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The Magazine of Metalworking and Metalproducing

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Determining Plate Quality Before Welding

Machining Stainless Steels-Lubricants, Broaching

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As the EDITOR

Tale of Two Cities

As this is written, proud Pittsburgh—leading iron and steel center of the world's greatest industrial nation—is desolate, defenseless and despondent because the demands of selfish minorities have been given preference over the rights of the public.

Management and employees of a power company are at loggerheads. Members of other unions refuse to cross power employee picket lines. Hotel employees are on strike. As a result of these and other work stoppages, residents in many sections of Pittsburgh are deprived of public transportation, restricted to one lighted lamp per home, urged to use water sparingly and inconvenienced in numerous other ways. Many industrial plants are at a standstill. Each large office building in the Golden Triangle operates a single elevator sparingly. Restrictions have been placed upon the flushing of toilets. Federal, state and local governments seem to be utterly helpless to do anything to remedy the situation. Pittsburgh today is in a state of near anarchy.

In this writer's experience, the city most closely resembling Pittsburgh in its present predicament is Mukden, Manchuria. Mukden, with a postwar swollen population of more than 3,000,000 has no piped water, no street car transportation and only a few feeble electric lights. In its once pretentious Shenyang Railway Hotel, elevators run only occasionally, electric lights glow dimly spasmodically and toilets are flushed infrequently. In this case the trouble is two-fold. The Soviets during the period from September through November last year stripped Manchuria of much of its industrial and power generating equipment. Since then the Chinese Communist Army has cut power lines, blown up bridges and otherwise slowed repair of the damage caused by the Russians.

As a result Mukden and Pittsburgh today share a common fate, but with one important difference. The Chinese in Manchuria were confronted with a menace from outside the nation—a stripping of facilities by a foreign power beyond their own control. In the Pittsburgh case, federal, state and local authorities are not plagued by outside influences. Every factor in the situation is well within their control, yet they seem to be powerless to act for the people.

Is this not a sad commentary upon our nation? Is it not an ironical reflection upon our Wagner act—that much glorified Magna Charta that was to insure industrial peace? Is it not a disgraceful spectacle to present to a war-sick world which is looking to the United States for leadership and guidance toward peace and stability?

the NEWS

VIEWS

October 7, 1946

MESABI'S TACONITE: A highlight of the annual convention of the Association of Iron & Steel Engineers in Cleveland last week was a clear-cut analysis of the Lake Superior iron ore situation by E. W. Davis of the University of Minnesota.

He pointed out that more than a billion tons of ore averaging 51.8 per cent iron have been taken from the Mesabi range during the last half century. Another billion tons of like quality remain. Assuming a consumption of 35 million tons annually, this reserve would last 30 years. If annual consumption should be 70 million tons, as it was in 1942, the high-grade Mesabi ore would be depleted in approximately 15 years.

The obvious way to prolong the life of the Mesahi range is to utilize its tremendous supply of taconite. Mr. Davis believes that taconite concentrate can be produced at a cost only slightly higher than normal Lake Erie prices. Tests indicate that such ore can be smelted cheaper than present lake ores. Inasmuch as the higher cost of producing taconite concentrate may be offset by lower smelting costs, the cost of producing pig iron should not be affected seriously.

If this vision of manufacturing high-grade ore from now worthless rock should materialize, the nation could draw a major portion of its iron ore requirements from Mesabi for another century or more. It is an exciting prospect! —p. 83

"DOCTORED" STATISTICS: At no time in history have government statistics been criticized as severely as during the past decade. Labor unions questioned the accuracy of the Department of Labor cost of living index. Almost everybody except a few labor leaders and leftist new dealers took violent exception to Henry Wallace's Department of Commerce fake statement that wages could be increased sharply without increasing prices. Now, Andy Court, General Motors labor economist, takes issue with the Federal Reserve Board index of industrial production which sets July automobile output at 78 per cent above the 1935-39 average, whereas, according to orthodox arithmetic, production actually was down 10 per cent.

The trouble with government statistics under the present regime is that New Deal gremlins in various departments try to manipulate the figures to serve their ideological objectives. The sanctity of government statistics will not be restored until the routine activities of the executive branch of government are divorced from politics. —p. 95

WORKING ELEPHANTS: Manufacturers at their wit's end as to how to obtain enough steel to keep their plants operating are prone to discount the effectiveness of the steel industry's stated steel ingot capacity of more than 90 million tons. They are inclined to subtract from this total liberal tonnages for ineffective bessemer and electric furnace capacity and for government-owned steelworks which may not get into private operations for years to come.

However, the record of these "white elephants" is not too discouraging. Geneva has gone to U. S. Steel, which has announced reassuring plans for its continued operation. Fontana, another facility born of wartime necessity, is booked months ahead. Republic Steel is highest bidder among five contestants for the \$92 million government-owned plant at South Chicago.

One by one these larger plants are going to producers who are struggling hard to work off tremendous order backlogs. In time this may prove to be a welcome break for steel consumers.

