, per cent oxygen or other terms.

Steel 5/20/46; Item No. 9295

# **Electrode Holders**

dening

For Production Furnaces, For Any

Process or Production, Consult

The Electric Furnace Co., Salem, Ohio

No Job Is Too Large or Too Unusual

A new line of air cooled carbon electrode holders for manual welding has just been announced by Tweco Products Co., Wichita 1, Kans. The line includes four sizes, 150, 200, 300, and 500 amp models. Positive "Hol-Grip" design with ample length and ventilation are features of this new line.

The average carbon arc welding job is done with either the 131/2 oz 150 amp holder or the 20 oz 200 amp unit. These two units are furnished optionally with or without special "Quick-Attach" whip cables for short duration jobs. The 300



When a leading tractor manufacturer contracted to build a transmission for a military tractor, they realized they could not take any chances with Government inspection. A SIMPLEX 3U 3-way Precision Boring Machine, large enough to bore a unit 4' long, made a quick and easy job of getting them out swiftly — and right!



The transmission case was approximately rectangular, 48" long, 19" wide and 21" high. There were six bores, ranging from  $2\frac{3}{4}$ " to  $6\frac{1}{2}$ ". Most of them were located so deep in the casting that extension type spindle heads were necessary. With this arrangement there was very little tool overhang, accuracy was easily maintained, tool life increased, chatter avoided.

Watch our advertisements for large and unusual developments in SIMPLEX Precision Boring Machines.

# -Precision Boring Machines

# STOKERUNIT CORPORATION

SIMPLEX Precision Boring Machines and Planer Type Milling Machines 4532 West Mitchell Street, Milwaukee 14, Wisconsin

# -INDUSTRIAL EQUIPMENT-

and 500 amp models are suitable for heavy welding, and cutting jobs. Steel 5/20/46; Item No. 9109

# **Roller Lifting Bar**

A new lifting bar with hardened steel roller for extra leverage and ledges for safe gripping, which enables one man to lift as much as a 5-ton load, has been developed by the Arnolt Motor Co., Warsaw, Ind. Five and 10 ton capacity bars are available.

Called Rol-R-Lift, it can be furnished with any of three styles of interchange-



ab'e toe plates: (1) Notched for prying up spikes and lag bolts and getting under heads and corners; (2) straight-edged for lifting and moving; and (3) straightedged with rubber-coating to prevent scratching enameled or finished surfaces. Steel 5/20/46; Item No. 9210

# Speed Control

Yardeny Laboratories Inc., 105 Chambers street, New York, offers a new remote control Flectrol commercial speed changer with accuracy better than 2 per cent. Its dial can be set to any speed, and speed changer will follow as fast as electric servo-motor can drive the speed adjusting screw.

Dial can be calibrated in revolutions per minute, feet per minute, gallons per minute, etc. It is applicable to new or



The Wire

Always Wins...



Keystone wire finds its way into an impressive line of hardware specialties and novelties . . . made by the Patent Novelty Company of Fulton, Illinois.

Due to the *variety* of items manufactured by Patent Novelty, a wide range of gauges, analyses, and finishes of wire are required . . . all normally available through Keystone.

"Wire that meets your exacting requirements" has long been a part of Keystone service, along with uniform quality and honest value.

KEYSTONE STEEL & WIRE CO. PEORIA 7, ILLINOIS





# for tractors, lift trucks and similar applications

Now, with the new, compact PESCO Hydraulic Power Packages you can quickly and easily add all the advantages of Pressurized Power and Controlled Flow to existing tractors, industrial lift trucks and other agricultural and industrial equipment, including manure loaders and small hydraulic presses . . . or you can engineer them into new jobs. Pumps in these Power Packages feature "pressure loading", PESCO's exclusive design that automatically compensates for wear and guarantees a long service life.

PESCO Hydraulic Power Packages consist of reservoir, pump and selector valve, and in some instances

a cylinder, to provide an easily installed, complete hydraulic system on older equipment. They are available with various size reservoirs from  $\frac{1}{2}$  to 2 gallon capacity; with various size pumps providing flows from 2 to 24 g.p.m.; and for pressures from 500 to 2000 p.s.i. They can be equipped with 3-way or 4-way control valves which incorporate positive holding, integral relief valve and sealed control handle features.

These Power Packages are light in weight and occupy very little space. They are the result of PESCO's years of experience in manufacturing hydraulic equipment. Write for complete information to Department 5K.

157

In Precision Hydraulics, Fuel Pumps, Air Pumps, Related Accessories and Aircraft Elec-**DIVISION BORG-WARNER** tric Motors ... Performance PRODUCTS CO. Points to PESCO First. **1610 Euclid Avenue Cleveland 6, Ohlo** SUPERCHARGERS MANUFACTURERS OF

# -INDUSTRIAL EQUIPMENT-

existing equipment of any type or can be built in or added to motor-operated valves, machine tools and conveyors. *Steel* 5/20/46; *Item No.* 9332

# Marking Outfit

A new light-weight marking outfit adapted to stamping brand names, lot numbers, stock numbers and machine parts is announced by M. E. Cunningham Co., Pittsburgh. Available in nine sizes with type recesses ranging from  $\frac{1}{2}$  to  $\frac{1}{2}$  in. in length, it is made of special



steel which eliminates spalling and mushrooming.

Wedge-shaped grip of the marker assures operator a firm grip, regardless of greasy fingers. Steel type is held in place by locking pin of spring steel, which allows quick and easy changes. Steel 5/20/46; Item No. 9272

# Link Grinding Machine

Consolidated Machine Tool Corp., Rochester, N. Y., has developed Newton heavy duty radius link grinding machine specially designed to grind radii of locomotive links and mating link blocks. With an extra rotary table attachment, internal bushing grinding is possible.

Machine is built with vertical oscillating grinding head and reciprocating table, both operated by hydraulic cylinders. Individual motor drive is provided for grinding spindle, and a separate motor operates pump unit for hydraulic head and table movements, controlled by adjustable trip dogs. Rate of head and table movemerts is independently adjustable while the machine is in operation.

Links to be ground are placed on table in a flat position. Full rigidity is provided by extra heavy radius arm and ball bearing equipped table to parallel grind sides of block slots in largest links.

Either short-fast reciprocation and wide faced wheels, or long-slow reciprocation and narrow faced wheels, may be used, the latter method being generally preferable as it produces a generated surface with a minimum of wheel dressing, simi-

# **Production Screwdrivers**

Speed up YOUR SCREWDRIVING ASSEMBLIES BY USING THESE MACHINES

Model B Will Drive Screws Fron No. 6 to No. 1/4, in Lengths 3/16 to 11/2 Inches

All Screws Driven to α Uniform Tension

No Marring of Heads



MODEL B



Model A Is Designed to Handle Small Screws in Sizes From No. 2 to No. 6 In Lengths From 3/16" to 3/4".

Driving Time One Second Per Screw

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Detroit Power Screwdriver Co. 2813 W. Fort St., Detroit 16, Mich.

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Two great vessels were added to the Cleveland-Cliffs Fleet during 1943. We now operate 25 boats with a total trip cargo capacity of 239,700 tons.

LAKE SUPERIOR IRON ORE VESSEL TRANSPORTATION COAL

CHAMPL



The Cleveland-Cliffs Iron Company

UNION COMMERCE BUILDING . CLEVELAND 14, OHIO

# **VAPOR DEGREASING PLUS**



Even though solvent vapor degreasing has been used successfully on thousands of applications it is not considered a "cure all" for all metal cleaning problems. A combination of Detrex processes is often the answer. Here is a case where a Triad Emulsion was used with vapor degreasing.

the Problem

The removal of residual solids remaining from drawing compounds after vapor degreasing was the problem. Hand wiping costs were running \$100 a day.

# the Answer

A Detrex field representative recommended a predip of Triad 93 and fuel oil at room temperature. The drawing compounds were completely wet out in this solution, then were removed in the degreaser.

# THE RESULT

The work came out 100% clean—no smut, no dirt, no residue. Hand wiping costs were eliminated and production was speeded up.

> Detrex field representatives can suggest cleaning processes to answer your individual problem. Consult one today.



-INDUSTRIAL EQUIPMENT-

lar to that produced with a conventional surface grinder.

Spindle is belt driven by a constant speed, totally enclosed, ball bearing motor. Head is fully counterweighted. Slide supporting spindle head, is adjustable horizontally by hand wheel at front with micrometer collar to facilitate final setting of grinding wheel cut.

Both oscillating and reciprocating motions of spindle head and work table are operated by dual hydraulic pumps driven by one constant speed motor. Radius arm fulcrum can be set for grinding links from a minimum radius of 22 in. to a maximum radius of 100 in.

Steel 5/20/46; Item No. 9084

# **Tube Testing Press**

Beatty Machine & Mfg. Co., Hammond, Ind., announces a new 25-ton hydraulic tube testing press for testing tubes up to 3¼ in. inside diameter, 48 in. long and 4800 psi, hydro-static in-



ternal pressure. Within limitations of its pressing and space capacities it can be used for other diameters and lengths with the proper ram attachments.

The machine has a stroke of 8 in. and a throat depth of 6 in. Pressing speed is 34 ipm and return speed on this unit is 68 ipm.

Steel 5/20/46; Item No. 9290

# **Heat Treating Furnace**

A new high temperature furnace for precision treating of high speed steel reamers, cutters and tools is announced by K. H. Huppert Co., 6830 Cottage Grove avenue, Chicago. It operates efficiently at continuous temperatures up to 2200° F, intermittent to 2250° F.

Both a floor and table model are offered with automatic temperature controls, high temperature alloy elements, all-steel con-



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# HEAVY METAL WORKING MACHINERY

THROUGHOUT the heavy metal working industry BEATTY designed equipment is bringing greater speed, greater accuracy and lower costs to all basic operations. It's the engineering behind a BEATTY machine that puts that machine out in front. Let us know your problem.



BENDING BLANKING BULLDOZING COPING EXTRUDING FLANGING FORMING JOGGLING PUNCHING Structural Plate SHEARING SHAPING STRAIGHTENING PERFORATING



# BEATTY MACHINE AND MFG. COMPANY HAMMOND, INDIANA

# -INDUSTRIAL EQUIPMENT-

struction and counterbalanced doors.

Both models operate on 110 v, ac only, with a current consumption of 2 kw. Inside measurements of each model are  $5\frac{1}{2} \times 3\frac{3}{2} \times 6$  in.

Steel 5/20/46; Item No. 9233

# **Magnetic Hardness Tester**

New magnetic hardness tester for rapid, accurate gaging of small, ferrous metal parts is announced by General Electric's Meter and Instrument Division, West Lynn, Mass. Providing a convenient gono go hardness gage, it simplifies inspection of such parts as electric-instrument



pivots and shafts and small steel balls too small to be production-tested with mechanical hardness testers.

The tester, 6 in. long,  $3\frac{1}{2}$  in. wide and 7 in. high, consists of an Alnico bar magnet set in an adjustable, soft-iron frame, which permits the air gap, and thereby field strength, to be set at correct value for testing pieces of different size. Knurled thumbscrew locks the air gap adjustment, and a brass block for positioning the specimens is mounted on the base of the tester. A two-way level attached to the base shows when tester is properly positioned.

Steel 5/20/46; Item No. 9134

# **Electric Timer**

A feature incorporated into the new Time-O-Lite timer model P-49, manufactured by Industrial Timer Corp., 117 Elison place, Newark, N. J. is a receptacle allowing use of foot switch for remote control applications.

The double scale face has large, clear divisions and numbers. Outer scale is for setting time interval and inner scale permits accurate determination of exact amount of time elapsed. Steel 5/20/46; Item No. 9250

# New Chucking Machine

(Continued from Page 111) is automatically cut off. The entire machining cycle is automatic. All controls are operated from one position by operator standing in front of machine.

Chuck is positioned 41 in. from floor --natural elbow height---for lessened physical exertion. Face of chuck is only 14 in. from main splash guard's front edge and slides are well retracted from chucking zone to rid area of obstructions during chucking.

Designed for all-carbide tooling, the machine can use relatively large diameter forgings and castings to obtain high surface speeds often needed for efficient carbide tool operation. Tests on compact frame show that there is no shake to cause tool chatter in operation.

Massively proportioned slides offer the proper support necessary when using carbide tools. Slides are a further factor in dampening shake and tool chatter. A very short linkage between slides and cam drums allows a steady flow of power required for carbide tools when cutting alloys of low machinability rating.

# Unit Uses Three Motors

Machine uses three motors—one 15 hp motor for spindle and tool cutting movements, one 2 hp motor for high speed clearance movements of slides and one ¾ hp motor operating a heavy duty coolant pump.

Cutting tools are mounted on compound slide and cross slide positioned opposite each other on machine frame. Compound slide at right of machine (see Fig. 2) carries tools for straight or taper boring, form boring or turning, drilling, reaming or grooving. Maximum boring length is 3½ in., turning length 4 in., and end-working tools return distance for chuck clearance is 6 in. Located at left, cross slide contains tools for forming, turning, facing and chamfering.

Both cross and compound slides approach point where cutting is to start at high speed. When ready to start actual cut, slide movements are shifted to low working speed, and power of main drive motor. Wear on cross slides is compensated by use of adjustable gibs.

Slide movements are controlled from cam drums located directly beneath slides. Cam drums can be pulled out on pilot shafts for convenience when setting cams.

Telescoping guard is used to prevent fine chips, dirt, and coolant from accumulating on slide ways, which are angled steeply to permit coolant to wash chips down into the pan easily.

Positive stops are provided for all slides, with standard adjustable stops being employed to limit slides' longitudinal



# NEW PRODUCTION METHOD SAVES POROUS CASTINGS

This new method is particularly applicable to engine blocks and heads, valve and pump housings and other castings intended to retain liquids or air under pressure.



- ... is effective on practically all metals and alloys.
- ... fits admirably into mechanized production techniques it is fast!
- ... costs little ... often less than 20c in labor and material to recover a casting costing as much as \$15.00 at the point of rejection.

Visit booth 1210 at the 1946 Foundry Congress and Show, Cleveland, May 6-10

**IMPORTANT** The statements made here are taken from the daily experience of some of industry's most important production foundries. **TZ\_TAT METHOD** has been used successfully

**MEIHUU** has been used successfully OF RECLAIMING by the automotive industry POROUS CASTINGS for more than 10 years.

For further Information, write





# NEW NOX-RUST WOODSEAL ELIMINATES "WASTER" SHEETS, CUTS LABOR AND MATERIAL COSTS!



SHIPPING Losses due to rust from wood skids and costs of paper wrapping are high.



STORAGE Wood separators and racks rust adjacent steel sheets and shapes.



WASTERS are sheets spoiled by rust marks and residues at points of contact with wood. No longer need the cost of wood rusted steel run to millions of dollars annually. Nor must hundreds of thousands be spent on paper and metal wrappings to protect steel from wood during shipping and storage. Moisture and corrosive sap can now be permanently "locked" in green wood skids, separators, crates and boxes.

Nox-Rust WoodSeal, developed in our laboratories at the request of a leading steel producer, is simply applied, will not come off, and gives positive protection against rust and residues injurious to tools. If you *make*, *ship*, *store* or *use* steel, we suggest you drop us a line for further information on WoodSeal.

We shall be glad to send on request our new catalog describing other Nox-Rust chemicals and protective coolings.





movement. Double positive stops are used on compound slide. In addition, there is a positive type stop on top of compound slide particularly for use in controlling depth during long boring cuts.

The three-jaw universal 12 in. swing chuck is controlled by a 12 in. diameter air cylinder. A reducing valve and sight gage are included in air circuit to obtain proper chucking pressure for different jobs.

Gears on shafts in case above and to right of spindle provide spindle speeds from 143 to 524 rpm. When desired, spindle speeds can be doubled by changing motor pinion and driving gear.

High and low speed cams are mounted on a disk at rear of machine (see Fig. 3). Easily accessible, cams can be changed to obtain same feed for a shorter cam rise, thereby saving set-up time on short run jobs as it is not necessary to change cams on drums controlling slide movement.

A snap-lock limit switch is used to prevent foot pedal from operating aircontrolled chuck while spindle is in motion. A safety valve stops all machine movements when air pressure falls below minimum needed. In addition to safety devices mentioned, there are a number of limit arrangements built into the Chuck-Matic to prevent damage to machine itself.

Rigidity and simplicity of construction are attained by using only two castings.

# Cincinnati Treatise Covers Ways and Means of Milling

In line with its policy of operating, engineering and production co-operation with users of modern milling machines, Cincinnati Milling Machine Co., Oakley, Cincinnati 9, published a new text book recently entitled, "A Treatise on Milling and Milling Machines".

This 6 x 9 in., bound volume has 182 pages generously sprinkled with halftones, line drawings, diagrams and tables augmenting the text. It has been compiled by Mario Martellotti, research engineer of the company, working with the engineering service department and with users out in the field. Mr. Martellotti is widely recognized as an authority on theory and practice of metal cutting.

The six chapters cover: The milling machine; milling machine accessories; milling cutters; milling cutter materials; milling cutter elements; and sharpening of milling cutters. Numerous setups, employed in manufacturing plants, are described and illustrated to emphasize good holding and fixture practice and economical cycles of operations.

Copies of this treatise are available from the company at \$1.00 each, prepaid.

# **Carbon-Graphite Parts**

(Continued from Page 110) property-heat resistance. Its chemical and physical analyses are unaffected by heat under neutral conditions. If oxygen is present it will begin to oxidize at 700° F. It will not melt or fuse at any temperature, however. If heated to 6332° F, volatilization takes place. The average expansion with variation in temperature is extremely small. In the range 74 to 625° F, size change of a part will not exceed 0.0000015-in. per inch per degree F. The glass industry has capitalized upon this resistance to heat by using carbon-graphite molds, diabolos, foot forming pads, conveyor pads, and other equipment parts. Thus is turned out a clean, high-finish product without scoring or adhering.

In contemplating design of Graphitar parts, it is well to keep in mind the facts set forth in following paragraphs.

Wall Thickness of 1/8-In.

In the interests of strength, wall thicknesses of carbon-graphite rings and similar parts should never be less than <sup>1</sup>/<sub>8</sub>in. and should be of greater thickness on large sizes.

Molded size, outside diameter, thickness, and inside diameter are the piece dimensions considered in the order of their ease of manufacture. Depending on part size and shape, and Graphitar grade, molded tolerances can be held to  $1\frac{1}{2}$  per cent of both inside and outside diameters, with an acceptable minimum of 0.010-in., whichever is greater. Length can be held to 10 per cent of overall dimension, minimum 0.040-in., and on projections a limit of 4 per cent is possible, minimum 0.010-in.