-pp. 87, 100, 101

SIGNS OF THE TIMES: Last Tuesday at Detroit officials of Gray Marine Division of Continental Motors demonstrated test vessels propelled by high velocity water jets. The idea of hydro-jet propulsion in the marine field (p. 96)-still in the experimental stage-is similar in many respects to jet propulsion in the aircraft field. . . . Britain's labor government is modifying its plans for the steel industry. Instead of nationalizing iron and steel facilities, as it first contemplated doing, the government will set about acquiring a majority of shares in the principal companies (p. 91), thus concentrating voting power in the hands of directors who will be nominees of the government. . . . Production of truck-trailers in 1946 is expected to reach 60,000 units (p. 92), exceeding the highest previous output of civilian trailers of 41,869 in 1941 by a substantial margin. . . U. S. Commercial Co., as agent for OMGUS (Office of Military Government, United States) in Berlin, has begun shipping German manufactures to the United States. Early consignments will consist of toys, Christmas tree ornaments, china, porcelain, earthenware, cameras, wine and optical goods. Objective is to help Germany to get onto a self-supporting basis (p. 88) and to pave way for German-American trade. . . . In spite of the numerous difficulties confronting business, 82,836 companies were incorporated in the first seven months of 1946. This represents an average of 11,834 new businesses per month (p. 176), as compared with a monthly average of only 5963 during the last half of 1945. . . . Recently a plane which ordinarily would have required a run of 2000 feet for takeoff was launched in 4 seconds after a run of only 340 feet with the aid of an "electropult" (p. 122), which is essentially a large electric motor laid out flat. Its track corresponds to the rotor of a conventional motor and the small shuttle car which traverses it acts as the stator. Designs are completed for an installation capable of launching the largest existing air liners with a takeoff of only 500 feet. . . . A British fabricator has been awarded a contract for 1200 to 1300 tons of structural steel (p. 91) to be used in rebuilding the famous House of Commons. . . . United States Steel's plate mill at Geneva, now rolling plate chiefly for large diameter pipe and tanks (p. 100) will be converted into a wide hot strip mill as soon as equipment can be obtained.

E.C. Ahar

EDITOR-IN-CHIEF

Meeting Steel Requirements

the Hard Way-

But Still Meeting Them!

A manufacturer of coal mining drills was desperate for $2\frac{1}{2}$ " x $2\frac{1}{2}$ " x $\frac{1}{4}$ " square tubing needed for drill supports, on an order scheduled for shipment halfway around the world. The required size of tubing was nowhere available, but Ryerson Steel Service was equal to the occasion.

By forming two channels from $\frac{1}{4}$ " plate and welding the channels together we were able to deliver several hundred pieces of the required tubing! While such an emergency measure is obviously not always practical, it did make it possible for the customer to complete his order and ship on schedule. And this is but one of numerous instances where Ryerson service has achieved the seemingly unachievable.

There are many requirements that we cannot handle today, but it is often surprising what can be done with the close cooperation of your nearby Ryerson plant. If needed steel is out of stock the Ryerson salesman will sometimes be able to suggest a practical alternate steel, or he may know a way in which flame cutting, forming or welding can serve to provide a workable substitute.

So we urge you to keep in touch with us. Our whole organization is doing everything within its power to help every customer get the steel he needs.

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STEEL

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Fluctuations of the primary economic indicators from the end of World War I to the present. Wholesale prices and cost of

living indexes are relatively lower now than following the first war; payrolls and production are relatively higher

Will Pattern of 27 Years Ago Repeat?

Economic histories of 1919 and 1946 contain many parallels. Both were disappointing in volume of production. Both were beset with widespread labor strife, lowered worker productivity, rising costs and prices, shortages and unbalances of supply

By W. J. CAMPBELL Associate Editor, STEEL

TURNING back the pages of economic history 27 years reveals some interesting parallels between then and now.

Fourteen months after the 1918 Armistice, this country's postwar record in recovery was disappointing and the future was uncertain. Many of the same shortages and unbalances in prices and supplies, comparable labor unrest, and widespread disappointments and fears existed.

The situation then was summed up by the Iron Trade Review, predecessor to STEEL, on Jan. 1, 1920: "For the United States the first year of reconstruction has fallen below expectations, gaged by business standards. The chief cause may be laid to labor disturbances and to labor inefficiency. The year's record of strikes and lost output has been appalling... "Organized labor, radical in its autocracy, has sponsored acts and demands bordering on the revolutionary. Dangerous and fanciful doctrines looking to the upheaval of orderly society have been common in all countries.

"Commodity prices have continued their unbroken advance until they have borne heavily upon domestic life. A passion for reckless spending has seized upon all the peoples. Deep unrest has been widespread."

The similarities found in the two postwar pictures are sufficient to start analysts speculating on the probability of the 1919-22 pattern repeating itself. Especially since the stock market break last month, prognosticators have been hinting guardedly of a recession similar to that of 1921.

. They also note certain basic differ-

ences between the situation in 1919 and the present, and many contend the present situation contains enough steam to carry along at a high rate, barring a new epidemic of major strikes and work stoppages.

One of the chief fears currently being expressed is that industry will be forced out of its markets by the large increases in labor and other costs forced upon it by the labor unions and the government.

Although little evidence of this is yet discernible, economic observers believe a continuation of the rising price trend will cut demand sharply and that today's scarcities may become tomorrow's surpluses almost overnight. They believe that a large number of potential buyers of automobiles, for example, are going to defer their purchases when they are asked to pay \$1600-\$1700 for a car that sold for \$1100-\$1200 before the war.

Such a move would find a parallel in April, 1920, when "Overall Clubs" were formed in many cities to combat the high and increasing cost of clothing. These were a manifestation of a buyers strike and within-a few-months clothing stores were advertising "sales" at price reductions up to 30 per cent.

A. T. Colwell, vice president and director of engineering, Thompson Products Co., Cleveland, recently told Michigan automotive engineers to expect a future demand of only around 3,000.000 cars a year, after the immediate demand was satisfied. Mr. Colwell pointed out that new automobile prices are climbing rapidly beyond the reach of many who bought cars before the inflationary trend began. He declared the auto industry already has lost the "gradual step" effect of the prewar second-hand car market.

During recent weeks, leading automakers have cut back or deferred expansion plans and the auto industry has reduced its estimate of the postwar market for automobiles rather sharply.

Exporters are fearful that we may be pricing ourselves out of foreign markets. Some exporters report they are not now able to continue trade connections with old British and European customers because of the higher price levels here. Some of those who anticipated a large postwar market, especially after this country extended large credits to foreign buyers, are now veering to the opinion that the sharp rise in lubor and materials costs here and the consequent higher prices they must ask for American goods will mean smaller foreign markets. The price advantage will be, they say, with British and continental countries where wages and materials have not advanced so sharply.

Price Level Generally Lower

Despite these threats, wholesale prices generally have not advanced to as high a level as in 1919 and 1920. According to the Department of Commerce index (see chart on page 79), wholesale prices in July had risen to 124.3. compared with an average of 138.6 in 1919 and 154.4 in 1920. Likewise the cost of living in July was 141, compared with a monthly average of 143.2 in 1920.

In contrast, factory payrolls have more than doubled at an index figure of 257.2 in June compared with 103.2 in 1919. Since 1941, industrial labor costs are estimated to have increased 60 per cent while industrial prices have advanced only 25 per cent. These figures admittedly are confusing to analysts as they appear to argue against buyers' strikes; it is apparent that factory wages today buy nearly twice as much as in the period following the first World War.

Complaints of lowered worker productivity or efficiency were heard in 1919 and 1920 as now. Although worker efficiency is difficult to measure and report in statistical terms, many employers now estimate productivity is at least 20 per

HISTORY OF AUTO PRICES

How automobile prices have fluctuated over the years is shown in the following figures on average wholesale value per unit produced. From a high of \$2131 in 1907, the average wholesale price declined to \$598 in 1917. During the first world war and the years immediately following, the higher prices of materials and labor were reflected in increases until 1920, after which the downward trend was resumed. No accurate estimate of the average wholesale price for 1946 can yet be made.

Year	Amount	Year	Amount
1904	\$1055	1924.	\$624
1905.	. 1905	1925.	657
1906	1851	1926.	695
1907.	2131	1927.	735
1908.	2129	1928.	674
1909.	1288	1929.	622
1910.	1189	1930.	591
1911.	1128	1931.	566
1912.	941	1932.	549
1913.	867	1933.	489
1914	762	1934	530
1915.	644	1935.	529
1916.	604	1936	551
1917	598	1937.	589
1918.	850	1938	636
1919.	882	1939.	634
1920.	949	1940.	656
1921.	719	1941.	698
1922.	659	1942.	786
1923.	606	1946.	?

cent under prewar levels. The problem is being recognized by the government which is sponsoring a "clinic" on the problem in Washington Oct. 28-29.

Encouraging in the present picture are the figures on overall industrial production which are being outstripped only by the payroll figures (see chart, page 79). Employment figures are running high, with 58 million employed and only 2 million jobless, including unemployables.

In fact, current employment is so high that, in the opinion of John D. Small, Civilian Production Administrator, the achievement of any substantial increase in overall production will depend on increased productivity of workers, lengthening the work-week or in increasing the total labor force.

Mr. Small believes that maintenance of the present rate of production until the end of the year would eliminate most of the problems of reconversion. CPA's report for August shows that production of basic materials was close to capacity and established a postwar peak.

Building materials made spectacular gains with increases of from 20 to 35 per cent over July in output of plumbing fixtures and other critical construction products. Production of nails, a bottleneck item, climbed 18 per cent.

Almost all kinds of consumer goods showed production advances over July.

Released at the same time as the August production figures were the Department of Commerce figures on manufacturers' inventories showing a further increase of \$325 million during August, and bringing the total to \$18.3 billion. The department, however, noted that the August increase was less than half that recorded in July.

The expansion of manufacturers' inventories is not viewed with any particular alarm as it is being accompanied by a substantial increase in shipments of finished goods and would be excessive only in event of a serious recession.

Consensus of manufacturers is that the pattern of the first world war aftermath, with its 1921 recession, need not recur. Through high production during the months ahead, the extremes of inflation and deflation can be avoided and a considerable period of prosperity enjoyed.

However, a new wave of wage demands, accompanied by work stoppages and loss of production, could create a greater inflation, destroy potential purchasing power and make another economic "bust" inevitable.

Power Strike Throttles Pittsburgh Activity

METALWORKING operations in the Pittsburgh district last week had receded to approximately 10 per cent of normal as result of the Duquesne Light Co. strike. Power output was reduced to one-third of normal and most of this was allocated to hospitals, water stations and similar users. Public transportation had broken down and an estimated 70,000 workers were idle.

The strike affected metalworking operations in other sections of the country as the flow of components from Pittsburgh plants, including electrical and railroad equipment, bolts and nuts, wire and castings, practically ceased. Open-hearth and steel finishing operations were well sustained as steel mills have their own power generating facilities. Electric furnace output, however, was curtailed sharply.

Despite the transportation breakdown, steel mills report enough men were able to get to their jobs to maintain a high rate of operations.

U. S. Steel, Union Reach Agreement On Elimination of Wage Inequities

Adjustments will amount to 3% cents per employee hour. Project was started early in 1945. Wage adjustments will be retroactive to January, 1944, under directive of National War Labor Board. Incentive plans being reviewed

AGREEMENTS between five steel producing subsidiaries of the United States Steel Corp. and the United Steelworkers of America on principles and procedures to be followed in establishment of plant standard hourly wage scales and in the elimination of any intraplant inequities were reached last week.

These agreements, made with the union by Carnegic-Illinois Steel Corp., National Tube Co., American Steel & Wire Co., Tennessee Coal, Iron & Railroad Co. and Columbia Steel Co., provide the guideposts for eventual coverage of all corporation steel producing plant jobs under standard wage scales, which will include in each plant only one standard wage rate for each of approximately 30 job classes.

A large part of the project, begun early in 1945 by U. S. Steel management and union representatives, has already been accomplished. This involves a painstaking survey and thorough description of 25,000 different steel mill jobs, and their classification, with the co-operation of the union, into 30 general categories. This description and classification work, on a plant by plant basis, is continuing.

Under the plan formulated by the current agreements, it is understood that any wage rate adjustments eventually made (and retroactive to January, 1944, under the directive of the National War Labor Board) are to be solely for the purpose of eliminating intraplant wage rate inequities, and cannot be general across-the-board wage increases. The third quarter of 1943 or the 12-week period closest to that time will be used as the base payroll period from which to determine the plant standard hourly wage scales.