Broad tolerances are most economical. However, close tolerances can be considered if higher costs can be tolerated. Tolerances of 0.0005-in. are not unusual on ground dimensions of small pieces. Flat surfaces can be lapped to within a few millionths of an inch, measured with light wave band equipment. Where ID's are 2-in. or less, the normal tolerance is 0.004-in., and proportionately larger dimensions are held to proportionately more liberal tolerances. ID's of less than 1/2-in. should carry a molded tolerance wherever possible, due to the extreme difficulty in grinding. Normal OD tolerance is 0.004-in. A normal tolerance of 0.010-in. is held on length; 0,004-in. on parallelism.

The following installations show how engineers have utilized carbon-graphite's many favorable characteristics to improve mechanical performance.

Wearing rings and lantern rings of this material are widely used in centrifugal pumps (Figs. 2a and 2b, respec<text>

Accurately, sensitively the modern gravimeter gauges the oil potential of the earth's subsurface strata. Here's a far cry from the supernatural peach twigs and "oil witches" used by prospectors a century ago!

In the transmission and control of power, too, there have been far-reaching advancements and improvements... paving the way to increased production from powered industrial equipment and machinery.

For 28 years, designing, building and improving *proved power links* has been a Twin Disc Clutch Company tradition...a tradition reflected today in the extensive line of Twin Disc Clutches and Hydraulic Drives. That's why so many leading manufacturers of powered industrial equipment turn to Twin Disc Engineers first for a solution to their most complicated linkage problems.

Why not take a tip from them? If the connection between driving and driven units presents a problem in *your* equipment, write for the recommendations of Twin Disc Engineers. Chances are, their broad experience will provide a profitable solution.

TWIN DISC CLUTCH CO., Racine, Wis. Hydraulic Division, Rockford, Illinois



# "KNOW HOW"

IS THE SOLUTION TO YOUR PROBLEMS ON SPECIAL WASHERS AND SMALL STAMPINGS

Bring your troubles to us at Master Products. The experience gained in 25 years of solving Special Washer and Small Stamping problems enables us to serve you well.

# OVER 10,000 SETS of TOOLS at your disposal

If these won't give you what you want, our Tool and Die Department will make up special designs for you at reasonable cost. Just send us your blueprints or specifications.

Also a full line of Standard Washers in kegs or cartons.

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tively) handling steam, water, hot oil, trichloroethylene, caustic soda, gasoline, and other solutions. Forming the bearing and seal surfaces on the pump impeller, these rings mate satisfactorily with smooth-ground steel, bronze, brass, and stainless steel in that order of preference. They can be ground to tolerances as close as 0.001-in. on small sizes. They are effecicient in close-clearance installations for preventing leakage of the material being pumped back to the suction side. Under typical operating conditions at 50 psi (max), 200 F and 3400 fpm, these rings resist corrosion, heat, and distortion, they are mechanically strong, and are lubricated by the material being pumped.

In classifying seals, engineers usually speak of good drop tight, or bubble tight seals. Carbon-graphite will make virtually any type of seal needed. A carbongraphite seal on a steam turbine, for example, makes a good seal, since the small amount of steam permitted to escape does not noticeably lessen turbine efficiency. Where there is a need for an absolutely leak-proof seal, as in a torque converter, a different grade of carbongraphite, one of less porosity, will provide the necessary protection.

A positive drop-tight seal is afforded by such rings in rotary pressure joints (Fig.3) handling solutions such as steam, water, hot oil, and trichloroethylene. The free-floating rings form the bearing and seal surfaces between the stationary and rotating members, the spherical surface providing the bearing for the rotating internal member while the flat face seals and provides for lateral motion. Such installations are on paper machines, waxing and parafinning machines, plasticators, and cotton and rayon slashers. These rings operate efficiently up to 210 psi, 650 F, and 600 fpm.

Graphitar guide bearings (Fig. 4a) held in the joint connection of sump pumps (Fig. 4b) align and support the vertical shaft while withstanding the destructive action of hot or corrosive fluids being pumped. They will operate satisfactorily at temperatures up to 1200 F, using the molten salt present as lubricant. In this installation, carbon-graphite guide bearings mate with stainless steel, hardened steel, soft steel, or hard bronze shafts, with all surfaces smooth-ground except stainless steel, which should be superfinished.

Water metering disks (Fig. 5) possess many advantages. Chemically inert, nonwarping, and easily machined, they are sufficiently light in weight to record a small head of liquid. In meters handling all liquids, including hot water and chemicals, the carbon-graphite wobble disk meters a definite quantity of liquid

# CARBON-GRAPHITE IS IMPERVIOUS TO THESE CHEMICALS

Acetic Acid (dilute) Acetic Acid (glacial) Acetol Acetone Alcohol Alum Amidol Ammonia Amyl Alcohol Aniline Arsenic Acid Asphaltum Beer Beet Juice Benzilic Acid Benzine Benzine Bleach Solutions Boric Acid Brine Bromine Water Butyl Alcohol Calcium Chloride Calcium Hydroxide Carbelie Acid Carbon Dioxide Carbon Dioxide Carbon Dioxide-Water Carbon Disulphide Carbon Tetrachloride Cellosolve Chlorine Chlorine-Water Chloroform Citric Acid Coke Oven Gas Cottenseed Oil Gas Creosole Cupric Chloride Cyanic Acid Dextrose Dibenzyl Dichloroether Distilled Spirits Ethyl Acetate Ethyl Alcohol Ethyl Chloride Ethylene Ethylene Dichloride Fluroroform

Formic Acid Freon (11) Freon (12) Fuel Oil Furfuryl Alcohol Gasoline Glue Glycerine Helium Hydrobromic Acid Hydrocarbon Gases Hydrochloric Acid Hydrochloric Acid Hydrofluoric Acid Hydrogen Peroxide Hydrogen Peroxide Water Hydrogensulphide Iodine-Water Isopropyl Alcohol Isopropyl Ether Kerosene Lard Lard Lactic Acid Lime Water Lithium Chloride Lithium Hydroxide Lubricating Oil Lye Maleac Acid Menthol Mercury Methane Methyl Alcohol Methyl-Ethyl Ether Milk Mine Water Mineral Oil Molasses Naphtha Naphthalene Nickel Chloride Nickel Sulphate N trin Acid-concentrated Nitric Acid-dilute Nitro Benzoic Acid Nitrogen Nitroglycerine Olive Oil Oxalic Acid

Oxygen Paint Paraffin Pentane Petroleum Phenol Phenol Phosphoric Acid Picric Acid Potassium Chloride Potassium Hydroxide Potassium Nitrate Propyl Alcohol Pyrenc Rape Sced Oil Rosin Salicyclic Acid Salt Water Sea Water Sewage Shellas Soap Sodium Chloride Sodium Hydroxide Sodium Hydroxulphate Sodium Hyposulphat Sodium Nyposulphat Sodium Nitrate Sorbic Acid Staroi Starch Stearic Acid Sugar Sulphur Sulphuric Acid Tar Toluene Tributyl Alcohol Tung Oil Turpentine Uric Acid Varnish Vegetable Oil Vinegar Vinyl Acetic Acid Water Wine Wood Pulp Zine Chloride

above and below the plate section. Up to 50 psi, at 200 F and 600 fpm, they hold constant clearances for accurate flow measurements.

Held in a synthetic rubber ring, a seal ring of this material seals on lapped metal nesepiece of a metallic bellows to hold hot kerosene in a torque converter (Fig. 8). Under 100 psi, at 350 F and 1000 fpm, this seal will not gall or leak hot oil and will hold a static head. Temperatures up to 400 F, caused by unusual conditions, will not affect it. Dimensions can be held as close as 0.001-in. on small sizes, and surfaces can be lapped within 3 light bands on small sizes. Lapped flat surfaces will not warp or distort.

# Graphitar Blades in Brake System

Successful operation of one of the most widely-known automotive air brake systems depends upon Graphitar blades installed in the compressor (Fig. 7). In the type illustrated, spring pressure holds the blade against the cylinder; in others, a center pin is used, and in a few types, a double blade extending through the rotor is employed. Up to 100 psi, at 200° F, and 1300 fpm, the blades give low wear, low friction, and high output. They may be operated dry to give high dry lift. These blades are also widely used in aircraft, being installed in instrument vacuum pumps, de-icer pumps, luel pumps, fuel transfer pumps, cabin superchargers, and magneto superchargers.

A metal backing, shrunk-fit on a carbon-graphite bearing (Fig. 6), adds strength and durability for installation on steam turbine camshafts, in baking ovens, paper-mill dryers, clutch release assemblies, kilns, and in other installations where temperatures and pressures are unusually high. Assembled in this manner, carbon-graphite can be readily installed in a bearing housing. Being under compression it will expand and contract with temperature differentials at approximately the same rate as the metal backing. Metal shell thickness should be third to half the thickness of the Graphitar wall section, and allowance must be made for a close in on the inside diameter of the bearings, which amounts to approximately 80 per cent of the shrink fit used.

In the table there are included the names of 143 chemicals that will not affect or react with carbon-graphite in any form.

Flo-Well No. 2 flux for brazing of aluminum is introduced by A. K. Mauk, 7501 Hamilton avenue, Pittsburgh. It is said to be equally useful in either furnace brazing or torch brazing alminum, and reportedly will not solidify

-0-



# for decorative purposes at lower cost

If you have a new product which must be decorative, or an old product that needs "dressing up," consider carefully the merits of Brass Coated ThomaStrip. Produced by fusion under the patented ThomaStrip process, it provides the finest type of coating. To meet your individual needs, the surface can easily be oxidized to provide a variety of finishes and is available in bright rolled, buffed, and clear lacquer finishes.

Brass Coated ThomaStrip affords protection against rust and corrosion, is highly ductile, will not chip or peel, and is readily adaptable to mild stamping, parts, and tubing. In many cases, it can be used to replace more expensive metals-without loss of product quality.



ELECTRO-COATED ZINC, COPPER, NICKEL AND BRASS...HOT DIPPED TIN AND SOLDER...LACQUER COATED IN COLORS ... **UNCOATED PRECISION STRIP, CARBON AND ALLOY SPECIALTIES** 

THE THOMAS STEEL CO. WARREN · OHIO COLD ROLLED STRIP STEEL SPECIALISTS

or deteriorate.



DEPRESSIVE effects of the bituminous coal miners' strike had accumulated sufficiently by the week ended May 11 to produce the greatest weekly decline in industrial production since the initial drop at the beginning of the strike.

Falling five points below the week ended May 4, STEEL's industrial production index for the week ended May 11 registered 115 per cent (preliminary) of the 1936-1939 weekly average. The first week of the coal strike produced a 9-point decline.

Largest portion of the latest decline is attributable to curtailment of ingot production in the steel industry, which is suffering from fuel shortages.

AUTOMOBILES—Meanwhile, however, the automobile industry was maintaining its forward impetus and in the week ended May 11 produced 70,225 passenger cars, trucks, and busses, the highest output since January, 1942. Production in the week ended May 4 was 67,060 units. COAL—By the end of the fifth week of the bituminous coal miners' strike, production of soft coal this year had fallen 41,316,000 tons, or 20.1 per cent, behind that for the corresponding period of last year. At the beginning of the strike, the 1946 cumulative output was 4.7 per cent ahead of the corresponding 1945 production.

COKE—Output of both by-product and beehive coke in March increased 2,464,570 tons over February and totaled 5,461,954 tons. The increase resulted from gains of 90 per cent and 26 per cent, respectively, in by-product and beehive output. The marked increase in by-product coke production was the result principally of increased activity at "furnace" plants for which the production rate advanced from 36 per cent of capacity in February (a month affected by a steel strike) to 79 per cent in March. RAILROADS-From advance reports from 60 Class I railroads, whose revenues represent 91.9 per cent of total operating revenues, the Association of American Railroads estimates that railroad operating revenues in April, 1946, decreased 28.8 per cent under the same month of 1945. This estimate covers only operating revenues and does not touch upon trends in operating expenses, taxes, or final income results. Estimated freight revenues in April, 1946, were less than in April, 1945, by 32.5 per cent, while estimated passenger revenues fell 17.4 per cent. CASTINCS-Shipments of malleable iron castings during March totaled 49,839 tons, a 24 per cent increase over the 40,156 tons shipped during February, but 42 per cent lower than the 85,307 tons shipped during March, 1945,

when wartime activity in the malleable iron castings industry was at its peak. New orders booked for outside trades, less cancellations, totaled 49,609 tons during March. This was a 60 per cent increase over the February, 1946, orders.



# -FIGURES THIS WEEK

INDUSTRY Steel Ingot Output (per cent of capacity)† Electric Power Distributed (million kilowatt hours) Bituminous Coal Production (daily av.—1000 tons). Petroleum Production (daily av.—1000 bhls.) Construction Volume (ENR—Unit \$1,000,000). Automobile and Truck Output (Ward's—number units). *Dates on request. †1946 weekly capacity is 1,762,381 net tons. 1945 we	Latest Period® 55.5 3,911 85 4,749 \$137.6 70,225 ekly capacity	Prior Week 64.5 4,012 125 4,721 \$108.8 67,060 was 1,831,636	Month Ago 75.5 4,015 142 4,691 \$118.9 49,425 net tons.	Year Ago 95 4,302 1,790 4,800 \$38.9 17,585
TRADE Freight Carloadings (unit-1000 cars). Business Failures (Dun & Brodstreet, number). Money in Circulation (in millions of dollars)†. Department Store Sales (change from like week a year ago)‡ †Preliminary. ‡Federal Reserve Board.	670† 23 \$27,958 +29%	671 23 \$27,859 +20%	649 24 \$27,955 + 50%	\$38 16 \$26,312 +5%

# THE BUSINESS TREND



FINANCE	Latest	Prior	Month	Year	
Bank Clearings (Dun & Bundstant willing)	Period	Week	Ago	Ago	
Federal Gross Debt (billions)	\$12,200	\$12,418	\$11,028	\$10,591	
Bond Volume, NYSE (millions)	\$202.3	\$34.4	\$30.8	\$69.9	
Long and NYSE (thousands).	7,426	5,446	7,591	8.159	
United Status Goldense (billions)	\$64.4	\$65.3	\$65.2	\$57.2	
iMember banks, Federal Reserve System.	\$45,993	\$46,935	\$46,538	\$42,844	
PRICES					
STEEL's composite finished steel price average	\$63.54	\$63.54 .	\$63.54	\$57.55	
Industrial D	109.9	109.6	109.1	105.7	
Manufacture 1 D Materials	123.1	123.0	122.2	117.8	
Bureau of Labor Statistics Index, 1926 = 100.	105.5	105.1	104.6	102.0	



# for Peacetime - Products:

# lightweight structures

# with heavyweight strength ... from B&W Tubes

For collapsible deck-edge elevators to whisk battle planes between hangars and flight decks of Essex class aircraft carriers, a lightweight yet exceptionally sturdy framework material was needed. The elevators overhang the deck without counterweighting, must support an 18,000 lb. load, absorb a terrific beating when submerged by heavy seas. B&W alloy tubing met the requirements with characteristic success.

There's an idea here for peacetime industry. B&W mechanical Tubing offers cost-cutting advantages, for instance, in lightweight, heavyduty drilling rigs, in hoists and masts ... telescoping or rigid. In dozens of other fields, too, B&W Tubing, developed for wartime jobs, merits investigation for weight-saving, moneysaving use today.

saving use today. B&W can supply mechanical tubing (either scamless or welded) of the proper analysis, size, gauge, temper, and finish for making practically any hollow part. Let us know what you plan to make. We may be able to suggest a B&W Tubing that's lighter, cheaper, and faster to fabricate than other materials you may have planned to use—and just as strong, too.





Water-Tube Boilers, for Stationary Power Plants, for Marine Service • Water-Cooled Furnaces • Superheaters • Economizers • Air Heaters • Pulverized-Coal Equipment • Chain-Grate Stokers • Oil, Gas and Multifuel Burners • Refractories • Process Equipment.



# BETTER COLD ROLLED STRIP FOR LESS MONEY

As you swing into the highly competitive market on strip, remember that M-H rolls with their greater resistance to indentation assure a better quality of finish for your product . . . and because these rolls have a deeper hardness penetration, they can be used down to scrap diameter without rehardening. Thus M-H rolls mean strip with greater sales attraction at a lower average cost.

MACKINTOSH-HEMPHILL CO.

Pittsburgh and Midland, Pa.

Makers of the rolls with the red wabblers

# MIRROR FINISH... MIRROR IN HALF... IME CUT SAVED IME 6.00

# LEBLOND HEAVY DUTY ENGINE LATHE!

**OPERATION:** Cutting taper, relief, and thread ... smooth finish overall... on chrome moly (#4130) steel laundry extractor spindles in the plant of WESTERN LAUNDRY MACHINERY CO., North Kansas City, Mo.

With fast powerful drive and smooth vibrationless operation, this LeBlond lathe has cut machining time from 5 hours to 21/2 hours, saves Western \$6.00 per spindle, and Works Manager C. F. Miles states, "Mirror finish is the best we can do on that LeBlond!"

Formerly, Western Laundry Machinery Co.

THE R. K.

had to grind each spindle after turning on another lathe. Now, grinding is completely unnecessary and the LeBlond speeds out spindles with only the barest suggestion of a tool mark.

If that kind of turning performance sounds good to you, call in your LeBlond Agent. He'll show you the proper LeBlond lathe for your range of products and he may have the answer to that tough job of yours that, up to now, just hasn't gone fast enough or good enough. Better find out!

# MACHINE TOOL CO., CINCINNATI 8, OHIO

NEW YORK 6, Singer Bldg., 149 Broadway, Worth 2-0722 CHICAGO 6, 20 North Wacker Drive, STA 5561



# MARKET SUMMARY

# Steel Carryover Covers Most Third Quarter Output

No definite delivery promises being made . . . Production continues to fall . . . Sheets, tin plate in best position

CONFUSION reigns in the steel industry as production continues limited by lack of fuel and orders back up far into the future. With most steelmakers sold through the year on practically all items and consumers pressing for deliveries it is impossible to make schedules with any certainty, especially in view of the continuing decline in production.

While the two weeks truce in mining is resulting in more coal being mined little has reached consumers and steelmaking has not been improved and no gain is expected until the coal situation is definitely settled.

Last week saw a leveling off in the case of some producers, with a sharper drop for others, the tendency being definitely downward. Not only is production dwindling but consumption also, with work being curtailed at some plants and stopped at others, from lack of steel or of fuel, or both.

Inability to formulate delivery schedules stems from the heavy load of orders on books. Some mills are so far behind on production that their present carryovers probably will absorb all of third quarter output. As a result producers are making no definite commitments on the general run of products, being practically obligated for the remainder of the year and accepting no new orders for 1947.

Production of sheets and tin plate has held up better during the coal strike than in most other products, as every elfort has been made to favor these items where possible beause of their special importance to the reconversion effort and food preservation. However, both have suffered. Civilian Production Administration has revoked export tin plate space reservations, though export orders must be kept in schedules and makers are urged to continue shipments in the same ratio for export as for domestic use.

Sheet sellers operating on a quarterly quota basis are being



DISTRIC	1 511	EL RA	IES	
(Percentage of in Le	Ingot ading	Capacity Districts)	/ Engag	ed
i.	Veek		Same	Week
May	18 C	hange 1	945	1944
Pittsburgh	39.5	-5.5	92	94
Chicago	45.5	-7.5	97.5	102
Eastern Pa	36	-21	93	94
Youngstown	43	2	90	96
Wheeling	72	-2.5	92	102
Cleveland	77.5	-0.5	92.5	77.5
Buffalo	49	None	60	90.5
Birmingham	44	None	95	95
New England	.75	-5	90	92
Cincinnati	84	5	92	82
St. Louis	44.5	-10	80	77
Detroit	84	None	88	86
Estimated national				
rate	49	-6.5	93.5	98.5
Based on week	ly stee	Imaking	capaciti	ies of
1,762,381 net ton:	s for	1946; 1,	831,636	tons
for 1945; 1,791,28	7 tons	for 1944		

forced to defer announcement of third quarter quotas and in many cases probably will have little new tonnage to allocate in view of current commitments. One large producer under the quota system believes he will have a fair tonnage available for September, assuming the coal strike is settled soon.

Estimated steel ingot production last week continued its decline, falling 6½ points to 49 per cent of capacity. Eastern Pennsylvania receded 21 points to 36 per cent, Pittsburgh 5½ points to 39½, Chicago 7½ points to 45½, Youngstown 2 points to 43, Cleveland ½-point to 77½, Wheeling 2½ points to 72, Cincinnati 5 points to 84, St. Louis 10 points to 44½, New England 5 points to 75. Rates were unchanged at Buffalo 49, Birmingham 44 and Detroit 84. West Coast operations are unchanged at 84 per cent.

In spite of greatly reduced consumption the demand for scrap has not abated and pressure for deliveries continues strong from all consumers, seeking to obtain material for use when steeImaking gets back to near normal. The famine in scrap is the most severe in the experience of most melters and springboards and freight absorption are no bar to efforts to bring in remote supplies. Shipments held up by the railroad embargo have been resumed but volume has not increased appreciably.

Pig iron shortage, a result of banking many blast furnaces, has caused many foundries to curtail operations and in some cases to close until conditions become more normal. Under the circumstances at least a month after fuel supply is resumed will be required to bring pig iron supply to a point where a reasonable rate of shipments can be expected. Additional furnaces are being banked as fuel supply shrinks further. Foundries are also handicapped by shortage of scrap in suitable grades, said to be the tightest situation in the experience of most melters.

While full effects of the steel and coal strikes have not yet been felt, the loss of ingot tonnage in four months this vear was 11,212.087 net tons. April production was only 5,876,998 tons, compared with 7,291,026 tons in April, 1945. The loss in May because of the soft coal strike will add to the deficit, as steelmaking operations have been substantially lower than in April.

Average composite prices of steel and iron products are unchanged from the level of several months.

# COMPOSITE MARKET AVERAGES

- MARKET PRICES -

				One	Inree	Une	rive
1				Month Ago	Months Ago	Year Ago	Years Ago
	May 18	May 11	May 4	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. Semifnished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:— Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

# COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago Finished Material and Wire Rods, cents per lb; coke, dollars per net ton; others dollars per gross ton.

# **Finished Material**

	May 18,	Арг.,	Feb.,	May,
	1946	1946	1946	1945
Steel hars, Pittsburgh	2.50c	2.50c	2.375c	2,17c
Steel hars Philadelphia	2.82	2.82	2.695	2.495
Steel bars Chicago	2.50	2.50	2.375	2.17
Shanes Pittshurgh	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
Platar Ditichurgh	2 50	2 50	2.375	2.212
Plater Philadelphia	2 55	2 55	2 425	2,263
Plates, Chicago	2.50	2 50	2 375	2 22
Shoots bot solled Dittsburgh	2 425	2 425	2 3125	2 20
Sheets, not-rolled, Fittsburgh	3 975	3 275	3 165	3 05
Sheets No 04 goly Ditteburgh	4.05	4.05	3 975	3.65
Sheets hot solled Corris	2 495	9 495	2 3125	2 20
Sheets, not-rolled, Gary	2.920	2.925	2 1625	2.05
Sneets, cold-rolled, Gary	3.210	3.210	3.1020	3.00
Sheets, No. 24 galv., Gary	4.05	4.00	3.8(3	0.10
Hot-rolled strip, over 6 to 12-in., Pitts.	2.35	2.35	2,220	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
Win plate new here how Dittehungh	FR 05	5 75	55 125	55 10

# **Semifinished Material**

Sheet	bars,	Pittsburgh.	Chicago	 \$38.00	\$38.00	\$37.00	\$34.50
Slabs,	Pittsh	urgh, Chica	ago	 39.00	39.00	37.50	34,50
Reroll	ing bil	lets, Pittsbi	urgh	 39.00	39.00	37.50	34.50
Wire I	rods. N	10. 5 to &-	inch. Pitts	 2.30c	2.30c	2.225c	2.05

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	д	-		ь.	~		

	May 18,	Apr.,	Feb.,	May.	
Bassamer del Pittshurgh	1946	527 69	\$26.94	\$26.19	
Basic. Valley	26.00	26.00	25.25	24.50	
Basic, eastern del. Philadelphia	27.84	27.84	27.09	26.34	
No. 2 fdry., del. Pgh. N. & S. sides	27.19	27.19	26.44	25.69	
No. 2 foundry, Chicago	26.50	26.50	25.75	25.00	
Southern No. 2, Birmingham	22.88	22.88	22.13	21.00	
No. 2 (dry del Philadelphia	26.99	20.94	20.19	26.34	
Malleahle 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	
Gray forge, del. Pittsburgh	26.69	26.69	25.94	20,19	
Ferromanganese, del. Pittsburgh	140.00	140.00	140.00	140.00	
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	18.70	
Rails for rolling, Chicago	22.25	22.25	22.25	20.00	
No. 1 cast, Chicago	20,00	20.00	20.00	20100	
Coke					
Connellsville, furnace ovens	\$7.50	\$7.50	\$7.50	\$7.00	
Connellsville, foundry ovens	8.25	8.25	8.25	7.75	
Chicago, by-product fdry., del	13.75	13.75	13.75	13,35	

# 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; beehive oven coke, No. 77; bolts, nuts and rivets, No. 147; coke by-products, GMPR, except sulphate of ammonia, 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

Carbon Steel Ingots: Fob mill base, rerolling quality, standard analysis, \$33.

Alloy Steel Ingots: Pittsburgh, Chicago, Buf-falo, Bethlehem, Canton, Massilion; uncrop, \$46.80.

Recolling Billets, Blooms, Slabs: Plttsburgh, 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.)

Forging Quality Blooms, Slabs, Billets: Pitts-burgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, \$47; Detroit, del., \$49; Duluth, billets, \$49; forging billets fob Pac. ports, \$59.

(Andrews Steel Co. may quote carbon forging billets \$50 gross ton at established basing points; Follansbee Steel Corp., \$49.50 fob 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. £59.16.

Sheet Bars: Pittsburgh, Chicago, Cleveland Fufialo, Canton, Sparrows Point, Youngstown, 33. (Empire Sheet & Tin Plate Co., Mans-field, O., carbon sheet bars, \$39, fob mill.)

Skelp: Pittsburgh, Chicago, Span Youngstown, Coatesville, lb, 2.05c. Sparrows Point,

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—4 in. inclusive, per 100 ib, \$2.30. Do., over  $y_1 \rightarrow \overline{y_1}$  in., incl., \$2.45; Galveston, base, \$2.40 and \$2.55, respectively, Worcester add \$0.10; Pacific ports \$0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: 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; Gulf 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.) Rail Steel Bars: Same prices as for hot-rolled 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, Massillon, 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, Oklaboma ). 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 61	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, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c. Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3,48c; Detroit, del., 3.58c; eastern Mich., 3.63c.

Reinforcing Barrs (New Billet): 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, Chl-cago, Gary, Cleveland, Elrmingham, Youngs-town, Buffalo, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, del., 2.50c; Guif ports, dock, 2.70c.

Iron Bars: Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Terre Haute, single ref., 5.42c; double ref., 6.76c.

# Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base, 2,425c; Gran-ite City, base, 2,525c; Detrolt, del, 2,525c; eastern Mich., del, 2,575c; Phila., del, 2,595c; 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., Consho-hocken, Pa., may quote 2,60c on hot carbon sheets, nearest eastern basing point.) Cold.Rolled Sheete: Pittsburgh, Chicago, Cleve-

Cold-Bolled Sheets: Pittsburgh, Chicago, Cleve-land, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite City, base, 3.375c; De-trolt, del., 3.375c; eastern Mich., del., 3.425c; New York, del., 3.615c; Phila., del., 3.595c; Pacific ports, 3.925c.

Facilic ports, 3.925c. Gaivanized Sheets, No. 24: Pittsbursh, Chi-cago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 4.06c; Granite City, base, 4.15c; New York, del., Corrugated Galv. Sheets: Pittsbursh, Chicago, Gary, Birmingham, 29-gage, per square, 3.73c.

Culvert Sheets: Plttsburgh, Chicago, Cuivert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corrugated, copper alloy, 4.15c; Granite City, 4.25c; Pacific ports, 4.60c; copper iron, 4.50c; pure iron, 4.50c; zinc-coated, hot-dipped, heat-treated, No. 24, Pitts-burgh, 4.60c.

Aluminized Sheets, 20 gage: Pittsburgh, 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. Electrated Sheats No. 244

## 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	7.625c	8.375c	
58	8.1250	8 875c	

58 ..... 8.125c 52 ..... 8.925c 9.675c . . . . .

Cold-Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less, 3.05c; Chi-cago, base, 3.15c; Detroit, 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.

# Tin, Terne Plate

III, IETRE Flate (OPA celling prices announced March 1, 1946.) The 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.

Cary, base 29-gage and lighter, 3.30c; Granite Cary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pa-elfic ports, boxed, 4.30c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted, 4.05c; Pacific ports, 4.80c. Manufacturing Ternes (Special Coaled): Pitts-burgh, Chicago, Gary, 100-base box, \$4.55; Granite City, Birmingham, Sparrows Point,

Mathe City, Building base per pack-Mathematic Pittsburgh base per pack-age 112 sheets: 20 x 28 in., coating I. C. 8-ib M2.50; 20-ib \$15.50 (nom.); 40-ib \$20.00 (nom.)

# Plates

Plates Carbon Steel Plates: Pittsburgh; Chicago, Ger, 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-differents, 3.05c; Guif ports, 2.85c. Grante City Steel Co. may quote carbon plates 2.6c fob D.P.C. mill; Geneva Steel Co., Provo, Utah, 3.20c fob Pac, ports; Central Inn & Steel Co., Harrisburg, Pa., 2.80c, bas-in points; Lukens Steel Co., Coatesville, Pa., 2.70c, base; Worth Steel Co., Claymont, Del., 2.70c, base; Worth Steel Co., Claymont, Del., 2.70c, base; Morth Steel Co., Conshoo-beken, Pa., 2.75c, base) Phore Plates: Pittsburgh, Chicago, 3.75c; Pa-cine ports, 4.40c; Guif ports, 4.10c. Den Harth Alloy Plates: Pittsburgh, Chi-can, Coatesville, 3.75c; Guif ports, 4.20c; Paelfo ports, 4.40c; Casteel Plates: Coatesville, 10% cladding: nicked. ed. B.72c; inconel-clad, 26.00c; monel-clad, 24.96c.

# 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. (Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.45c, Bethlehem, Pa., on the gumalent of 2.45c, Bethlehem, Pa., Steel Putter, Pa., Steel Putter, Pa., Chicago, Buffalo, 2.65c; Pacific ports, 3.20c.

Wire Products to Trade	•\$4.00
Standard and cement-coated	+\$3.25
Mire, Merchant Quality	11\$2.90
Galvanized	\$\$3.50 \$\$3.85

Fob Pittsburgh, Chicago, Cleveland, Bir.	ming-
am, per base column)	70
sarbed wire, 80-rod spool	79
sarbless wire, twisted	79
Cence posts	74
	12 72

•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 butt weid. Pittsburgh base only on wrought iron pipe. Butt Weld

Dutt WClu										
	Ste	el		I	non					
In.	Blk.	Galv.	In.	Blk.	Galv.					
1/8	53	30	1/1	21	01%					
14 & .	56	3716	34	27	7					
1/0	601%	48	1-114	31	13					
34	6316	52	116	35	151%					
1-3	651%	5416	2	3416	15					
Lap Weld										
	Ste	eel		L	ron					
In.	Blk.	Galv.	In.	Blk.	Galy.					
2	58	4616	114	20	014					
21/0-3	61	4916	11/	251/6	7'					
316-6	63	5114	2	2716	9					
7-8	. 62	4914	216-314	. 2816	1116					
9-10	6116	49	4		15					
11-12	6016	48	416-8	2914	14					
			0.10							

Boller Tubes: Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

		-301	umess	-Elec,	weig
0.D.		Hot	Cold	Hot	Cold
sizes	B.W.	G. Rolled	Drawn	Rolled	Rolled
1"	. 13		\$9.90	\$9.36	\$9.65
14".	. 13		11,73	9.63	11.43
11/1"	. 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
2¼″.	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. \$5

**Rails, Supplies** Standard rails, over 60-lb, fob mill, net ton, \$43.40. Light rails (billet), Pittsburgh, Chicago, Birmingham, net ton, \$49.18. •Relaying rails, 35 lb and over, fob railroad and being points \$31.53

Areasying rails, 35 ib and over, fob railroad and basing points, \$31-\$33. Supplies: Track bolts, 4.75c; heat treated, 5.00c. The plates \$51 net ton, base, Standard splkes, 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; oil-hardening 25.97c; high carbon-chromium 46.53c.

				Dase,
W.	Cr.	V.	Mo.	per lb.
18.00	4	1		72.490
1.5	4	1	8.5	58.43c
	4	2	3	58.430
6.40	4.15	1.90	5	62.22c
5.50 '	4.50	4	4.50	75.740

## Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

ill uctur	<u>ен</u> ,						٠	٠						٠			٠	٠	٠	٠	٠		υ.	100
-inch	and	ι	ine	1	e	r							-	•		•					, (	65·	-5	of
				λ.						٢.	4	ŧ.												

**Bolts**, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chi-cago. Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow

1% and lar	ger, all len	gths		59 off
All diameter	s, over 6-ir	long		59 off
Tire bolts .				50 off
Step bolts				56 off
Plow bolts				65 off
	Stove	Bolts		
In package	, nuts set	parate. 7	1-10 off	nuts
attached	71 off hu	k 80 off	on 15	000 of
3-in and	shorter or	5000 ov	er 3 In	nuta
senarate	Shorter, or	0000 01		,
separate.				
a	N	uts		
Seminished	nex	υ.	9.S.	S.A.E.
1's -in. and si	maller			64
1/1-In. and si	maller		62	100
1/2-in1-in.				60
y, -in1-in.	*********		59	
1 1/2 - in1 1/2 - i	n		57	58
1%-in, and	larger		56	
Additional d	iscount of 1	10 for ful	kegs.	
	Hexagon (	Cap Screw		
Upset 1-in.,	smaller			64 off
Milled 1-in.,	smaller			110 06
	Square Hea	d Set Sere	ews	
Upset 1-in.	and smalle	r		71 off
Headless. 1/4	-in. and la	rger		60 off
No. 10 and	smaller			70 off
P	C 4 1			
Stainles	s Steels			
(Open m	arket prices	S. OPA p	rice cont	rol
S	uspended O	ct. 11, 194	(5.)	
	Base, Ce	nts per lb		
CHROMIN	NICEPT	STEFF		
CHROMION	I HIGHEL	STELLAS	HP	C R
R	are Platos	Shoote	Strin	Strin
000 05	0Go 20 21	26 700	23.034	20 200
202 79	12 21 39	38.95	20.21	35 71
204 27	05 21 29	22 05	25 45	32.46
209 21	39 36 70	44.36	30.84	37 87
200 38	05 43 28	50.85	40.03	50.85
310 53	02 56 26	57 35	52 74	60.59
310 32	05 43 28	53.02	02.112	00.00
0316 43	28 47 61	51 94	43 28	51 94
1201 21	38 36 70	44 36	31 65	41 12
1247 25	71 41 19	48 69	35 71	45 44
421 20	56 22.90	31 30	19 94	24 35
401 20.	20.00	01.00	10.01	
STRAIGHT	CHROMIU	M STEEL	100.00	00.01
403 23.	93 26.51	31.92	22.99	29.21
** 410 20	02 23.93	28.67	18.39	23.80
416 20.	56 23.80	29.21	19.75	20.40
11420 25	96 30.84	36.25	25,70	39.49
430 . 20	56 23.80	31.38	18.94	24.30
11430F. 21.	10 24.35	31.92	20.29	26.51
440A. 25.	96 30.84	36.25	25.70	39.49
442 . 24.	35 27.59	35.17	25.96	34.04
443 24.	35 27.59	35.17	25.96	34.62
4.16 . 29	.76 33.00	39.49	37.87	56.26
501 8	.66 12.98	17.04	12.98	18.39

Decuive Ovens	
Connellsville, furnace Connellsville, foundry New River, foundry Wise county, furnace 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 St. Louis, delivered Birmingham, delivered Indianapolis, delivered Cincinnati, delivered Buffalo, delivered Detroit, delivered Detroit, delivered Detroit, delivered	13.05 13.00 13.75 13.50 13.75 14.65 10.90 13.50 13.20 13.20 13.40 13.75 13.20

\*Operators of hand-drawn ovens using trucked coal may charge \$8.00; effective May 26, 1945. †14.25 from other than Ala., Mo., Tenn.