A representative cross-section of jobs in U. S. Steel plants discloses that equitable plant standard hourly wage scales will entail for the subsidiary companies, as compared to the base payroll period, a total expenditure equal to an average of 35% cents per employee hour to provide any necessary upward adjustments.

Elimination of high ont-of-line wage rates as the result of completion of the present management-union study will not apply to employees presently working at those rates until after Feb. 15, 1947. It is anticipated that normal turnover of employees and installation of new or revised incentive plans will be among the means utilized in the elimination of high out-of-line rates. All incentive plans will be reviewed and adjusted under principles of the agreement after the standard wage scales are established in the plants.

Canadian Steel Union Accepts Settlement Plan

TORONTO, ONT.

F. B. Kilbourn, government controller of Canada's basic steel industry, has announced the negotiating committee of the United Steelworkers of America-CIO has accepted a plan for settlement of the steel

strike that has tied up Algoma Steel Corp., Sault Ste. Marie; the Steel Co. of Canada, Hamilton; and Dominion Steel & Coal Co., Sydney, since July 15. It is understood employees of the Steel Co. of Canada and Algoma Steel Corp. are offered an increase of 10 cents an hour retroactive to April 1 and a further 3 cents an hour when work is resumed, making a total cf 13 cents against the union's original demand for 19½ cents an hour. Two weeks ago the union rejected the government's offer of wage increases of from 11 to 121/2 cents an hour. At Dominion Steel & Coal, Sydney, N. S., the proposed increase is said to be 18 cents an hour, which provides for the 5 cents differential between steel wages in Nova Scotia and in Ontario. It is stated that the government subsidy would be boosted to meet the increase at the Nova Scotia plant, The original demand by the union was 241/2 cents.

As a result of the strike, Canada's iron and steel production for July showed a loss of almost 50 per cent from June.

Comparative production figures, in net tons, follow:

	Steel Ingots Castings	Pig Iron	Ferro- alloys
July, 1946	135,914	64.472	6,191
June, 1946	214.861	129,890	11,624
July, 1945	229.161	150,387	15.750
7 mos. 1946	1,585.553	940,495	75,057
7 mos. 1945	1,824,779	1,092,350	114,422
7 mos. 1944	1,747,001	1,115,527	105,750

Present, Past and Pending

■ APOLLO STEEL SALE REPORTED RECOMMENDED

PITTSBURCH—Sale of plant and inventories of Apollo Steel Co., Apollo, Pa., to Irving Grayson for a sum in excess of \$2,500,000, is reported to have been approved by the board of directors. Special meeting of stockholders, it is understood, has been called for late October to approve the sale. Company's name will be changed to Apollo-Pittsburgh Co. and it will be liquidated over a period of time. The plant will be operated by the purchaser under a new name. It is understood Mr. Grayson represents a group of fabricators.

AUGUST VACUUM CLEANER OUTPUT AT ALLTIME PEAK

CLEVELAND-Factory sales of household vacuum cleaners in August were at an alltime high of 234,148 units, compared with 199,722 in July, and 170,272 in August, 1941. August sales broke the previous record of 217,906 established in March, 1941.

METALS RESERVE CONTRACTS FOR CHILEAN COPPER

WASHINGTON-Metals Reserve Co. has contracted for purchase of 40,000 tons of Chilean copper for fourth quarter delivery. Negotiations for other foreign copper purchases are underway.

SCRAP ADVISORY COMMITTEE APPROVES CPA CONTROLS

WASHINGTON—Iron & Steel Scrap Industry Advisory Committee has approved proposals of the Civilian Production Administration for controlling scrap inventories of both consumers and dealers. CPA is reported to favor limits of 45 days' supplies for steel mills and 30 days' for foundries.

STEELMAN SAYS CPA TO BE CONTINUED AFTER DEC. 31

WASHINGTON—Civilian Production Administration will be continued after Dec. 31 and none of its functions will be transferred to other agencies, according to Reconversion Director John Steelman.

AUGUST STRUCTURAL SHIPMENTS AT YEAR'S PEAK

NEW YORK-Shipments of 145,137 tons of fabricated structural steel in August were the largest for any month in 1946 and represented an increase of 13,186 tons over July.

Steel Leaders See Prosperous Future

Optimism qualified by possibility of further labor disturbances. Ten thousand attend convention and exposition of Association of Iron & Steel Engineers at Cleveland. Wide variety of technical subjects explored. New ore mining practice forecast

BARRING unnecessary disturbances, the steel industry faces a prosperous future, T. M. Gudler, chairman, Republic Steel Corp., Cleveland, declared at the opening of the 1946 convention and exposition of the Association of Iron & Steel Engineers in Cleveland Oct. 1-4.

Mr. Girdler's qualified optimism was shared by other industry leaders attending the meeting and show which attracted an attendance estimated at 10,000. The exposition was the first to be held since 1941.

Twelve technical sessions were held throughout the 4-day meetings, covering electrical, combustion, safety, lubrication, rolling mill and operating practice. A total of 39 papers was presented.

L. R. Milburn, electrical engineer, Great Lakes Steel Corp., Ecorse, Detroit, Mich., was elected president of the association for 1947.

R. W. McCann and H. F. Lesso, Great Lakes Steel Corp., were awarded first place in the 1945 Kelly Award for their paper on "Influence of the Charge Upon Open-Hearth Furnaces" by the board of directors of the association. Their paper gives extensive data on the character of the charge materials entering the furnace charge and evaluates the effects of variations in the charge upon the performance of the open hearth. Specific data are given in an extensive series of curves.

Ross E. Beynon, superintendent, Roll Shop Division, Carnegie-Illinois Steel Corp., Chicago, was awarded second place in the contest for his paper "Structural Mill and Structural Mill Roll Design". Mr. Beynon on two other occasions was cited for his contributions on bar and rail mill and roll design.