## Coke By-Products

8.66 9.74

Metallurgical Coke

501... 502...

12.98 14.07

 502...
 9.74
 14.07
 16.12
 14.07

 STAINLESS CLAD STEEL (20%)
 150b
 Pittsburgh and Washington, Pa., prices include annealing and pickling.)
 304...
 19.48
 20.56
 ...

 304...
 17.31
 18.39
 ...
 430
 ...
 17.85
 18.94
 ...

 430...
 17.45
 18.94
 ...
 19.48
 20.56
 ...

• With 2-3% molybdenum. § With titanium. † With columbium. •• Plus machining agent. †† High carbon. ‡‡ Free machining.

Price Per Net Ton

18.12

14.07

§ With titanlum.

19.48

plate

Omaha
15.00c
27.00c
26.00c
26.00c
10.50c
11.25c
9.50c
8.00c
\$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 announced March 1, 1946. Open market prices designated by dagger.

Hot-rolled bars	Structural shapes	Plate.	Floor plates	Hot-rolled sheets (10-gage base)	Hot-rolled strip (14-zage and lighter, 6-in and narrower)	Hot-rolled strip (12-gage and heavier wider than 8-inch)	Galvanized flat sheets (24-gage base)	Cold-rolled sheets (17-gage base)	Cold finished bars	Cold-rolled strip
Boston 4294 New York 4.100 Jersey City 4.100 Philadelphia 4.075 Baltimore 4.055 Washington 4.191 Norfolk, Va. 4318 Bethlehem, Pa.• 4.191 Norfolk, Va. 4.318 Bethlehem, Pa.• 4.191 Coatesville, Pa.• 4.191 Buffalo (city) 3.604 Buffalo (country) 3.504 Pittsburgh (city) 3.604 Pittsburgh (city) 3.604 Pittsburgh (city) 3.604 Pittsburgh (city) 3.604 Pittsburgh (city) 3.604 Pittsburgh (city) 3.604 Detroit 3.700 Omaha (city, del.) 4.295 Omaha (country) 4.195 Clacionati 3.861	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 4.162^{1}\\ 4.018^{1}\\ 5.855^{1}\\ 3.844^{1}\\ 4.048^{1}\\ 4.221^{1}\\ 3.70^{1}\\ 3.70^{1}\\ 3.70^{1}\\ 3.55^{1}\\ 3.65^{1}\\ 3.55^{1}\\ 3.65^{1}\\ 3.65^{1}\\ 3.65^{1}\\ 3.859^{1}\\ 4.843^{3}\\ 4.248^{3}\\ 3.911^{1}\\ \end{array}$	5.977 <sup>3</sup> 5.824 <sup>1</sup> 3.768 <sup>1</sup> 5.502 <sup>1</sup> 5.591 <sup>1</sup> 5.715 <sup>1</sup> 5.15 <sup>1</sup> 5.15 <sup>1</sup> 5.438 <sup>1</sup> 5.531 <sup>1</sup> 5.531 <sup>1</sup> 5.948 <sup>1</sup> 5.948 <sup>3</sup> 5.848 <sup>3</sup> 5.541 <sup>1</sup>	$\begin{array}{c} 3.999^{1}\\ 3.815^{1}\\ 3.815^{1}\\ 3.815^{1}\\ 3.619^{1}\\ 3.821^{3}\\ 3.996^{1}\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	$\begin{array}{c} 5.456^{4}\\ 4.324^{1}\\ 4.524^{1}\\ 4.6251^{1}\\ 4.252^{1}\\ 4.741^{1}\\ 4.865^{1}\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	$\begin{array}{c} 4.356^{1} \\ 4.224^{1} \\ 4.224^{1} \\ 4.522^{1} \\ 4.152^{1} \\ 4.291^{1} \\ 4.415^{1} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	5.67414 5.46011 5.46011 5.468115 5.3441 5.82111  5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 5.2011 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4.553 <sup>n</sup> 4.553 <sup>n</sup> 4.022 <sup>11</sup> 4.502 <sup>11</sup> 4.615 <sup>11</sup>  4.615 <sup>11</sup> 4.20 <sup>21</sup> 4.10 <sup>21</sup> 4.20 <sup>21</sup> 4.10 <sup>21</sup> 4.20 <sup>21</sup>	4.965 5.024 5.022 5.022 5.022 5.022 5.022 5.022 5.022 5.022 5.022 5.022 5.022 5.022 5.022 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 5.024 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Ioungstown          Middletown, O.*          Chicago (city)       .3,75;         Milwaukee       .3,83;         Indianapolis       .3,83;         St, Paul       .4,01*         St, Louis       .3,83;         Memphis, Tenn.       .4,26;         Birmingham       .6,65;         Houston, Tex.       .4,00*         Los Angeles       .4,65*         San Francisco       .4,20*         Portland, Ureg.       .4,70*         Tacoma, Wash.       .4,60*	$\begin{array}{c} & \mathbf{3.80^{i}} \\ \mathbf{3.937^{i}} \\ \mathbf{3.88^{i}} \\ \mathbf{4.06^{i}} \\ \mathbf{4.315^{i}} \\ \mathbf{3.80^{i}} \\ \mathbf{4.315^{i}} \\ \mathbf{4.408^{i}} \\ \mathbf{4.50^{i}} \\ \mathbf{4.50^{i}} \\ \mathbf{4.90^{i}} \\ \mathbf{4.70^{i}} \\ \mathbf{4.70^{i}} \\ \mathbf{4.70^{i}} \end{array}$	8.80 <sup>4</sup> 3.937 <sup>1</sup> 3.88 <sup>1</sup> 4.08 <sup>3</sup> 3.947 <sup>1</sup> 4.315 <sup>1</sup> 3.80 <sup>4</sup> 4.408 <sup>1</sup> 4.50 <sup>4</sup> 5.20 <sup>4</sup> 4.15 <sup>7</sup> 5.00 <sup>4</sup> 5.00 <sup>6</sup> 5.00 <sup>6</sup>	5.40 <sup>4</sup> 5.587 <sup>1</sup> 5.48 <sup>1</sup> 5.66 <sup>30</sup> 5.547 <sup>1</sup> 6.158 <sup>1</sup> 6.158 <sup>1</sup> 6.329 <sup>1</sup> 5.75 <sup>4</sup> 7.45 <sup>4</sup> 5.85 <sup>7</sup> 6.75 <sup>4</sup> 6.75 <sup>4</sup> 6.75 <sup>4</sup> 6.75 <sup>4</sup>	$\begin{array}{c} 3.475^1\\ 3.475^1\\ 3.743^1\\ 3.785^3\\ 3.622^1\\ 4.190^1\\ 3.675^1\\ 4.283^1\\ 3.988^1\\ 5.225^4\\ 4.125^7\\ 4.87^4\\ 4.87^4\end{array}$	$\begin{array}{c} 3.85^{1} \\ 3.95^{1} \\ 4.087^{1} \\ 4.118^{1} \\ 4.272^{3} \\ 4.565^{1} \\ 4.565^{1} \\ 4.658^{1} \\ 4.668^{3} \\ 5.85^{7} \\ 5.85^{7} \\ 5.80^{6} \\ 5.80^{6} \end{array}$	$\begin{array}{c} 3.750^{3}\\ 3.850^{1}\\ 3.987^{1}\\ 4.018^{1}\\ 4.172^{3}\\ 3.997^{1}\\ 4.465^{5}\\ 3.950^{1}\\ 4.563^{6}\\ 5.200^{4}\\ 4.50^{7}\\ 5.000^{37}\\ 4.60^{6}\\ 4.60^{6}\\ \end{array}$	4.85 <sup>10</sup> 5.10 <sup>10</sup> 5.40 <sup>10</sup> 5.368 <sup>10</sup> 5.368 <sup>10</sup> 5.707 <sup>11</sup> 5.20 <sup>10</sup> 5.20 <sup>10</sup> 5.20 <sup>10</sup> 5.808 <sup>10</sup> 5.808 <sup>10</sup> 5.808 <sup>10</sup> 6.35 <sup>11</sup> 6.35 <sup>11</sup> 6.20 <sup>11</sup> 6.40 <sup>11</sup> 6.40 <sup>11</sup>	4.4254 4.7934 4.7934 4.6854 4.5724 5.0054 5.0074 5.3044 5.8194 7.4256 6.87513 6.8254 6.8254 6.5514	4.20 <sup>ii</sup> 4.33 <sup>ii</sup> 4.43 <sup>ii</sup> 4.811 <sup>ii</sup> 4.481 <sup>ii</sup> 4.481 <sup>ii</sup> 4.78 <sup>ii</sup> 5.079 <sup>ii</sup> 4.10 <sup>is</sup> 6.03 <sup>3<sup>ii</sup></sup> 5.783 <sup>ii</sup> 5.983 <sup>io</sup> 6.23 <sup>3i</sup> 6.23 <sup>3i</sup>	4.90 5.037 5.030 5.352 5.181 5.465 5.863 7.583

<sup>o</sup>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.

43.50

BASE QUANTITIES 400 to 1999 pounds; 400 to 14,999 pounds; env quantity; 300 to 1999 pounds; 400 to 8999 pounds; 300 to 9999 pounds; 400 to 89 999 pounds; 400 to 8999 pounds; 400 pounds; 400 to 1499 pounds; 410 pounds;

to 1499 pounds; "-one bundle to 1499 pounds; "-one to nine bundles; "-one to six bundles; "-100 to 749 pounds; "-300 to 1999 pounds; "-1500 to 39,999 pounds; "-1500 to 1999 pounds; "-1000 to 39,999 pounds; "-400 to 1499 pounds; "-1000 to 1999 pounds; "-under 25 bundles, Cold-rolled strip, 2000 to 39,999 pounds, base; "-S00 to 4999 pounds.

#### Rhodesian

Domestic (seller's nearest rail)

48% S:1 ..... \$43.50 less \$7 freight allowance.

## Manganese Ore

Sales prices of Offices of Metals Re-serve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Bal-timore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo,

Utah, and Pueblo, Colo., 91c; prices are subject to premiums, penaties 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 tob cars the buyer. Outside shipments direct to consumers at 10c per unit less the buyer. Outside shipments direct to consumers at 10c per unit less

# Molybdenum

Sulphide conc., lb, Mo cont., 10.78 mines .....

Foreign Ore									
Centa	per	unit,	cif	Atlant	io porta				
Manga	nifero	ous d	ore,	45-					
55%	Fe,	6-10	% 1	\[n	Nom.				
N. Afri	can	low p	hos.		Nom.				
Swedisl	h bas	ic, 60	) to	68%	Nom				
Spanish	), N	. Afr	icar	ba-					
sic. !	50 to	60%	120		Nom				
Brazil	iron	ore.	68	-69%					
fob	Rio	de J	anei	ro	7.50-8.00				

Lake Superior Iron Ore Gross ton, 511/2% (Natural) Lower Lake Ports

Eastern Local Ore

Cents, units, del. E. Pa.

Old range nonbessemer .....

Foundry and basic 56-63% contract .....

80%	Nom.	1
de Janeiro	7.50-8.00	
Tungsten Ore		
olframite ner		Desi

13.00

A			

Indian and African

Brazilian-nominal

South African (Transvaal)

 44% ne ratio
 \$27.40

 45% no ratio
 \$28.30

 48% no ratio
 \$31.00

 50% no ratio
 \$2.80

44% 2.5:1 lump ..... \$33.65 48% S:1 lump ..... 43.50

Extras for alloy content)

# VATIONAL EMERGENCY STEELS (Hot Rolled)

# Basic open-hearth Electric furnace

3.24	Tungsten Ore			Chemica	I Composi	tion Limits	, Per Cent-		Bars	Billata	Barr	Billets
Chinese	Wolframite, per ton unit, duty	Desig- nation	Carbon	Mn.	SL.	Cr.	NL	Mo.	100 lb.	per GT	100 lb.	\$28.00
paid	\$24.00	NE 9415	.1318	.80-1.10	.2085	.3050	.3060	.0815	\$0.780	\$15.60	1.300	28.00
	Chrome Ore	NE 9425	.4045	1.00-1.30	.2035	.3050	.3060	.0815	.832	16.64	1.352	23.95
(Equ	uivalent OPA schedules):	NE 9722	.2025	.5080	.2035	.1025	.4070	.1525	.676	13.52	1.612	32.24
Philad	lelphia, Baltimore, Charles-	NE 9920	.1823	.5070	2035	.4080	1.00-1.30	2030	1.248	24.96	1.612	32.44
ton, S	. C., Portland, Oreg. or Ta-					5' ''						
(S S	paying for discharge; dry	Extras are in	addition	te a base p	rice of 2.	808c, per	pound on	finished r	roducts	and \$56.	16 per s	quoted
basis,	subject to penalties if guar-	on semifinished ste	el major	basing point	ts and are	in cents	per pound	and dolla	us per gr	Calla from		
MINEC Da			<i>.</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,									

Ores

# **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, de-livered light face. Federal tax on freight charges, effective Dec. 1, 1942, ret includes the section of the sec not included.

	No. 2	TT I THE		Mal-
and an and the second	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	20.00		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		211.00	
Boston, del.	27.64		1	
Chicago, del.	26.72			
Cincinnati, del.	26.94	26.06		
Cleveland, del.	26.62	25.74		
Newark, N. J.	28.64	20.11		
Philadelphia, del.	27.96	27 46		
St. Louis, del	26.62	27.54		
Buffalo, hase	26 50	25.50	27 50	27.00
Boston, del	28.00	27.00	20.00	21.00
Rochester del	28.00	21.00	29.00	20,00
Svrarusa dal	20.00		29.03	28.03
Chicago haso	20.00	00.00	29.58	29.08
Milwaukaa dal	20.00	20.00	21.00	26.50
Muskagon Mich dal	27.00	21.10	28.10	27.60
Cleveland hose	21.09	00.00	000.000	27.69
Akron Conton del	26.50	26.00	27.00	26.50
Detroit base	21.89	27.39	28.39	27.89
Saginaw Mich del	26.50	26.00	27.00	26:50
Buluth hose	28.81	28.31	29.31	28.81
St Doul del	27.00	26.50	27.50	27.00
Frie Po hone	29.13	28.63	29.63	29.13
Evenett Mana	26.50	26.00	27.50	27.00
Boston dal	27.50	27.00	28.50	28.00
Grapite Ott	28.00	27.50	29.00	28.50
St Toula, III., base	26.50	26.00	27.00	26.50
Bralling Gel.	27.00	26.50		27.00
Chalman, U., base	26.50	26.00		26.50
Neullie Neullie del.	27.61	27.11		27.61
appland, Pa., base	26.50	26.00	27.00	26.50
Phusburgh, del. N. & S. sides	27.19	26.69	27.69	27.19
chove, Utab, base	24.50	24.00		
Sharpsville, Pa., base	26.50	26.00	27.00	26.50
sparrows Point, base	27.50	27.00		
Baltimore, del.	28.49			
Suceiton, Pa., base		27.00		
swedeland, Pa., base	27.50	27.00	28.50	28.00
Philadelphia, del.	28.34	27.84		28.84
Voiena, O., base	26.50	26.00	27.00	26.50
roungstown, O., base	26.50	26.00	27.00	26.50
Mansfield, O del	NO AA	07.04	00.04	00 44

To Neville Island base add: 55 cents for McKees Rocks, Pa.; 84 cents, Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 17 cents (water), Monongahela; \$1.11, Oakmont, Verona; \$1.24, Brack-enridge,

Exception to Ceiling 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. Ceiling Prices are aggregate of (1) governing basing point, (2) differ-entials, and (3) transportation charges from governing basing point to

Ferromanzancse, standard: 78-82% C.J. Rross ton, duty paid, \$135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products C. is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Cc. is producer); \$140 fob cars, Steel Corp. is producer); add \$6 for packed cl., \$10 for ton, \$13.50 for packed cl., \$10 for each 1%, or frac-tion cartined manganese over \$2% or under 78%. or under 78%-

or under 78%. Ferromanganese, low carbon: East-ern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central 20.80c; medium, 14.50c; regular, 20.80c; medium, 15.75c; Prices are per pound contained Mn, bulk car-lot stimments, fob shipping point, freisht allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

and 0.06% P. Sperciesen: 19-21% carlot per gross ton, Palmerton, Pa., S36; Pittsburch, 340.50; Chicago, 540.60. Electrotette Manganese: 99.9% plus, fob Knovville, Tenh., 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 14c for hydrogen-removed metal.

hetal Chromium Metal: 97% min. chromi-um, max. 0.50% carbon, eastern zone, per lb contained chromium bulk, cl. 79,50c, 2000 lb to cl. 80c; central 81c and 82,50c; west-ern 82.25c and 84.75c; fob ship-ping point, freight allowed. Ferrocolumbium: 50-60% per lb contained columbium in gross ton

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lois, contract basis, R. R. freight allowed, eastern zone, \$2.25; less-ton lots \$2.30. Spot prices 10 cents per lb higher.

Ion lots \$2.30. Spot prices 10 cents per lb higher.
Frröchrome: High carbon. eastern zone, bulk, c.l., 13c, 2000 lb. to c.l. 13.90c; central, add 0.40c and 0.65c; western, add Ic and 1.85c-bigh nitrogen, high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l. max.
0.06% carbon 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c; 2.00% 19.50c; 2000 lb to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 22c, 1.00% 21.50c, 2.00% 23.50c, 0.15% 22c, 1.00% 21.50c, 2.00% 20.50%; central, add 0.4c for bulk, c.l. and 0.65c for 2000 lb to c.l.; carload packed differential 0.45c; fob shipping point, freight allowed. Prices per lb contained Cr, high nitrogen, low carbon ferrochrome; Add 2c to low carbon ferrochrome; Add 2c too shipping point, freight allowed. Prices per lb contained Cr, high nitrogen, low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each 0.25% of nitrogen over 0.75%.

Special Foundry Ferrochrome: (Cr 62-66%; C approx, 5-7%.) Con-tract, carload bulk 13.50c, packed 13.95c, ton lots 14.40c, less 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot un 0.25c

14.95c, 16.25c and 16.75c, western; spot up 0.25c. S.M. Ferrochrome, hlgh 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; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c

High Silicon, Silvery

6.006.650 per cent (base) .....\$32.00 6.51-7.00...\$33.00 9.01- 9.50. 38.00 7.01-7.50...\$4.00 9.51-10.00. 39.00 7.51-8.00...\$5.00 10.01-10.50. 40.00 8.01-8.50...\$6.00 10.01-10.50. 40.00 8.51-9.00...\$7.00 11.01-11.50. 42.00 Fob Jackson county, O., per gross ton; Buffalo base \$1.25 hlgher. Buyer may use whichever base is more favorable.

Electric Furnace Ferresilicon: 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

Basing point prices are subject to following differentials: Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%). Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over. Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion there-of, manganese in excess of 1%. Nickel: An additional charge for

Nickel: An additional charge for Nickel: An additional charge for Nickel: content as follows: Under 0.50%, no extra; 0.50% to 0.74%, Inclusive, \$2 a ton; for each addi-tional 0.25% nickel, \$1 a ton.

**Ferroalloy Prices** 

per pound contained chromium. S.M. Ferrochrome, 1 ow carbon: (Cr 62-66%, SI 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot. bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, '20.40c, 20.85c, 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. Sillenz Alloy: (SI 33-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Tl 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, 21.00, 25.30, and 25.30, western; spot up 0.25c. Silvaz Alloy: (SI 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up 0.25c. CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, SI 18-21%, Zr 1.25-1.75% and 60.300-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 0.25c. CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, SI 13.50-16.00%, Zr 0.75-

# Refractories

Pa. Pa Ala N.

Ohl Pa. Ala N.

Pa

All

Per 1000, fob shipping point. Net prices

### Fire Clay Brick Super Duty

, Мо., Ку	\$76.05
High Heat Duty	
. Ill., O., Md., Mo., Ky. ., Ga. J.	60.40 60.40 65.90
Intermediate Heat Duty	
о , III., Md., Mo., Ку , Ga	50.60 54.80 49.15 54.80
Low Heat Duty	
, Md., Ohio	42.35
Malleable Bung Brick	
bases	70.45

#### Ladle Brick

	(Pa.,	0.	. W.	Va.,	Mo.)	
Dry Wire	Press Cut .					36.45 34.15

#### Silica Brick

#### Magnesite

Domestic dead-burned grains,	
net ton fob Chewelah,	
Wash., net ton, bulk	22.00
net ton, bags	26.00

### Basic Brick

Net	ton,	fob	Baltimore,	Plyi	mouth
	Me	eting	, Chester,	Pa.	
Chro	me b	rick			54.00
Cher	n. bo	nded	chrome .		54.00
3100	manléa	held	ala		70 00

Magnesit	e brick				76.00
Chem. bo	onded 1	magnesit	е.	 ·	65.00

## Fluorspar

Metallurgical grade, fob III., Ky., net tons, carloads, CaF<sup>3</sup> 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 \$20.00\$30.00.

and 17.25c, western; spot up 0.25c; and 17.25c, western; spot up 0.25c; S.M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot. bulk, 20.00c, packed 20.45c, ton lots 21.05c, lassern, freight allowed; 11.25c, lassern

15.00c, western; spot up 0.22c. Ferro-Boron: (B 17.50% min., 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 \$1.329, western; spot add 5c. and \$1.329, western; spot add 5c. Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Sl 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., Sl 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 a 11 o w e d; \$1.9125, \$2.0125 and \$2.1125, central; \$1.9445, \$2.0445 and \$2.1445, western; spot same as contract. Chromium-Copper: (Cr 8-11%, Cu

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, 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. Chromium-Copper: (Cr 8-11%) Cu

2.5%) Contract, any quantity, \$1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, \$1.105, less carlots, \$1.108, central; \$1.118 and \$1.133, western; spot add 5c to contracts in all cases. Calcium metal; cast: Contract ton lots or more \$1.35, less, \$1.60, pound of metal; \$1.36 and \$1.61 central, \$1.40 and \$1.65, western; spot up 5c.

apot up 5c. Calcium-Manganese-Sillcon: (Ca 18-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c. Calcium-Sillcon: (Ca 30-35%, Si 60-65% and Fe 3.00% max)

18.05C, 19.10C and 19.60C Western; spot up 0.25c.
Calclum-Sillcon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.
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 0.063c eastern freight allowed; 0.063c, 0.063c, 0.0635c, 0.0755c and 0.078c, central; 0.066c, 0.0685c, 0.0855c and 0.088c, western; spot up 0.25c.

0.066c, 0.0685c, 0.0885c and 0.088c, 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 Sl, 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 Sl, or weighing approx. 2½ lb and containing exactly 1 lb of Sl, bulk, c.l. 3.35c, 2000 lb 'o c.l., 3.80c; central, add 0.15c for c.l., and 0.40c for 2000 lb to c.l.; xestern, add 0.30c for c.l. and 0.45c for 2000 to c.l.; fob shipping point, freight allowed.

(reight allowed. Ferromolybdenum: 55-75% per lb contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content, with unitage of \$3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price \$58 50, spot \$62.25.

353 50, spot \$62.25.
Ferrosilleon: 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; 50%, bulk, c.l., 6.65c and 2000 lb to c.l., 10.85c; 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., 9.165c; 2000 lb to c.l., 11.65c, 2000 lb to c.l., 15.60c; 80-90%, bulk, c.l., 15.60c; 80-90%, bulk, c.l., 15.60c; 80-90%, bulk, c.l., 15.5c, 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.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance

allowance. Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l., 12.90c; 2000 lb to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l., 12.50c, 2000 lb to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c, fob shipping point, freight allowed. Price per lb con-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, \$1.88; freight allowed as far west as St. Louis. Tungsten Metal Powder: Spot, pot

far west as St. Louis. Tungsten Metal Powder: Spot, not less than 97%, 32:50-52:60; freight allowed as far west as St. Louis. Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained T1; ton lots \$1:23; less-ton lots \$1:25; east-ern. Spot up 5c per lb. Ferrotitanium: 20-25%, 0.10 maxi-mum carbon; per lb contained T1; ton lots \$1:35; less-ton lots \$1:40 eastern. Spot up 5c per lb. High-Carbon Ferrolitanium: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight al-

lowed to destination east of Mississlopi river and north of Balimore and St. Louis, 6.8% C \$142.50; 3-5% C \$157.50.

Carbortam: B 0.90 to 1.15% net ton to carload, & 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%, con-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 Arconum Anoys: 2r 12-15%, per ls of alloy, eastern contract, carlota, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton \$102.50; packed \$107.50; ton lots \$108; less-ton lots \$112.50. Spot up ¼c per ton.

\$112.50. Spot up ¼c per ton. Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per 1b of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up ¼c. Alsifer: (Approx. 20% Al, 40% SI, 40% Fe) contract basis fob Niagara Falls, N.Y., lump, per 1b 5.50c; ton lots 6.00c. Spot up ½c. Siminal: (Approx. 20% each SI, Mn, Al) Contract, freight not ex-ceeding St. Louis rate allowed, per lb alloy; carlots &c; ton lots 8.76c; less-ton lots 9.25c.

less-ton lots 9.25c. Borosil: 3 to 4% B, 40 to 45% Sl, \$6.25 lb contained B, fob Philo, 0., 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 Quo	tations are on gross tons.	04.50
PHILADELPHIA:         (Delivered consumer's plant)         No. 1 Heavy Melt. Steel       \$18.75         No. 2 Heavy Melt. Steel       18.75         No. 2 Bundles       18.75         No. 3 Bundles       18.75         Mixed Borings, Turnings       13.75         Blindles Shop Turnings       13.75         Billet, Forze Crops       23.75         Cast Steel       21.25	Machine Turnings       14.25         Short Shovel Turnings       16.25         Mixed Borings, Turn       14.25         Cast Iron Borings       15.25         Low Phos.       21.75         PITTSBURGH:       (Delivered consumer's plant)         Railroad Heavy Melt. Steel       20.00         No. 1 Heavy Melt. Steel       20.00         No. 2 Heavy Melt. Steel       20.00         No. 1 Heavy Melt. Steel       20.00	No. 1 Comp. Bundles         19.50           No. 2 Comp. Bundles         19.50           Machine Turnings         10.50-11.00           Shoveling Turnings         11.50-13.00           Cast Iron Borings         11.50-12.00           Mixed Borings, Turnings         10.50-11.00           No. 1 Cupola Cast         20.00           Breakable Cast         16.50           Low Phosphorus         21.00-22.00           Stove Plate         18.50-19.00	Street Car Axles       24.50         Steel Rails, 3 ft.       21.50         Steel Rails, 3 ft.       21.50         Steel Angle Bars       20.00         Cast Iron Wheels       20.00         Railroad Malleable       22.00         Breakable Cast       16.50         Stove Plate       15.25         Brake Shoes       15.25         BIRMINGHAM:       21.50
Lichings 21.25 Heavy Turnings 18.25 Cast Grades (Fob Shipping Point) Heavy Breakable Cast 16.50 Charging Box Cast 19.00 Cupola Cast 20.00 Unstripped Motor Blocks 17.50 Malleable 22.00 Chemical Borings 16.51 NEW YORK:	No. 2 Comp. Bundles       20.00         Short Shovel Turnings       17.00         Mach. Shop Turnings       15.00         Mixed Borings, Turnings       15.00         No. 1 Cupola Cast       •16.50         Cast Iron Borings       16.50         Billet, Bloom Crops       22.50         Plate Scrap, Punchings       22.50         Railroad Specialties       24.50         Scrap Rall       21.50	DETROIT:         (Delivered consumer's plant)         Heavy Melting Steel       \$17.32         No. 1 Busheling       17.32         Hydraulic Bundles       17.32         Flashings       17.32         Short Shovel, Turnings       12.32         Short Shovel, Turnings       13.32         Low Phos. Plate       19.82         No. 1 Cast       20.00         Heavy Reagenable Cont       16.50	(Delivered consumer's plant)Billet Forge Crops\$22.50Structural, Plate Scrap19.00Scrap Rails Random18.50Rerolling Rails20.50Angle Splice Bars20.00Stove Plate20.00Long Turnings11.00Cast Iron Borings13.00Iron Car Wheels20.00
(Dcalers' buying prices) No. 1 Heavy Melt. Steel \$15.33 No. 2 Heavy Melt. Steel 15.33 No. 2 Hyd. Bundles 15.33 No. 3 Hyd. Bundles 13.33 Chemical Borings 14.33 Machine Turnings 10.33 Mixed Borings, Turnings 10.33 No. 1 Cupola 20.00 Charging Box 19,00	Axles       26.00         Rail 3 ft, and under       23.50         Railroad Malleable       22.00         *Shipping point.       22.00         (Delivered consumer's plant)       0.1         No. 1 Heavy Melt. Steel       \$19.50         No. 1 Comp. Bundles       19.50	CHICAGO: (Delivered consumer's plant; cast grades fob shipping point; railroad grades fob tracks) No. 1 R.R. Heavy Melt. \$19.75 No. 1 Heavy Melt. Steel 18.75 No. 2 Heavy Melt. Steel 18.75 No. 1 Ha. Manuels 18.75	LOS ANGELES: (Delivered consumer's plant) No. 1 Heavy Melt. Steel \$14.00 No. 2 Heavy Melt. Steel 13.00 No. 1, 2 Dir. Bundles. 12.00 Machine Turnings 550 Mixed Borings, Turnings 5.50 No. 1 Cast
Heavy Breakable       16.50         Unstripped Motor Blocks       17.50         Stove Plate       19.00         BOSTON:       (Fob shipping points, Boston differential 99c higher, steelmaking grades; Providence, \$1.09 higher)         No. 1 Heavy Melt, Steel       \$14.06         No. 2 Heavy Melt, Steel       \$14.06         No. 1 Bundles       14.06         No. 2 Bundles       14.06         No. 1 Busheling       14.06         No. 1 Busheling       14.06         Machine Shop Turnings       9.06         Mixed Borings, Turnings       10.66         Chemical Borings       13.31         Low Phos. Clippings       16.56         No. 1 Cast       20.00         Clean Auto Cast       20.00         Heavy Breakable Cast       16.50	No. 2 Comp. Bundles19.50No. 1 Busheling19.50Mach. Shop Turnings14.50Short Shovel Turnings14.50Mixed Borings, Turnings14.50No. 1 Cupola Cast20.00Heavy Breakable Cast16.50Cast Iron Borings24.50Sheet Bar Crops22.00Plate Scrap, Punchings22.00Elec. Furnace Bundles20.50VALLEY:(Delivered consumer's plant)No. 1 R.R. Heavy Meit Steel20.00No. 1 Heavy Meit Steel20.00Short Shovel Turnings17.00Cast Iron Borings16.00Machine Shop Turnings15.00Low Phos. Plate22.50	No. 2 Dir. Bundles       18,75         Bailed Mach. Snop Turn.       18,75         Bailed Mach. Snop Turn.       18,75         No. 3 Galv. Bundles       16,75         Machine Turnings       13,75         Mix. Borings, Sht. Turn.       13,75         Short Shovel Turnings       15,75         Cast Iron Borings       14,75         Scrap Rails       20,25         Cut Rails, 3 feet       22,25         Cut Rails, 18-Inch       22,25         Plate Scrap, Punchings       21,25         Plate Scrap, Punchings       21,25         Railroad Specialites       22,00         R.R. Maileable       22,00         ST. LOUIS:       (Delivered consumer's plant; cast grades fob shipping point)         Heavy Meiting       \$17,50         No. 1 Accordition Three       21,00	SAN FRANCISCO:         (Delivered consumer's plant)         No. 1 Heavy Meit, Steel         14.00         No. 2 Heavy Meit, Steel         15.00         No. 1 Busheling         15.00         No. 1 Busheling         15.00         No. 1 Busheling         15.00         No. 3 Bundles         15.00         Machine Turnings         15.00         Billet, Forge Crops         15.50         Bar Crops, Plate         Cast Steel         Cut, Structural, Plate,         1 ft and under         7.00         Alloy-free Turnings         14.10         Tin Can Bundles         15.50         No. 2 Steel Wheels         15.50         No. 2 Steel Axles         15.50         No. 2 Cast Steel         15.50         No. 2 Cast Steel         10-0 Frogs, Switches         15.50         No. 2 Cast Steel         15.50         Scrap Ralls         15.50         Locomotive Tires
BUFFALO:         (Delivered consumer's plant)           No. 1 Heavy Melt. Steel         \$19.25           No. 2 Heavy Melt. Steel         19.25           No. 1 Bundles         19.25           No. 2 Bundles         19.25           No. 1 Busheling         19.25	MANSFIELD: (Delivered consumer's plant) Machine Shop Turnings \$15.00 CINCINNATI: (Delivered consumer's plant) No. 1 Heavy Melt. Steel \$19.50 No. 2 Heavy Melt. Steel 19.50	No. 1       Locomotive Tites       21.00         Misc. Ratis       19.00         Raliroad Springs       22.00         Bundled Sheets       17.50         Axle Turnings       17.00         Machine Turnings       10.50         Shoveling Turnings       12.50         Rerolling Rails       21.00	SEATTLE: (Delivered consumer's plant) No. 1 Heavy Melt. Steel 514-12 No. 2 Heavy Melt. Steel 14.50 Heavy Ralfroad Scrap 14.50 No. 1 Cupola Cast 20.00
100			/TEE*

# NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in earlots 12.00c, Del. Conn., less carlots 12.124/c, refinery; dealers may add %c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 14/c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more; 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; No. 1 yellow (No. 405) 10.00c.

Ziac: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Lowis, 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, corrodbar, 6.45, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Deiroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Emmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c 41., plus 14.00c del.; metallurgical 94% min. 18.50c del. Base 10,000 lb and over; add ¼c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 10.50-11.00c; No. 12 foundry alloy (No. 2 grade) 10.50-10.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-5714%) 11.75-12.00c; grade 2 (92-95%) 10.25-10.75c; grade 3 (90-92%) 8.50-9.00c; grade 4 (33-99%) 8.25-8.50c. Above prices for 30,600 b or more; add ¼c 10,000-30,000 lb; ¼c 1000-10,000 lb; 1c less than 1000 lb. Prices Include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard insots (4-notch, 17 lb) 20.50c per lb, cartots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 27.50c, carlots; 29.50c 100 lb to c.l.

Th: Prices ex-dock, New York in 5-ton lots, Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 7½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 90.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum areane, 51.871/c; Grade C, 99.65-99.79% incl. 51.521/c; Grade D, 99.50-99.64% incl., 51.30c; Orade E, 99-99.46% incl. 51.121/c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 90.9% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10.000 15.1 ½c for 9999-224 hb; and 2c for 223 hb and less; on sales by dealers, distribuiors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, fob refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c.

Mercury: Open market, spot, New York, \$103-\$107 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., \$14.75 lb contained Be.

Cadmium: Bars, Ingots, pencils, pigs, plates, rods, sinbs, slicks, and all other "regular" itright or flat forms 90.00c lb., del.; anodes, balla, dises and all other special or patented thapes 95.00c lb. del.

Cubalt: 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.

Silver: Open market, N. Y. 70.625c per ounce.

Platinum: \$35 per ounce.

May 20, 1946

Palladium: \$24 per troy ounce.

and and group per groy 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; muntz 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	25,70e
11-12	26"-48"	24,20c	27.00e
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
00.04	DN 048	OF CO.	80.00.

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet fob mill, 12.15c; 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 lc 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.

Sedium Cyanide: 96%, 200-lb. drums 15.00c; 10.000-lb. lots 13.00c fob Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 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 Grassell, N. J.; 100-lb, kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 35.50c.

Zinc Cyanide: 100-1b. 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 Turning
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 hronze	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 % 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; babbit-lined brass bushings 13.00c.

(Group 3) Admiralty condenser tubes, brass plpe, 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, 25, 38, 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 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 6.50c, old zinc 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 ¼c 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 1/2 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  $\frac{1}{2}$ % 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.

# Sheets, Strip . . .

#### Sheet & Strip Prices, Page 174

With sheet production sharply curtailed and mill backlogs extending into next year buying has practically ceased and consumers, recognizing futility of trying to place orders, have slackened inquiry. Slight betterment of the situation by the mine strike truce has had little effect in increasing production.

**Pittsburgh** — Sheet production is sharply curtailed. Finishing operations on galvanized and electrical sheets were resumed on a 10-turn basis at U. S. Steel Corp.'s Vandergrift plant here, but sheet production facilities at Irvin Works are still idle. The 80-inch hot strip mill at Irvin has resumed, but its output is being used in tin plate production. Sellers report a dearth of inquiries, as consumers know that sheet and strip tonnage is not available for nearby delivery. Carryover sheet and strip commitments are expected to represent at least 10 to 12 weeks output. During the summer mills are expected to cancel out this tonnage to realign their production schedules on a more realistic basis. Sellers are not booking new tonnage because of the uncertain outlook and the fact they are scheduled through most of this year.