B. M. Larson and C. Siddall, research laboratory, United States Steel Corp., Kearny, N. J., were awarded third prize for their paper on "Theoretical Limiting Efficiency of Various Fuels in the Open Hearth". Their paper brings out factors which should be kept in mind in long range consideration of fuel selection and furnace design.

The 1947 convention will be held at the William Penn hotel in Pittsburgh Sept. 22-25.

"The sharp fluctuations in its operating rate have caused steel to be called the 'prince and 'pauper' industry," Mr.

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Girdler declared. "When demand for steel on the part of the heavy and consumer industries is high, steel is prosperous. When the demand decreases, steel production decreases in proportion.

"This fact is both an advantage and a disadvantage to the industry and because of it, it is only logical to assume that the next few years should see the steel industry at a close-to-capacity peak.

"Almost no steel has been used for other than war purposes for nearly five years. This has resulted in an accumulation of demand greater than we have ever seen in this country.

"Linked with that is the necessity for world reconstruction and the fact that steel industry outside of the United States has suffered serious war damages. "Steel today is needed for housing,

transportation, automobiles, pipe lines, electric power lines, vessels, commercial and industrial buildings, on the farm, and in a score of other industries. To satisfy these needs is a task which challenges an industry even as big as steel.

"However, the future is not entirely without serious questions.

"Strikes and industrial unrest have undoubtedly decreased the nation's potential purchasing power. How much this will affect the overall total demand cannot be estimated. We do know, however, that a continuation of this unrest, added to the necessity for increasing wages, may have an unhappy effect upon an otherwise bright picture.

"Secondly, I feel that our long-range stability and promise of prosperity may be clouded if industry expands too tapidly in an effort to meet an abnormal, accumulated demand for goods.

"There is always, of course, a need for industrial expansion and improvement. If that need is not met, industry stagnates.

"However, this normal expansion is

based on a sound, healthy 'look ahead' and not on a desire to 'capture and exhaust' markets as rapidly as possible.

E. G. Grace, chairman, Bethlehem Steel Co., Bethlehem, Pa., in commenting on the future of the industry, bointed out that anything that would hamstring the industry or impair its efficiency constituted in effect an attack on our national economy.

Mr. Grace called attention to the remarkable stability with which the industry converted from a war to a peacetime basis and cave credit to the high quality or management and technical talents of the industry.

Critical survey of government regulations was urged in a statement at the convention issued by Wilfred Sykes, president, Inland Steel Co., Chicago, Pointing out that the incentives and competition of the free enterprise system have given the nation the highest standard of living and the greatest productivity per man hour of labor of any nation, he said that in our complex civilization certain controls become necessary but that it is important we recognize essential restrictions and differentiate between them and such restrictions as have developed counter to the fundamentals of free enterprise.

E. M. Richards, operating vice president, Republic Steel Corp., addressed the convention banquet Oct. 3 on "Where Are Union Policies Leading?" He pointed out that unless local officers of unions and their followers change their attitude and treat a contract as a legal and binding instrument, the union cause in the long run will suffer. Union leaders should recognize, he said, that in the final analysis the success of business is just as important to them and their followers as to management. If business cannot prosper, the worker cannot prosper.

This nation can continue to draw the major portion of its iron ore requirements from the Mesabi range in Minnesota for another century or two, but to accomplish this, great changes must take place in the present mining industry, E. W. Davis, University of Minnesota, Minneapolis, warned.

Mr. Davis stated that the geological formations making up the Mesabi range are composed of a type of rock called taconite, containing about 30 per cent iron and 50 per cent silica, and stretching across northern Minnesota in a continuous sheet 100 miles long and several hundred feet thick. If this rock is ground fine enough, the grains of iron oxide can be removed in a fairly pure state, he stated.

From leached areas found here and there along the range, over one billion tons of iron ore have been taken out in the last 50 years. The average analysis of this ore has been 51.8 per cent iron, 7.61 silica and 0.062 phosphorus. Open pit direct shipping has accounted for 963,-556,000 tons; underground direct shipping, 265,783,000 tons; and concentrates, 207.147.000 tons.

No Great Discoveries Expected

In view of the simple geological nature of the Mesabi range and the extensive exploration that has been done, the discovery of any new large bodies of high grade ore is improbable. Most of the mining companies reluctantly gave up this hope many years ago. Mr. Davis pointed out that some new ore undoubtedly will be discovered since the tonnage estimates computed by the tax commission are conservative, but no great discoveries of new ore should be expected in this district, he warned.

There are about a billion tons of iron ore remaining on the Mesabi of the types now being shipped, and if this tonnage is divided by an estimated produc-

Elected president of the Association of Iron & Steel Engineers for 1947 was L. R. Milburn, electrical engineer, Great Lakes Steel Corp., Ecorse, Mich.

IRON & STEEL ENGINEERS

tion, say 35 million tons a year, the life cf the Mesabi range becomes about 30 years. However, if the production rate is 70 million tons annually as in 1942, the ore will last only 15 years.

The speaker mentioned that such a simple method of calculation leaves entirely the wrong impression. Nearly all of the ore on the Mesabi range is owned by various consuming interests and even these do not all own ore reserves that are proportional to their annual requirements. While some of the steel companies have reserves for perhaps 30 years, others will exhaust their reserve in 5 years or less, Mr. Davis contended. He explained that there is no real shortage of iron in this part of the world. The only question, he stated, is from which of several sources can ore be secured at the lowest delivered cost. He directed attention to the fact that nearly all the steel companies have engineers engaged in a search for a new supply of ore. Some are in South America, Cuba, Labrador, New York and some working on taconites of the Mesabi. In the speaker's opinion, work in this direction would not be so active if steelmakers had a 20-year ore supply on the Mesabi as casual statistics might seem to indicate.