Chicago — Sheet and strip production has been dipping steadily. Further loss is to be expected, as the two-week mining truce is not likely to see shipments to mills resumed. Thus until coal again begins to flow to steel plants operations are stymied. However, Carnegie-Illinois Steel Corp. reopened its sheet and tin division May 13, after having been closed down the week before because of power shortage.

New York — With sheet production at the lowest ebb since the steel strike, because of the effects of the coal stoppage, most sheet sellers are so far behind on commitments that they have little tonnage available before second quarter of next year. Sellers generally have not formally opened books for 1947, but assert that they feel obligated on tonnage which will take them through most if not all of first quarter.

Current inquiry involves 1200 tons of 16-gage sheets from a district fabricator engaged in manufacture of prefabricated houses. As the work is part of the national housing program and as the mills are so congested with tonnage a directive may be necessary to get desired delivery.

Cincinnati — Return of miners to the pits and lifting of the rail embargo came just in time to prevent drastic curtailment of district sheet rolling. The proposed move, to hit hot-rolled first, was quickly canceled. It was designed, for one thing, to avoid a glut of finished tonnage for which storage space was not available. Steelmaking was to continue, for stock, at least to June 1. Currently production is near normal. Mills have delayed third quarter rolling schedules and allotments until the carryover tonnage can be judged. Cleveland—Sheet and strip mill pro-

Cleveland—Sheet and strip mill production and shipping schedules remain extremely spotty. Some mills which maintained close to normal operations prior to the coal strike truce are still operating at a steady rate in this district. Others which closed down before the truce have remained closed and have completed shipments of finished products. Customers are attempting to find out the prospects for shipments of material on May and June schedules but in most instances are unable to get definite promises, due to uncertainty of fuel supplies and transportation facilities during those months.

Boston—No early recovery of production lost in hot-rolled output is expected and with deliveries further extended likelihood of placing sheet orders, notably in lighter gages, for shipment this year is fading fast. Openings may develop but they are uncertain as to size and grade. Most producers are not scheduling beyond this year. Latest disruptions in rolling schedules have set back deliveries already four to five weeks beyond ground lost in first quarter. Effect on consumer production is more apparent, with less tonnage in sight for fill-in needs. In carbon grades, hotrolled especially volume is affected by selectivity in taking orders, which in some cases favors grades taking extras. Full backlogs, however, tend to limit this increasingly. Narrow cold strip production is suffering from curtailed and uncertain supply of hot-rolled.

St. Louis — A strike continues to keep plate and sheet production at a standstill. There have been no operations for nine weeks. Schedules are filled five months into next year.

Birmingham—The coal strike has completely demoralized the sheet situation with potential buyers squarely up against it. Result is lack of sheets where they area most needed, in the agricultural industry. While bookings are not being made on the basis of delivery next year, large carryovers into 1947 are certain.

#### Steel Bars . . .

# Bar Prices, Page 174

Little hot-rolled carbon bar capacity is available before the end of the year and mills are accepting little new tonnage. While some larger sizes may be available, small diameters are sold well into first quarter by most mills. In alloy bars most producers quote July and August. Cold-drawn bar producers are sold to the end of the year or further.

New York — Few hot carbon bar sellers have much to offer before the end of this year and, under present unsettled conditions of the coal industry, are, in fact, making few definite commitments. There is a general belief that even if the soft coal dispute were to be settled immediately, bar producers would not get back into production sufficiently fast to permit scheduling of much tonnage before next year. Certain larger sizes of hot-rolled plates and rounds might be available in fair quantity, but certainly little in smaller sizes, it is indicated. Some sellers actually are committed well into first quarter of next year. Cold-drawn carbon bar sellers are scheduled into late fourth quarter this year and beyond in small sizes. Producers of hot alloy bars are now generaly quoting July and August.

Pittsburgh — Reflecting reduced mill shipments in recent weeks, cold finishers have had to curtail production. Some interests have sufficient bar stock for less than a week's balanced operations. Small bars are in short supply. Sellers are not opening books for new tonnage until carryover tonnage is determined. This tonnage is expected to be heaviest on record and will be impossible to make up through the remainder of the year. Dearth of steel is forcing gradual curtailment by many metalworking companics, resulting in sharp reduction of parts for automotive, farm equipment and other uses.

Cleveland—Production of bars is declining steadily but at a higher level than anticipated. Some mills are operating close to the pre-coal-strike level. However, at least one week's production has been lost and an additional tonnage will be lost before normal operations can be resumed. Most mills are booked solidly through 1946 and many have carryovers into the first quarter of next year.

Philadelphia — Hot-rolled carbon bar sellers are sold for the year except on large rounds and flats. One leading producer has flats 3½ inches and over for October delivery and rounds two inches and over for November and December, but is sold completely on all smaller sizes for 1946. Cold-drawn carbon bar producers are well sold on smaller sizes.

Boston—Carbon bars in small sizes, generally 1-inch and under, are sold through this year, also cold-finished alloys %-inch and under, although hotrolled alloys are available in July. Although inventories with consumers are generally small, one Maine shop has held up shipments on some grades. Paradoxically, other forge shops are short of stock and are buying material when specifications approximate requirements. Another forge shop, producing crankshafts for the automotive trade from die-rolled sections, seeks more tonnage.

St. Louis — Barmakers curtailed shipments only slightly during the rail embargo, but production was set back substantially as they sought to change rolling schedules to products destined for points served by oil-burning railroads. The confusion dropped output sharply and steel orders were off a trifle for the same reason. The principal producer here planned to use the embargo period for repair of furnaces and followed through when the embargo was lifted. The work will require a week, due to scarcity of bricklayers, after which capacity operations are to be resumed. Stalled shipments were moved quickly after the embargo. Pressure on merchant bars continues to increase, with smaller sizes in great demand.

Chicago — Barmakers are losing production. Consumption has dropped somewhat as manufacturing plants are also affected. A large segment of the farm implement industry is now at a standstill because of labor difficulties. Several automobile plants also have closed down because of lack of parts or inability to operate for lack of coal.

#### Steel Plates . . .

# Plate Prices, Page 175

With plate production restricted by various impediments demand is heavy and a number of projects are pressing for large tonnages. Tankmakers are booked ahead for several months and find difficulty obtaining material. Water storage tanks are coming out freely and a large refinery in the East will require a heavy tonnage of plates. Backlogs are large and most mills can offer little for the remainder of this year.

New York-Alan Wood Steel Co., Con-

## MARKET NEWS

shohocken, Pa., has been granted permission by the Office of Price Administration to advance prices on plates \$5 a ton. Consequently, this seller is now quoting 2.75c base. This action follows increases for three other eastern plate mills, an increase of \$6 a ton for Central Iron & Steel Co., Harrisburg, Pa., a few weeks ago, and more recently an advance of \$2 for Worth Steel Co., Claymont, Del., and \$5 for Lukens Steel Co., Coatesville, Pa., the latter at least applying the full increase to plain carbon plates and only \$2 to quality plates.

bon plates and only \$2 to quality plates. Production is still restricted, with indications of little material improvement until well after the soft coal strike is settled. Meanwhile, backlogs are accumulating, with most plate mills having little to offer for shipment over the remainder of this year.

Tank fabricators are booked ahead many months, even on a normal basis of operation, which at present they are not able to maintain because of difficulty in obtaining steel. Less public work is being figured by tankmakers than earlier in the year as costs generally exceed appropriations and that in a number of instances these appropriations are not being increased. However, industrial requirements for tanks continue heavy.

continue heavy. A substantial tonnage of plates will be required for a petroleum refinery to be erected by the Texas Co., New York, on the Delaware River, opposite the Philadelphia Navy Yard. The first unit of the new plant is expected to be placed in operation in 1948. Details as to cost, capacity and type of construction will be announced later.

While ship requirements in general continue to decline, there nevertheless is pressure for considerable tonnage. Several yards in the district have not maintained a normal working inventory for various reasons and find themselves hard put in obtaining steel for repairs and reconversion work, to say nothing of new construction. Current shipyard requirements include a sizable proportion of 3/16-inch plate, which is especially difficult to obtain.

Boston — Only approximate delivery can be promised on floor plates, with industrial demand steady, although the total is reduced by the slump in shipbuilding. Warehouse stocks of floor plates are also ample in most instances. Other grades, notably light gages of tank plates, are sold for the year. Heavier sizes in flange and firebox grades are available in fourth quarter but in these grades lighter gages are also well filled. Tank and boiler shops continue to be hampered by lack of co-ordination of hard and plate deliveries, the former now being extended six to seven months, with shearing a bottleneck with most fabricators. Up to now plate shops have been able to keep schedules fairly well maintained, indicating some duplicate buying several months ago, but this is becoming increasingly more difficult. Additional requirements are up for water storage tanks at Westboro, Weston and Seekonk. Mass., aggregating several hundred tons.

Philadelphia — Plate producers have little tonnage available for shipment during the remainder of this year, some having none. Permission to increase plate prices \$5 per ton has been granted Alan Wood Steel Co., Conshohocken,



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Pa., the fourth eastern seaboard plate producer allowed price relief. Permission to apply the increase to export sales as well as domestic deliveries may come later, as this has been granted in other cases, usually after some delay.

Seattle — Shops report a large number of small jobs requiring plates, tanks being in good demand. Plate inventories are low but some relief is being afforded by surplus shipyard material. American Steel Pipe Co., Albambra, Calif., is low at \$17,083 for fabricating three water storage tanks for the Columbia Basin project, tonnage instated.

bia Basin project, tonnage instated. Birmingham — Scramble for plates, especially lighter gages, continues unabated, but the situation is confused, with production practically stopped. Fabricators are suffering and deliveries are highly indefinite. Mill allocation continues.

# Wire . . .

#### Wire Prices, Page 175

Boston—Rod supply is increasingly serious with nonintegrated mills and production is off. Several have started layoffs and otherwise curtailed production for this reason. Demand for most specialties is heavy and production schedules are constantly being revised. Consumers are taking wire in sizes and specifications not usually acceptable. This includes some tonnage to automotive users

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chant wire products will start scheduling mills next week for third quarter. Orders on hand are far in excess of capacity so quotas will be assigned again on the basis of tonnage purchased in a base period. Volume of orders on hand is the largest in the industry's history and would be sufficient to cover capacity operations through next year if producers would schedule that far ahead. Promises on shipments are subject to revision in view of the uncertain fuel and transportation situations.

Pittsburgh — Under present price ceilings wire manufacturers have been forced to convert most of their wire rod output into specialty items, which are more profitable. CPA officials have set aside 7500 tons of wire in government surplus for the manufacture of bale ties. One bale tie manufacturer here recently warned that a large part of the nation's hay, alfalfa and peanut crops may be lost through shortage of baling wire, for output has been substantially curtailed as producers must sell steel to bale tie manufacturers at \$4 per ton under the regular market.

**Birmingham** — Wire output, down because of the coal strike, has not been sufficient to keep pace with demands. Greatest need is for wire fencing and drawn wire for a variety of smaller industries, most of which have been forced to curtail production sharply.

## Tin Plate . . .

#### Tin Plate Prices, Page 175

Cleveland—Export tin plate space reservations have been revoked by Civilian Production Administration. Producers must keep export orders in rolling schedules and are urged to continue shipments in the same ratio, depending upon available supplies, as for domestic orders. This has the effect of removing the preference rating for export orders carrying the "CXS" symbol certified by the Commerce Department's Office of International Trade. These orders had guarantees of delivery while domestic tin plate orders did not. Pig tin is in adequate supply for immediate requirements. Many mills are operating on dangerously low stocks of tin plate production materials. Resumption of rail transportation tie ups would severely strain the flow of these materials, although some mills would be able to receive them in sufficient quantities by truck.

Pittsburgh — Tin plate output has not yet been affected by the coal strike and ino significant decline in production is indicated over this month. Carnegie-Illinois Steel Corp. has a fair stock of hot-rolled coils at its Irvin Works, and with resumption of rolling on its 80-inch hot-mill early last week the situation has been eased somewhat. Need for the seasonal food pack is indicated by plans for holding output near capacity as long as possible and recent statements by can manufacturers to the effect that inventories are dangerously low.

# Tubular Goods . . .

# Tubular Goods Prices, Page 175

New York — Approximately 18,300 ton of 6%-inch pipe will be required for a 360-mile line to be built jointly by the Phillips Petroleum Co. and the
Shamrock Oil & Gas Co. for transporting finished products from their refineries at Phillips, Tex., and McKee, Tex., respectively, to La Junta and Denver, Col.

Most pipe mills have opened books for third quarter requirements of oil country goods, but up to the moment specifications have been light, pending compilation of needs by the various operators.

Merchant pipe demand locally continues well in excess of supply, with producers not only currently handicapped in production but expecting to be for some time, as a result of the soft coal situation.

Demand for boiler tubing reflects shrinkage in operations at shipyards and limited steam locomotive purchases by domestic carriers. The Chesapeako & Ohio is now in the market for 40 of the 2-8-4 type, the first sizable inquiry by domestic railroads in a number of weeks.

Pittsburgh — Heavy demand for cast iron pipe shows no signs of easing, with most new inquiries involving municipal projects. Much of this work, scheduled to get under way this spring, must be postponed, for due to shortage of pig iron most cast iron pipe producers have not been able to meet delivery schedules. In many instances these interests are booked through remainder of this year. Mill pipe and tubing output receded further last week, with sharp reduction by National Tube Co. Pittsburgh Steel Co, and National Supply Co. operations also have been adversely affected. In connection with concentration of galvanizing operations at National Tube Co.'s Lorain, O., works, the production of galvanized pipe at Versailles, Pa., has been discontinued, and the latter plant is now limited to specialty items. Output at nonintegrated pipe plants also has been adversely affected due to limited production of tube rounds and skelp. Unfavorable price levels will continue to be a retarding factor in output of these items for nonintegrated mills when coal strike is terminated. Jobbers' pipe stocks are low.

Boston—Mills are lagging in meeting quota shipments in butt and lap-weld, with demand heavily centered in small sizes. Distributors get some tonnage from surplus at Davisville, R. I., but mainly in large sizes. Smaller sizes have been trozen for the housing program. Demand for tubing is unabated, both welded and seamless. Butt-weld wrought inon pipe deliveries also are in fourth quarter, although the slump in shipbuilding has affected overall demand. Cast pipe shipments range up to six or seven months, with foundries promising carlier until recently also more extended.

Cleveland—June quotas for tubular products have been cut 50 per cent and may be entirely eliminated if the coal strike is resumed after the May 25 deadine or if there are further interruptions in rail transportation. Three pipe mills which were closed in this district for two days recepened when the coal strike truce was announced. No direct shipment business is being accepted for the balance of this year. Jobbers have been unable to replenish stocks since mill shipments are well below demand.

Seattle — Cast iron pipe sellers find strong potential market but are unable to obtain supplies and contracts are subfect to ability of producers to deliver. Many large projects are being held back

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for this reason. Pacific States Cast Iron Pipe Co. is reported to have taken about 650 tons for Spokane, Wash. H. G. Purcell, Seattle, has taken 450 tons in various sizes for Tacoma, Wash.

#### Structural Shapes . . .

Structural Shape Prices, Page 175

Boston—Plain structural material deliveries are more extended and in small sizes mills generally are filled through fourth quarter. No early easing in this situation is expected, due to limited allocations of semifinished expected to be given shape mills in the immediate future. Several larger structural inquiries have been placed and considerable industrial construction authorized will be subject to delay. Average rollings on structural mills are well below the approximate 50 pounds per foot range, reflecting the trend of more pieces per ton. Maine turnpike contract for bridge structures, including four major river bridges, will take about 3500 tons, to be bid late in June. American Bridge Co., Pittsburgh, is low on small bridges for that state.

New York — Structural buying is featured by placing of 9000 tons for an office building for the 1407 Broadway Corp. at 39th St. and Broadway, with Bethlehem Steel Co., Bethlehem, Pa. Structural orders otherwise are small, with inquiry tapering, partially as a result



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of the recent CPA order limiting construction and of the mixed labor situation.

Indicative of the extent to which the CPA limitation order is being applied is the action taken at a recent meeting of the New York District Committee of CPA in approving ten projects, involving \$2,718,125, and rejecting 17 projects, involving \$8,613,000.

Chicago — Structural fabricating shops were permitted to work full time last week after the coal truce was announced and electric power restrictions were lifted. The previous week they had been limited to 24 hours. The loss was not important in view of the short supply of steel from mills. At least a month will be required for near-capacity operations. Meanwhile, fabricators are not seeking much new business, already being overcommitted and delayed on jobs in hand. Inquiry for fabrication is light and is expected to remain so for several months.

Philadelphia — Shape producers are virtually covered for the year. Further disruption of production as a result of the fuel situation apparently will mean a carryover at the end of the year. Despite building restrictions shape producers are confronted by heavy demand, especially from jobbers, whose stocks continue greatly out of balance.

Seattle — Fabricating plants face an uncertain outlook with heavy tonnages awaiting placement and steel supply lacking. New material from mills had



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begun to arrive after the steel strike when the coal strike interrupted. Inventories are low and while local mills supply a portion of the demand their output is insufficient to meet needs. Plants are operating on available material and refraining from bidding on other jobs. Anthony M. Meyerstein Inc., Brooklyn, N. Y., is low bidder to the Bureau of Reclamation, Denver, for fabrication of six reverse flow coaster gates for the Coulee Dam pumping plant and American Bridge Co. is low for shapes, rails and other material for a warehouse for Anderson Ranch dam of the Boise project, tonnage unstated. A civic survey indicates that 34 Seattle industries plan construction totaling \$6,750,000 in the immediate future.

#### Reinforcing Bars . . .

#### Reinforcing Bar Prices, Page 175

Boston—Except for approximately 550 tons for two university buildings, awarded to Concrete Steel Co., demand for reinforcing bars is limited to small lots. The Maine turnpike from Portland to Kittery, takes 350 tons in the first section, with large volume expected to be placed in July for the paving section.

Philadelphia — Reinforcing bar buying is at a standstill because of dearth of steel for this purpose. Inquiries are numerous but few can be figured. One leading Philadelphia jobber reports that receipts so far this month have been about 60 per cent of outgoing tonnage, this reducing inventories.