Use of Taconite Emphasized

If the Mesabi is to continue for long to supply the major portion of the iron ore smelted in this country, Mr. Davis emphasized that this ore must come from the large supply of taconite that exists in this district. Several companies have ecquired great areas of taconite on the range, he said, and are actively engaged in developing these properties and studying their concentrating characteristics.

Since taconite is low in iron, it will be necessary to mine 3 tons of the rock and reject 2 tons as tailing in order to produce 1 ton of shipping product. To make such an operation economical, Mr. Davis explained, it must be accomplished in large plants in which every advantage is taken of the possibility of cost reduction

Figures obtained from many sources show that the cost of a taconite plant to produce a million tons of agglomerated ore per year will be about \$10 million. Moreover, he stated, this agelomerated toconite can be produced at a cost only slightly above normal Lake Erie prices. Large scale blast furnace smelting tests. using high-grade magnetite sinter, indicate a considerable saving in smelting cost over the cost of smelting normal lake ore. Therefore, while the cost of producing taconite concentrate may be higher than the present cost of lake ore, smelting costs will be lower and, the

(Please turn to Page 196)





TEEL

Committees To Be Set Up To Plan Industry Mobilization for War

Some 75 or more groups to be created to work with Army & Navy Munitions Board. Plan envisions fullest utilization of industry for war production and maintaining of civilian economy in event of future hostilities

WASHINGTON

IN THE course of the next month or two many manufacturers will be invited to help prepare plans for the mobilization of industry in event of another war. They will be asked to serve as members of 75 or more committees to work with the Army and Navy Munitions Board, or as members of one or more of several hundred subcommittees that will have special detail and technical assignments.

This network of industry committees, on the basis of present plans, will be formed largely with the assistance of the three organizations that make a business of co-operating with the armed forces.

These are the Navy Industrial Association, the Army Ordnance Association and the Aircraft Industries Association of America. The first-named body already has played its part in the program under the direction of a special 17-man Indusrial Mobilization Committee. The other two will take similar action.

The general objective is to enroll representatives of every sector of American industry — representing companies large and small—to set up plans for the effective use of industry should another war break out and, after the plans have been formulated, to keep them continually revised to keep abreast of changing conditions.

The first task for this committee system is to determine, "from industry itself, what raw materials, basic materials, component parts and end items were bottlenecks during World War II so that these difficulties can be eliminated or minimized in our next emergency." After this information has been obtained, the board will proceed with the formulation of a "written, explicit industrial mobilization *plan."

The speed with which the program is to be tackled is indicated by a statement by Richard R. Deupree, the board's executive chairman. "My guess," says Mr. Deupree, "is that the board will come up with good practical and factual presentation, ready for continuous revisions and review, sometime during 1947."

The board, as indicated by Mr. Deupree, already has accomplished a large amount of preliminary work:

1-It has completed the skeleton outline of the complete industrial mobilization plan for later development.

2—In the belief that the War Production Board, properly constituted, will inevitably be the cornerstone of an effective industrial harness in any forthcoming emergency, the board "has authorized the creation of a group of distinguished civilians who will be selected from those who had experience with WPB in the last war, and who will develop a manual which will embody the organizational changes in the WPB structure consid-

GE, Army Co-operate in Guided Missile Research

ROCKETS that will surpass the German V-2 in speed, distance, accuracy and effectiveness are the objects of a program of guided missile research being conducted jointly by General Electric Co. and the Army Ordnance Department.

The joint program really started during the war when GE scientists were sent to Europe in November, 1944, to study captured V-2 rockets. Later special facilities were provided by the Army at the GE Schenectady works for testing new types of missiles and motors, and company scientists have been assisting the Army in test firings at the proving grounds at White Sands, N. Mex.

R. S. Neblett, manager of GE's Federal & Marine Divisions, disclosed that power propulsion research is being made on rocket engines, ram-jets and a combination of both. The ram-jet is simply a cylinder which compresses air through speed in flight, adds and ignites fuel in the combustion chamber, and derives forward motion from the thrust produced by expanding gases which blast through the nozzle. Dependent on oxygen from air, ram-jets are subject to range-altitude limitation; their ceiling cannot much exceed the maximum altitude for aircraft.

Development and use of new and more powerful fuels create metallurgical problems. Materials must have greater strength, more corrosion resistance and higher melting points. Rocket fuel, as used by the Germans, was liquid oxygen and alcohol, mixed in the combustion chamber.

In test flights to determine the nature of the upper air, special instruments replace the war head of the rockets. Weighing as much as 1800 pounds, these instruments, through radio impulses, relay to the ground temperatures, pressures, cosmic ray, spectograph studies and other information. By forcible ejection from the body of the missile, delicate re-



cording instruments, bearing data from the ionosphere 100 miles above the earth, can be parachuted to the ground undamaged. Accompanying photo shows a test rocket being made ready by the light of moon and floodlights. ered necessary as the result of actual experience with the one which was developed in the midst of the war."

3—The board has "reconciled and formalized" Army and Navy action on about 3000 war plants in which the two services are interested, and of these over 2000 have been cleared to the War Assets Administration for disposal action. The board also has about completed clarification of the retention or disposal status of the remaining plants—the socalled 'twilight zone" establishments. "The whole pattern thus established is now under study by Mr. Donald Nelson."

4—The board has set up stockpiling objectives over a period of years to come, and already has determined on the purchase program during the first year under the new stockpiling act.

5—The board has undertaken a study to promote co-ordinated buying on the part of the Army and Navy but it probably will take several years to complete this task in view of the difficulties involved. "If the program does not accomplish effective and economical purchase it will be of no value." Standardization must receive careful attention. "For example, in a radar set of similar operating characteristics, the Army must have dust protection while the Navy must have comparatively small size and resistance to gunfire shock."