Chicago — Reflecting the restricted supply of steel, made worse by the coal strike, reinforcing steel suppliers are confining activities to small jobs, particularly 100 tons or less. Inquiry is steadily growing lighter and competition is light in what invitations are issued. It will be several weeks before steelmaking can reach near capacity and in the meantime reinforcing activity is expected to drag at low level.

Seattle — Reinforcing bars are being placed in small lots but the total is large. Mill backlogs are heavy and business in sight assures full operation for the remainder of the year. Many large projects are being planned but await government approval or other factors. Bethlehem Pacific Steel Co., Portland, Oreg., has taken 1400 tons for the Navy's layup piers at Astoria, Oreg., and an unstated tonnage of H-piling for the same project. Pending business includes 300 tons for two Washington state highway sections, bids May 21.

#### Rails, Cars . . .

#### Track Material Prices, Page 175

New York — Domestic freight car demand continues brisk, with 1000 box cars for the Gulf, Mobile & Ohio and 200 box cars for the Illinois Terminal outstanding among awards. Both orders went to American Car & Foundry Co., New York. Also several fair sized lists are being actively figured, with the possibility that domestic buying this month may at least be fairly comparable with that of last month, when 3405 cars were placed, according to recent returns.

The April total was the largest this year and brought the aggregate for the first four months up to 5920, as compared with 12,570 in the corresponding

DONG TOTTOTT.				
	1946	1945	1944	1943
Jan	420	7,200	1,020	8,365
Feb	1,795	1,750	13,240	350
March	300	2,500	6,510	1,935
April	3,405	1,120	4,519	1,000
May		1,526	1,952	870
June		670	1.150	50
July		3,500	795	4.190
Aug		7,240	3.900	8.747
Sept		12.840	400	6.820
Oct		1.320	2.425	5.258
Nov		1.650	1.065	870
Dec		4.116	16.245	2,919
Total		45,432	53,221	41.355

The largest domestic inquiry for steam locomotives in some time involves forty 2-8-4 locomotives for the Chesapeake & Ohio, bids closing June 6.

#### Pig Iron . . .

#### Pig Iron Prices, Page 177

Shortage of pig iron, resulting from the coal strike and rail embargo, has caused considerable idleness in the foundry industry and there are no signs of improvement for some time as production will be resumed slowly. Lack of coke also plagues foundries. The situation is becoming tighter each week.

New York — Melt at local foundries this month is expected to be little relieved by the present truce in the soft coal industry. There are no indications of early resumption at blast furnaces which are now down and, as a matter of fact, production may decline even further before there is a general turn upward. Foundry operations in various instances are now being handicapped as much by a direct shortage of coke as by shortage of iron, and most foundry operators have reconciled themselves to an appreciably lighter production this month than in April, when, despite the fact that the soft coal strike existed throughout the month, they were able to maintain fairly substantial output. Some foundries have suspended operations completely for a week, applying this to vacations, which normally would fall around the first of July.

Buffalo — Serious shortage of raw materials has unsettled the pig iron trade here. Many foundries have reduced operations for lack of pig iron and coke. Pig iron production has been reduced to 42½ per cent in this district, from lack of fuel. A few small cancellations have been received from foundries which lack coke and others are expected. Further reduction in pig iron production will result if the coal strike is not settled by the end of this week.

Boston — Shortages in pig iron are slowing down melting at some foundries and several are about to go down. No early substantial improvement is indicated, with several furnaces normally supplying a good part of the iron for this district down or curtailed. Second quarter shipping schedules have been revised and reduced. Carryover for third quarter will be substantial and supply is uncertain.

Philadelphia — Blast furnace production in the easten seaboard district now is below 30 per cent of capacity, with a further decline slated for this week. One merchant stack has gone down for complete relining and is expected to be out of blast 60 to 90 days. Meanwhile consumer melt is off appreciably from the April rate, inventories becoming exhausted. It probably will be a month to six weeks after the coal strike before consumption becomes normal.

Pittsburgh — Foundry operations are gradually receding, due to lack of pig iron and this is expected to become more pronounced over the next two weeks despite the fact most interests are using a greater proportion of cast scrap. The one merchant blast furnace here is operating on reduced wind and coal stocks are sufficient to sustain present output only to May 26. This interest does not expect to share in the limited coal output under the 12-day truce. Only 19 out of 54 blast furnaces were active here at the close of last week and some of these were on reduced wind. Merchant iron shipped into this area has been far below normal in recent weeks, further accentuating the tight supply situation.

Chicago — Although the two-week resumption of coal mining brought lifting of restrictions limiting manufacturing industries to 24 hours per week not all foundries have been able to operate full time. Because of low inventories of pig iron and coke, as well as other supplies, some shops are holding to reduced hours. As of last weekend, 18 of the district's stacks were in production, compared with 17 the week before and 34 before the strike.

Cincinnati — Only a small tonnage of foundry iron has come into this district in the last three weeks and furnaces are hesitant on giving promises. All found-



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tions, the CORRECT SELECTION of your operations a major bearing on your operating costs—and your profits.

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ry iron has been coming from outside, putting melters at a disadvantage during rail embargoes or rail congestions. So far few foundries have suspended entirely. The melt is down about 50 per cent and apparently tending lower, despite return of the miners. St. Louis — Pig iron production, here-

St. Louis — Pig iron production, heretofore unhurt by the fuel shortage, will cease at the end of the month unless more coal and ore can be obtained. Iron scarcity here is increasing because of curtailed operations at Birmingham and Chicago. Until the coal shortage, production in this district was gaining on demand because of the strike shutdown of a rolling mill which took half the pig output. Iron inventories are extremely low, with little prospect they can improve for many weeks if local furnaces shut down.

Birmingham — Pig iron melters describe the situation as progressively worse. Additional furnaces have gone down, while demand for iron continues unprecedented. Sloss-Sheffield Steel & Iron Co, has taken off a furnace due to the coal situation and has one on ferro, while Woodward Iron Co., with two stacks of three down, is preparing to return them as quickly as possible. Demand for iron is measurably above the supply at the moment.

#### Scrap . . .

#### Scrap Prices, Page 178

Shortage of scrap in face of heavy demand continues and the situation is difficult in face of transportation restrictions. Melters are paying high springboards and freight equalizations in the effort to obtain material from remote points.

Pittsburgh — Further reduction in movement of industrial scrap has been noted recently as many metalworking companies taper production to conserve steel inventories. Most scrap produced by auto manufacturers has been absorbed within a short radius. Railroads are far behind on recent offerings, and are apportioning scrap carefully. Crushers are operating on a day-to-day basis and frequently their yards are bare of a single car of turnings. Indicative of heavy demand for all scrap items is the reported \$2.50 per ton springboard gencrally paid for heavy melting steel and turnings and up to \$6 on cast scrap. Shipments of low phos are being made into this district at a freight equalization of \$4 above former level. Due to general scrap shortage keen interest is shown in recent offerings of surplus unprepared material. One such lot, involving 1500 gross tons, is located at the Ordnance Depot, Richmond, Ky., bids to be taken May 24. Cincinnati — Brokers and dealers are

Cincinnati — Brokers and dealers are being implored to provide foundry scrap to offset the shortage of pig iron. Melters are resisting shutdowns with only partial success. Fewer heats have brought production down to about 50 pre cent. Neither this situation nor reduced blast furnace operations has cut demand for scrap. The unsettled rail situation may decrease, at least temporarily, receipts of remote scrap in this district. Most sources of scrap, and especially industrial material, are below normal yields.

St. Louis - Scrap demand remains high with no effect of the coal strike felt here yet. The rail embargo stopped shipments abruptly and movement of scrap is expected to be low for at least a week. No cars had been ordered in advance of the embargo and spotting and loading operations will take several days. Thereafter brokers foresee quick resumption of shipments to the former rising level. Mill stocks have shrunk somewhat but still average 30 days. Premium grades are in heaviest demand but there is a ready market for all grades. Freight charges from remote points are being paid widely to maintain reserves. Prices remain at ceiling.

Buffalo — Effect of strikes in many foundries has made it easier for dealers to handle demand for cast scrap. The freight embargo had small effect on scrap deliveries as movement was permitted within switching zones, thus allowing dealers to move cars to all leading consumers. Supplies are light and melters continue to press for deliveries. Another barge fleet has arrived by canal, with about 2500 tons.

Boston — Demand for steelmaking grades and cast is heavy, despite some easing in melt because of pig iron shortage. Limited scrap supply barely enables most consumers to maintain level of reserves. Production of industrial scrap is declining. Prices for unprepared scrap are over ceiling frequently for govemment offerings, as some of this material can be moved with a minimum of processing.

Chicago — Pressure for scrap continues strong and all district steel producers are maintaining recent active demand, including the leading interest which when able to run at near full capacity is largely self sufficient as to scrap. Inventories have been shrinking steadily. Banking of at least 16 blast furnaces has forced heavier dependence on scrap and available supply has not been sufficient. Production of scrap has dropped steadily, as most manufacturing industry is on a reduced basis. Exceptions to scrap strength are light material and alloys.

material and alloys. New York — Heavy melting steel is in active demand for Sparrows Point, eastern Pennsylvania and Pittsburgh, with tonnage moving as rapidly as accumulated. Little, if any, is going to Lackawanna, N. Y., at the moment. Scarcity of foundry grades, coupled with shrinkage of pig iron supply is forcing several consuming plants in this district to reduce melt substantially.

Philadelphia — Scarcity persists in all leading scrap grades, with cast material never more scarce and with heavy melting steel in shortest supply since the war. In spite of reduction of actual consumption because of lack of coal most consumers are pressing as hard for scrap as at any time.

Seattle — Steel scrap is in active demand and supply is ample. The recent increase in mill price was due mainly to higher processing costs at yards. While the Portland area has shipped a heavy tonnage to eastern mills some of the supply is being absorbed by mills here. Some material still comes from shipyards but the situation is fast approaching normal. Reduced rail rates to the East are not expected to affect the market reiously as most of the Portland area surplus has already moved.

Birmingham — Steel mill suspensions have not lessened demand for scrap, especially since blast furnace schedules have been so drastically cut. Tonnage is moving as it is available but general laxity of dealers as preparation costs, weather conditions and other factors, add to scarcity, especially of cast grades.

#### Warehouse . . .

#### Warehouse Prices, Page 176

Pittsburgh — Continued heavy demand on warehouses is noted for 10inch beams, and 6-5-4-inch channels. Interest in galvanized sheets and lighter gage sheets has eased somewhat for most consumers are reconciled to fact these items are not available. In recent weeks a steady increase in orders for 10-11-12gage hot-rolled sheets for truck bodies has developed. Small size tubing shipments out of stock are heavy, while requirements for bars and flats up to and through 1-inch, far exceeds available supply. Steady reduction in mill output in recent weeks has accentuated the overall demand for warehouse steel. Most distributors report inventories at the lowest level in years because of interruptions to mill production and heavy demand prevailing since V-J Day.

mand prevailing since V-J Day. Chicago — Demand for steel from warehouses continues brisk, but inventories are low and unbalanced. Now with mills once more at low level operations, the outlook for stock replenishment is not good. Demand is of somewhat different character than earlier in the year. Consumers had set up production schedules which are now untenable in light of economic events, consequently schedules have now been revised to

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#### MARKET NEWS

a more realistic basis for balance of the year.

Cincinnati — Warehouse steel is in light supply while demand continues. Some jobbers are receiving fair shipments from mills, but in all cases stocks are badly out of balance. Structural steel is all but unobtainable.

#### Canada . . .

Toronto, Ont. — The Canadian steel industry continues to face serious operating conditions, with the most serious being the coal shortage, followed by labor problems. The armistice in the coal strike in the United States has not relieved the shortage or prospective shortage of coal for industry in Canada and steelmakers are doubtful that it will help. Officials of the Steel Co. of Canada Ltd., Hamiton, Ont., announced that the blast furnace, which was closed for repairs a few weeks ago, will not blow in until fuel supply is assured, but no actual curtailment in steel production has been necessary. Present coal stocks are sufficient for only a week or two longer at current consumption rates.

There has been no easing in steel supply and many manufacturers are badly handicapped through shortage of steel, but most are obtaining small lots to enable restricted operations. While some mills continue to accept orders with delivery dates uncertain, but with commitments extending into third and fourth quarter, others are not accepting business beyond the end of this quarter. No improvement is reported in supply of steel sheets or bars and consumers report serious difficulties in obtaining sufficient for current needs. Warehouse stocks on bars and sheets are negligible and when monthly quotas are obtained they are speedily taken up by small lot consumers. Steel plate is in heavy demand, but no actual shortage is reported. Wire and nails are scarce and even small lots are difficult to obtain.

Pig iron production is being hampered through scarcity of fuel, while demand is gaining at a rapid rate. largely due to the shortage of scrap. Blast furnace operators are dealing out pig iron in lots of 50 to 100 tons to keep as many consumers supplied as possible. Sales recently have been about 10,000 tons weekly, with overall demand at least 50 per cent higher.

per cent higher. In scrap only minor improvement was reported in receipts during the week, mainly in secondary grades. Only small quantities of No. 1 scrap are appearing and dealers are unable to meet demands of customers in various iron grades. Dealers with baling equipment have accumulated fair quantities of light scrap and this is being bundled, but otherwise scrap deliveries are limited. Both steel mills and foundries are seeking little success.

Iron and steel production for March registered gains over February, but continued below the corresponding month of 1945. Pig iron output at 159,049 net tons was at an average rate of 63.4 per cent, compared with 62 per cent in February. For the first time in several years foundry iron was made for further use of producing companies. During March nine blast furnaces were blowing, an increase of one in the month, while five stacks were down.



WASHERS

STANDARD AND SPECIAL

#### MARKET NEWS

Steel ingot and casting production in March at 249,117 net tons showed a gain of about 5 per cent over the rate for February. Comparative figures fol-

1011.			
	Steel Ingots, Castings	Pig Iron	Ferro- alloys
March, 1946 .	249,117	158,049	8,405
Feb., 1946	233,893	143,171	10,872
March, 1945	277,461	165,817	16,434
3 Mos. 1946	727,633	444,905	30,155
3 Mos. 1945 .	796,647	471,273	41,966
3 Mos. 1944	747,577	442,053	44,642
			-

#### Steel in Europe . . .

London (By Cable) - More pig iron is needed for the light castings industry in Great Britain, despite a steady increase in productoin. Plate mills are operating to capacity in effort to meet demand. Sheet mills are booked for many months on black and galvanized sheets.

#### **Export Tin Plate Space Reservations** Revoked

Tin plate producers have been directed by the Civilian Production Administration that export tin plate space reservations have been revoked. Producers must keep export orders in rolling schedules and are urged to continue shipments on these orders in the same ratio as for domestic orders.

Export orders that had carried the "CXS" symbol certified by the Commerce Department's Office of International Trade had guarantees of delivery, while domestic tin plate orders did not. This preference was justified in the pre-coal strike period but producers and government officials now agree that domestic food packing should not now suffer at the expense of export shipments.

Pig tin is in adequate supply for immediate requirements. However, industry members indicated recently that reserves of tin plate materials (such as sulphuric acid, muriatic acid, palm oil, middlings for cleaning tin plate, platform and packing lumbers, wire and strapping, caustic soda and sodium chloride) are small.

A member of the trade pointed out that it is now too late for tin plate to reach foreign countries in time to pack perishable farm crops harvested in this year's canning season.

#### STRUCTURAL SHAPES ....

- STRUCTURAL STEEL PLACED
- 9000 tons, 1407 Broadway Corporation office building, 39th Street and Broadway, New York, to Bethlehem Steel Co., Bethlehem, Pa.
- 8000 tons, ore, coke and limestone pockets, Chicago, for Carnegie-Illinois Steel Corp., io American Bridge Co., Pittsburgh.
- 2700 tons, bridge for Reading Railroad at Reading, Pa., to Bethlehem Steel Co., Bethlehem, Pa.
- 500 tons, factory building for Maltine Co., Morris Plains, N. Y., to Lehigh Structural Studies of Walter Steel Co., Allentown, Pa., through Walter Kidde Co., New York.

475 tons, plant and office building for Hinde

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If you are now producing small metal parts by conventional methods of casting, forging or machining, you may be able to realize substantial savings in production costs by using precision casting methods.

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& Dauche Paper Co., Buffalo, to Pittsburgh-Des Momes Steel Co., Pittsburgh; H. F. Stimm Co., Buffalo, general contractor.

- 350 tons, bridge W-450-3, Cherokee, Ia., for Illinois Central, to American Bridge Co., Pittsburgh.
- 325 tons, bank building, Philadelphia, for Real Estate Trust Co., to American Bridge Co., Pittsburgh.
- 300 tons, addition for Brost Motors Inc., Buffalo, to Buffalo Structural Steel Co.; Siegfried Construction Co., Buffalo, general contractor.
- 230 tons, Sacred Heart Hospital addition, Norristown, Pa., to Phoenix Bridge Co., Phoenixville, Pa.
- 200 tons, crane runway extension, Rutland, Vt., for Vermont Marble Co., to American Bridge Co., Pittsburgh,
- 180 tons, building addition, R. P. Adam Co., Buffala, to Bethlehem Steel Co., Lackawanna, N. Y.; H. F. Stimm Co., Buffalo, general contractor.
- 150 tons, building for Fisher-Price Toy Co., East Aurora, N. Y., to Buffalo Structural Steel Co.; Siegfried Construction Co., Buffalo, general contractor.
- 125 tons, men's dormitory, Lexington, Ky., for Hargett Construction Co., to American Bridge Co., Pittsburgh.
- Unstated, H-piling for Navy layup base. As-toria, Oreg., to Bethlehem Pacific Steel Co., Portland, Oreg.