6—The board, by joint action by the secretaries of war and navy, recently was given responsibility in determining the military interest in United States import and export policies. As a result it holds membership on inter-agency State Department committees concerned with different phases of economic foreign policy.

7—The board has made progress in locating, surveying and cataloging all underground plant sites, including caves and abandoned mines.

8—The board is working on one subject of specific individual importance to large numbers of contractors. That is coordination of the packaging and packing specifications of the Army and Navy.

One of the matters that will be taken up in detail with the 75 industry committees and various subcommittees is that having to do with plant locations.

In addition to Mr. Deupree, the members of the board are Kenneth C. Royall, undersecretary of war, and W. John Kenney, assistant secretary of the navy. The board has two deputy executive chairmen, Brig. Gen. Sidney P. Spalding for the War Department and Rear Admiral Roger W. Paint for the Navy. It has a staff of some 50 Army and Navy officers and civil service employees drawn from the two services. In policy matters it is advised by a committee of top staff officers of the Army and Navy.

OPA Reported Discussing Steel Price Decontrol with Industry

DECONTROL of prices on iron and steel products is reported under consideration by the Office of Price Administration. It is understood in informed quarters that members of the Steel Industry Advisory Committee already have held initial conversations with the OPA on the subject, the conversations encompassing the entire range of products produced in the industry.

It is not clear whether this action means that the advisory committee's application for upward revision in price ceilings has been indefinitely deferred. However, up to late last week no such application had been filed with OPA.

As a general thing it is thought early decontrol of prices on the entire range of steel products is unlikely. Removal of price ceilings on such scarce products as sheets and strip, it is said, is not likely so long as demand is far in excess of production as at present, and especially since there is little promise of any material easing in the supply of these products before mid-1947.

An important development of the past week was the action of OPA permitting delivered prices on iron and steel products at Toledo, O., Detroit, eastern Michigan, Mahoning Valley, and the Gulf and Pacific Coast points to be increased, effective Oct. 9, to permit sellers to pass on to consumers the increase in freight rates which became effective July 1. The increases amount to 50 cents per gross ton for ingots, blooms, billets, slabs and sheet bars and $3\frac{1}{2}$ cents per 100 pounds for all other iron and steel products. This is provided in amendment 43 to price schedule 49.

The practice in the industry has been to quote flat delivered prices for shipment into these areas which were less than the aggregate of the price at the nearest governing basing point plus applicable transportation charges from such point. Under terms of price schedule No. 6, the increase in freight rates which became effective July 1 could not be passed on to the consumers in these torritories.

The amounts of the adjustment were computed by the Office of Price Administration as closely as possible to permit mills to charge the same proportion of the freight increase to the consumer at the named points as they are already permitted to charge under the basing point system where the consumer bears all freight increases from the basing point to delivery points.

Amendment 43 to price schedule 49 provides for a passthrough at the warehouse level of increases in the mill arbitrary basing point prices.

Federal Trade Commission Expected To Ask Supreme Court Review Basing Point Ruling

IF THE reasoning of the Seventh Circuit Court of Appeals in the cement basing point case is upheld by the Supreme Court, the United States Steel Corp. apparently has little reason to worry about the final action on its recent request for permission to meet competitors' delivered prices on steel products at consuming points.

That is the opinion of antitrust law specialists after careful study of the decision (see STEEL, Sept. 30, p. 33). The Circuit Court flatly denied the Federal Trade Commission's contention that absorption of freight to meet competitors' delivered prices is illegal. That right, the court held, definitely is given under Section 2 (b) of the Robinson-Patman Act. The Circuit Court decision is regarded as a major defeat for the Federal Trade Commission.

The court regarded as radical the

commission's contention that cement should be sold strictly on the basis of fob mill, and that the delivered price in each instance should be the fob mill price plus the actual freight from the mill to the consuming point.

The Circuit Court in the cement decision reaffirmed the illegality of charging phantom freight rates.

The Federal Trade Commission now has no alternative but to petition the Supreme Court for a review.

It is recalled that the Supreme Court in 1925 gave the cement basing point system a clean bill of health in the Department of Justice suit under the Sherman Antitrust Act. Since then there has been a substantial change in the Supreme Court's philosophy, so that its previous cement decision probably is no reliable guide as to what it may decide in reviewing the cement case.

Export Tool Trade Less Active Now

Failure of government to approve loans to several foreign nations reflected. Competition increasing in world market

FAILURE of the government to approve loans to several foreign countries has cut sharply into the export business of leading machine tool builders. Prior to V-J Day pent-up demand for American tools rose to record proportions in China as extensive plans were laid for industrialization of many sections of that country. Actual sales to that country, however, have been negligible due chiefly to lack of exchange, although unsettled political conditions have also hampered fulfillment of postwar plans.

Some foreign buyers have obtained required machinery elsewhere with which to retool their plants, either by rebuilding and reconditioning old ones or by placing orders with British, Swiss, Swedish or Czechoslovakian producers.

While competition from these latter interests is increasing in the export market. American producers generally still have an advantage from a delivery standpoint. British producers, for instance, are now promising deliveries in a year on new business whereas the American industry can promise shipments in three to six months on most types.

On the other hand, foreign producers have a price advantage on most machine tools. Czechoslovakian prices are about 40 per cent lower than American quotations while British prices are about 26 per cent lower. However, this applies chiefly to the smaller types of machines, this country being on an equal or lower price basis on the larger and some special machines.

Production of machine tools is still hampered by serious shortages of materials, components and labor. Control panels, for instance, are delaying the completion of some equipment and the shortage of castings is equally critical. Availability of electric motors and bearings has improved markedly in recent weeks Skilled workers, especially engineers and machinists, are very difficult to find.