#### STRUCTURAL STEEL PENDING

- 3300 tons, New Jersey state bridge, Route 25A, over Passaic river; bids June 4.
- 3000 tons, steel sheet piling, foundation treat-ment for dike at West Springfield, Mass.; bids to United States Engineer, Providence, R. I.
- 600 tons, sheet and H-piling, breakwater pier heads, Keweenaw waterway, Houghton, Mich., for U. S. Engineer, Duluth; bids May 21.
- 440 tons, sheet piling, lock and guide wall extension, affect philip, fock and guide with ex-tension. dam No. 11, Dubuque, Iowa, for U. S. Engineer, Rock Island, Ill., to Bethle-hem Steel Co., Bethlehem, Pa.; La Crosse Dredging Corp., Chicago, contractor; bids April 30.
- 400 tons, expansion, Vernon, Calif., for Pacific Press Inc., to Virginia Bridge Co., Roanoke, Va.
- 286 tons, Solduc river bridge, Washington state; bids to Olympia, May 21.
- 280 tons, Washington state overpass, King county; bids to Olympia, May 21
- 240 tons, H-piling, Garrison dam, North Da-kota, for U. S. Engineer, Omaha, to Beth-lehem Steel Co., Bethlehem, Pa.: Missouri Valley Constructors Inc., Leavenworth, Kans., and Winston Bros. Co., Minneapolis, joint contractors; bids April 16.
- 120 tons, service building for Connecticut Power & Light Co., Montville, Conn.; bids May 20.
- Unstated, coaster gates for Grand Coulee pumping plant; A. M. Meyerstein, Inc., Brooklyn, N. Y., low at \$152,568.
- Unstated, steel warehouse, Boise project; American Bridge Co., low, \$13,221

#### REINFORCING BARS ...

#### **REINFORCED BARS PLACED**

- 1400 tons, navy layup piers, Astoria, Oreg. to Bethlehem Pacific Steel Co., Portland, Oreg.
- 925 tons, including 750 tons wire mesh and 173 tons bars, highway construction, La Salle and Kendall counties, Ill., for State Highway Commission, mesh to American Steel & Wire Co., Chicago, and bars to Carnegie-Illinois Steel Corp., Chicago, through Edgar W. Zimmerman, Chicago; Arcole-Midwest Corp., Chicago, contractor; bids April 23.
- 130 tons, dormitories, Valparaiso, Ind., for

Valparaiso University, to Ceco Steel Prod-ucts Corp., Cicero, Ill.; J. W. Snyder Co., Chicago, contractor

107 tons, lock and guide wall extension, dam No. 11, Dubuque, Iowa, for U. S. Engineer, Rock Island, Ill., to Bethlehem Steel Co., Bethlehem, Pa.; La Crosse Dredging Corp., Chicago, contractor; bids April 30.

#### REINFORCED BARS PENDING

- 1100 tons, hangars, Chicago, for American Air Lines.
- 768 tons, relocation of right of way, between Newark and Zanesville, O., for Baltimore & Ohio railroad; bids May 7.
- 530 tons. expansion, Peoria, Ill., for Illinois Light Co.
- 400 tons, elevator, Iowa Falls, Iowa, for Balston Purina Co.
- 300 tons, expansion, Milwaukee, for Hamischfeger Com
- 180 tons, St. Rita high school and faculty quarters, Chicago; bids May 13.
- 180 tons, Washington state railroad overpass, King county; bids to Olympia, May 21.
- 135 tons, addition to store, Chicago, for Goldblatt Bros. Inc.
- 125 tons, Washington state bridge Soldne river; bids to Olympia May 21.
- 100 tons, Bonneville system construction; bids to Portland, Oreg., May 20.
- 100 tons, flood protection, Shamokin Creek section, Pennsylvania; bids May 24 to U. S. engineer, Syracuse, N. Y.
- Unstated, naval science building, Urbana, Ill., for University of Illinois; bids May 25.
- Unstated, memorial center building, Blooming-ton, Ill., for Illinois Wesleyan University: bids May 18.
- Unstated, storage garage and service station, Standard Oil Co., Seattle; bids soon; Mc-Clelland & Osterman, Seattle architects.
- Unstated, radio center Station KOMO, Seattle; the Austin Co. general contractor.

#### PLATES . . .

#### PLATES PLACED

110 tons, water storage tank at Wenham, Mass., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

#### PLATES PENDING

- 1958 tons, plate steel risers and surge tanks, Fort Peck powerhouse, near Glasgow, Mont.; bids about June 2, to U. S. engincer, Ft. Peek, Mont.; also 428 tons of structural steel framework; 65 tons of miscellaneous metal work, and 84 tons of reinforcing bars for tank housings.
- 150 tons, water storage standpipe for Hudson, Mass.; bids over appropriation may be readvertised.
- 120 tons, elevated water storage tank for Westboro, Mass.
- 120 tons, water storage tank for Weston, Mass.
- 110 tons, water storage standpipe for Seekonk, Mass.
- Unstated, three water storage tanks Columbia Basin project, American Steel Pipe Co., Al-hambra, Calif., low at \$17,083.

#### PIPE . . .

#### STEEL PIPE PLACED

- 2625 tons, 6 to 12-inch, Seekonk, Mass., <sup>to</sup> Warren Pipe Co., Everett, Mass.
- 1000 tons, 6 to 12-inch, Braintree, Mass., to R. D. Wood & Co., Florence, N. J.
- 650 tons or more, for Spokane, Wash., reported let to Pacific States Cast Iron Pipe Co., Provo, Utah.
- 450 tons, various sizes, Tacoma, Wash., in-

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Two Pole Connectors as shown above have Automatic Spring Cover closing live end when not connected.

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Cable Ends are No. 4 B & S Extra Flexible Insulated Wire.

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	We	ight	Net Price
Single Pole Connectors	. 5	Lbs.	\$13.80
Double Pole Connectors	.1316	Lbs.	\$28.75
Lower or Plug End Separately			\$ 8.60

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100 tons, 12-inch, for Watertown, Mass.

#### RAILS, CARS . . . LOCOMOTIVES PLACED

- Gulf, Mobile & Ohio, 1000 fifty-ton box cars, to American Car & Foundry Co., New York.
- Illinois Terminal, 200 fifty-ton box cars, to American Car & Foundry Co., New York. Pacific Fruit Express, 2000 forty-ton sheathed
- refrigerator cars, 500 each going to American Car & Foundry Co., New York; General American Transportation Corp., Chicago; Pullman-Standard Car Mfg. Co., Chicago; Pacific Car & Foundry Co., Seattle.

#### RAILROAD CARS PENDING

New York, New Haven & Hartford, 50 air dump cars.

#### LOCOMOTIVES PENDING

Chesapeake & Ohio, forty 2-8-4 type freight locomotives; bids June 6.

## CONSTRUCTION AND ENTERPRISE

#### ARKANSAS

FORT SMITH, ARK .--- American Can Co., 104 South Michigan Ave., Chicago, has let contract to Ditmars, Dickman & Pickens, Gazette Bldg., Little Rock, Ark., for a one-story can manufacturing plant, to cost about \$1 million.

#### CALIFORNIA

- CHICO, CALIF .--- Berlinger Steel & Supply Co has been incorporated with \$75,000 capital by Roy Berlinger and associates. Grayson Price, First National Bank Bldg., is representative.
- SAN BERNARDINO, CALIF .--- B. F. Giebeler, 1340 Rialto Avc., is building a machine and tool shop 30 x 50 feet, to cost about \$6000.
- SAN DIEGO, CALIF .--- Solar Aircraft Co., 2200 Pacific Highway, as first step in a \$600.000 expansion program, will build an addition 120 x 680 feet, costing about \$350,000. Later two hangars at Lindbergh Field will be remodeled and an administration building will be erected at cost of about \$250,000.
- VERNON, CALIF .- Progressive Body Works. 2800 South Soto St., is erecting a paint and body shop 30 x 60 feet,  $60 \times 198$  feet and 24 x 88 feet.

#### CONNECTICUT

- DANBURY, CONN .- Neptune Meter Co., Colonial Bldg., has let contract to Thompson Starrett Co. Inc., Madison Ave., New York, estimated to cost about \$500,000.
- STRATFORD, CONN .- Bendix Helicopter Inc., 50 Rockefeller Plaza, New York, has let contract to Dyker Building Co., 122 East 42nd St., New York, for a one-story 170 x 525 and 65 x 120-foot plant, to cost about \$375. Irving S. Chanin, same address, is engineer.
- WALLINGFORD, CONN.-General Electric Co., 34 Cambridge St., Meriden, Conn., has plans by Francisco & Jacobus, 511 Fifth Ave., New York, for a plant to cost about \$2 million. (Noted Apr. 15.)

#### FLORIDA

LAKE WORTH, FLA .- City will receive bids May 28 for a power plant, yard structures and yard piping. Burns & McDonnell, Kansas City, Mo., are architects.

#### GEORGIA

MACON, GA .- Armstrong Cork Co., Lan-

caster, Pa., has let contract for a plant here to Beers Construction Co., 70 Ellis St., At-lanta, Ga., to cost about \$4 million.

#### IDAHO

- BOISE, IDAHO-Federal Works Agency has approved a proposed \$550,000 hydroelectric power project for King Hill irrigation District. R. J. Briggs, Boise, is engineer.
- BOISE, IDAHO-Morrison-Knudsen Co., Boise, has contract from United States Engineer at \$1,720,341 for a powerhouse at Dale Hollow Dam, Obey River, Tenn. Same firm built the dam in 1943.

#### ILLINOIS

ELGIN, ILL .--- Vermont Marble Co., 510 North Dearborn St., Chicago, will build a one-story marble processing plant 60 x 290 feet. Shaw, Naess & Murphy, 80 East Jackson Blvd., Chicago, are architects.

#### IOWA

DUBUQUE, IOWA-Virginia-Carolina Chemical Corp. has let contract to Ulrich Willys Construction Co., Dubuque, for a fertilizer plant.

#### MARYLAND

BALTIMORE-International Harvester Co., 180 North Michigan Ave., Chicago, is considering bids for a one-story  $400 \times 420$  and  $80 \times 125$ -foot office and parts depot, to cost about \$500,000.

#### MASSACHUSETTS

EVERETT, MASS .- Monsanto Chemical Co., Everett, has let contract to William M. Bailey Co., 88 Broad St., Boston, for a research laboratory to cost about \$250,000. J. R. Worcester & Co., 79 Milk St., Boston, is engineer.

#### **MICHIGAN**

- BIRMINGHAM, MICH .- Troy Chain & Stamping Co., 5081 Deinmore Rd., has been incorporated with 150 shares no par value to manufacture stampings and chains, by George B. Dupont, 816 Lockwood Ave., Royal Oak, Mich.
- DETROIT-Carrier Tool & Die Co., 597 Beaufait Ave., has been incorporated with \$50,000 capital to manufacture machinery, by Ed-mund T. Carrier, 1627 West Fort St.
- DETROIT-Penn Engineering Inc., 2902 Webb Ave., has been incorporated with \$10,000 capital to manufacture tools, dies and jigs, by Donald P. Gorham, same address.
- DETROIT-Controls Inc., 1160 National Bank Bldg., has been incorporated with \$15,000 capital to manufacture electrical and mechanical devices, by Harold O. Love, 1610 Ford Court, Grosse Pointe, Mich.
- DETROIT-Davis Pattern & Mfg. Co., 16909 Divernois Ave., has been incorporated with \$50,000 capital to manufacture foundry pat terns, by P. B. Bloch, 4373 Fullerton Ave.
- DETROIT-Aircraft Mfg. Inc., 1826 Sixth St., has been incorporated with \$50,000 capital to manufacture metal products, by Frank T. Rubisch, same address.
- DETROIT-Edlund Co., 4473 Woodward Ave., has been incorporated with \$50,000 capital to manufacture tools, by Oscar T. Edlund. same address.
- DETROIT—Sherwood Mfg. Co., 2230 Buhl Bldg., has been incorporated with \$25,000 capital to manufacture tools, by Donna Von Boi. Reis, 86 Lockwood Blvd.
- DETROIT-Commercial Metal Products Co., 987 East Milwaukee Ave., has been incorporated with \$100,000 capital to manufacture metal stampings and parts, by Clarence J. Berini, 16536 Edinborough Rd.

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## GEORGE J. HAGAN CO. PITTSBURGH, PA. DETROIT CHICAGO LOS ANGELES SAN FRANCISCO

Grand River Ave., has been incorporated with \$225,000 capital to manufacture machine products, by Bernie L. Lattner, 16750 Ashton Rd.

- FLINT, MICH.—Hi Grade Mfg. Co., 2026 Beach St., has been incorporated with \$100,-000 capital to manufacture tools, by Warren Hunt, 2206 Wisconsin Ave.
- JACKSON, MICH.—Metal Stamping Inc., 808 East Michigan Ave., has been incorporated with \$100,000 capital to do general manufacturing and stamping, by Frank W. Beyer, 142 West Prospect St.
- LANSING, MICH.—Machine Tool & Engineering Co., 1606 Olds Tower, has been incorporated with 10,000 shares no par value to manufacture tools, dies and fixtures, by Gustav W. Nowitzke, 2024 Teel Ave.

#### MINNESOTA

HOPKINS, MINN.—Minneapolis-Moline Power Implement Co., will build a three-story 233 x 354-foot plant addition; Petersen Construction Co., 612 National Bldg., is low bidder. (Noted May 6.)

#### NEW HAMPSHIRE

BERLIN, N. H.—Brown Co., 650 Main St., has let contract to Rust Engineering Co., Clark Bldg., Pittsburgh, for a plant, including dryer plant and sulphite mill, to cost about \$1 million.

#### NEW JERSEY

TRENTON, N. J.—Westinghouse Electric Corp., Pittsburgh, will let contract soon for a manufacturing plant at Trenton,

#### OHIO

- CANTON, O.—Dependable Appliance Parts Co has been incorporated by Thomas Reid, 1257 Ducher Ave., statutory agent, to manufacture washing machine parts.
- CLEVELAND—Cecpo Corp., Arvo H. Cecro. 3231 Rocky River Dr., and associates, has bought small plant and will engage in manufacture of flexible couplings and in development work. Plant is at 8215 Clinton Rd.
- CLEVELAND—Kilroy Structural Steel Co., 13800 Miles Ave., is erecting a complete new plant at 8500 Union Ave. to which operations will be removed. Cost is estimated at \$100,000. Edward A. Kilroy is president.
- CONNEAUT, O.--Pittsburgh & Conneaut Dock Co., Conneaut, will build a one-story 85 x 232-foot ship repair shop, to cost about \$115,000.
- LEETONIA, O.—Leetonia Tool Co. has let contract to Heller-Murray Co., 222 West Ryan Ave., Youngstown, for a 100 x 240-foot plant.
- MAUMEE, O.—Anderson Elevator Co., Maumee, has let contract to MacDonald Engineering Co., 188 West Randolph St., Chicago. for a 500,000-bushel capacity elevator, with silos 150 feet high, to cost about \$125,000.
- NORWALK, O.—B. L. McClure Inc. will build a factory costing about \$50,000 for manufacture of a small motor to operate on gasoline, diesel oil or kerosene, developed by Henry J. Hickey, 18511 Euclid Ave., Cleveland.
- YOUNGSTOWN—Buffalo Body Co., 3400 West Federal St., will build a plant covering 50,-000 square fect on North Meridian Rd., to cost about \$150,000. K. W. MacDonald is vice president.

#### OREGON

PORTLAND, OREG.—Crown Willamette Paper Co. has let contract to L. H. Hoffman for crection of coating and bleaching plant at mill F and remodeling mill D at Oregon City, Oreg., at cost of several million dollars, completion to be next January.

PORTLAND, OREG .- Oregon Steel Rolling

Mills will build a 72-foot open craneway extension, to cost about \$30,000.

#### PENNSYLVANIA

OAKS, PA.—B. F. Goodrich Co., 500 South Main St., Akron, has let contract to Hughes-Foulkrod Co., 1405 Race St., Philadelphia, for a boiler house and warehouse, to cost about \$200,000. McGeorge & Hargett, 9500 Quincy Avc., Cleveland, are architects.

#### **TENNESSEE**

- ERISTOL, TENN.—Knoxville Fertilizer Co. plans erection of a \$400,000 fertilizer plant here.
- MEMPHIS, TENN.—Tennessee Coal, Iron & Railroad Co., L. C. Teague, Birmingham, purchasing agent, will build one-story warehouse 200 x 400 feet. Hanker & Heyer, 1036 Commerce Title Bldg., are architects.
- SWEETWATER, TENN.—A. Vestal & Sons have bought site for three foundry buildings for manufacture of stoves, ranges and heaters.

#### TEXAS

DALLAS, TEX.—Continental Motors Corp., Garland, Tex., has let contract to J. W. Bateson, 622 Irwin-Kaesler Bldg., at \$250,000 for a one and two-story plant and office building. H. B. Gieb & Associates, Texas Bank Bldg., are architects.

#### WASHINGTON

- BELLINGHAM, WASH.—General Engineering Co., Seattle, is preparing plans for the city's proposed sewer system and disposal plant, to cest about \$1 million.
- FUYALLUP, WASH.—Harris Green, city engineer, will take bids May 29 for a \$700,000 sewage treatment plant and 1250 feet of 4 to 18-inch cast iron pipe.
- SEATTLE—Austin Co. has been given contract to erect a \$500,000 modern center for radio station KOMO.
- SEATTLE—Standard Oil Co. plans a \$250,000 storage garage and service station 120 x 240 feet. McClelland & Osterman are architects.
- SEATTLE—William Wadleigh, 329 West Ewing St., plans an addition 24 x 76 feet to foundry.
- SHELTON, WASH.—Ahro K. Catto, city clerk, will receive bids May 28 for a 500,000-gallon steel water tank.
- TACOMA, WASH.—Tacoma Powdered Metals Co., Frank Eichelberger, president, recently incorporated, has bought plant formerly occupied by Rayonier Inc. and will equip it for early operation.
- TACOMA, WASH.—Roy T. Earley Co. has been awarded contract for two additions to plant of Pensylvania Salt Co., part of a \$1 million project.

#### WISCONSIN

- APPLETON, WIS.—Miller Electric Co., South Bounds St., has let contract to T. Utschig. Appleton, for a one-story 90 x 108-foot plant addition. E. A. Wettengel, 116 South Pierce Ave., is architect.
- BELOIT, WIS.—Beloit Castings Co., 1546 Henry Ave., has let contract to Luety Bros., 1505 Prairie Ave., for a one-story 120 x 160-foot foundry building. B. H. Jillson, 2009 West 102nd St., Chicago, is architect.
- KAUKAUNA, WIS.—Thilamany Pulp & Paper Co., Kaukauna, has let contract to Permanent Construction Co., 4100 North Third St., Milwaukee, for a one-story 37 x 200foot machine room addition.
- WAUWATOSA, WIS.—Safway Steel Products Co. Inc., 6228 West State St., has let contract to Selzer-Ornst Co., 6222 West State St., for a one-story 121 x 188-foot plant addition, to cost about \$100,000. Eschweiler & Eschweiler, 720 East Mason St., Milwaukee, are architects.

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