Despite production difficulties, how-



SETTLE STRIKE: Officials of Allis-Chalmers Mfg. Co. and the CIO electrical, radio and machine workers union sign a contract ending a 28-week strike at the company's Norwood plant in Cincinnati. Left to right: Emerson Sonnycalb, union president; Arthur Fuhrman, union vice president; Arnold Thorsen, plant production manager; G. E. Hager, personnel superintendent; W. J. McGowan, company attorney. NEA photo

ever, many companies are approaching a spot delivery situation and may attain it in most types of tools by the yearend.

Otto Pfaff Heads Foundry Equipment Manufacturers

Otto A. Pfaff, president, American Foundry Equipment Co., Mishawaka, Ind., was elected president of the Foundry Equipment Manufacturers Association at the society's annual meeting at the Homestead, Hot Springs, Va., Sept. 24-26. He succeeds Thomas Kaveny Jr., president, Herman Pneumatic Machine Co., Pittsburgh.

William L. Dean, vice president and general manager, Mathews Conveyer Co., Ellwood City, Pa., was elected vice president cf the association, and Arthur J. Tuscany, Cleveland, was re-elected executive secretary-treasurer.

New directors: P. F. Bauer, Allis-Chalmers Mfg. Co., Milwaukee; H. S. Hersey. C. O. Bartlett & Snow Co., Cleveland; and Otto A. Pfaff, American Foundry Equipment Co., Mishawaka, Ind.

At the first session, President Kaveny announced formation of a Foundry Equipment Committee of the Industrial College of the Armed Forces.

R. L. McIlvaine, National Engineering Co., Chicago, described the activities of the group's Public Relations Committee.

At the second session President Kaveny discussed the recent action of OPA on foundry equipment. P. F. Bauer reported war surplus sales of foundry equipment and stated a timetable had been developed looking toward the sale or scrapping of surplus equipment within a year. President Kaveny and Frank G. Steinebach, editor of *The Foundry*, discussed the proposed National Castings Council.

Earl L. Shaner, president, Penton Publishing Co., and editor-in-chief of STEEL, described his trip around the world as a member of the Pauley Reparations Mission. Mr. Shaner indicated the important contributions of American equipment. especially transportation equipment, in all of the countries he visited, and stressed the tremendous needs that now exist if these countries are to recover to any extent from the war.

Malleable Founders Told Pig Iron Supply Improves

At the recent meeting of the Malleable Founders' Society at Haddon Hall, Atlantic City, N. J., John A. Claussen, chief of the Pig Iron Section, CPA, discussing the problem of pig iron supply for malleable founders explained that some improvement is being made, since production of foundry and malleable iron increased from approximately 350,000 tons in July to 386,000 tons in August. Not over 40,000 tons of foundry and malleable iron is on hand at the furnaces.

Plans are under way to bring in additional furnace capacity but critical shortages of coke, and in some districts shortages of iron ore, indicate the possibility that this program may not develop as much pig iron as previously had been estimated by Washington.

Francis J. Buckley, head of the Castings Section of CPA, stated that preliminary reports for August indicate malleable foundries used about 27,000 tons of pig iron to produce approximately 70,000 tons of malleable castings. This was the highest monthly production of malleable iron for the past 12 months. Mr. Buckley also indicated the CPA needs better statistics, and recommended foundrymen speed up the supply of necessary data

Warren Huff, head of the Metallics Division of OPA, discussed the new price regulations on scrap. He indicated there has been an improvement in the scrap supply since the recent OPA action.

Mechanical Engineers Hold Fall Meeting at Boston

Metal cutting and production engineering in the textile and wood industries as well as engineering and industrial education were emphasized in discussions at the fall convention in Boston last week of the American Society of Mechanical Engineers. More than 1000 attended the sessions.

Keynote address of the meeting was delivered by Frederick S. Blackall Jr., president, Taft Pierce Mfg. Co., Woonsocket, R. I., at a luncheon which was attended by Gov. Maurice Tobin of Massachusetts. Mr. Blackall urged technical societies to guard against "gate" crashing by self-styled engineers who cannot even read a slide rule. He said he believed five-year engineering courses soon will be necessary because of the tremendons technical advances, thus putting engineering on a parity with medicine and law as a profession.

Machine Tool Deliveries at St. Louis Picking up

St. Louis — Machine tool deliveries are picking up a bit. Standard lathes are reported available in 12 to 14 weeks, although sheet metal equipment still requires a year or more.

Surplus sales in this district are diminishing, which promises to raise local demand for new tools unless surpluses from other areas are sent in for disposal. New tool demand has been fairly active here for many weeks, even though used ones came in for first consideration by most buyers.

Some dealers express surprise that removal of price ceilings had so little effect. There were no price rises of consequence and prices now do not average more than 12½ per cent above 1941.

GOVERNMENT CONTROL. DIGEST

OFFICE OF PRICE ADMINISTRATION

Cast Iron and Enamelware: Manufacturers of household cast iron and enamelware no longer are remaired to pre-ticket their product with the retail price. Several clarifying changes a.s were made in the order. (MrB-106; OrA-T-5082)

Hand Tools: Sellers of certain hand tools and related hardware items may use, effective Oct. 2, either of the following two methods of allocating transportation charges to articles to determine their net cost: Method provided in the regulation or the established method of allocation that they used immediately preceding Aug. 2, 1946. (MPR-614; OPA-T-5082)

Woodworking Machinery: Producers of wood working and timber working machinery and equipment granted an interim increase of 16 per cent, effective Sept. 27, replacing the former increase of 10 per cent over base date maximum salar prices (MIRA 136, OPA-T-5043)

maximum sales prices. (MPR-136; OPA-T-5042) Price Control Exemption: Aluminum furniture, wrought iron furniture and specified accessories for hospital beds have been removed from price control. effective Sept. 30. (SO-126)

rice control, effective Sept. 30. (SO-126) Price Control Suspension: unrotted industrial machinery, automobiles, furniture, motorcycles, cameras and pnct, aphic equipment, chinaware, glassware, and household utensils and appliances have been suspended from price control. In addition, 42 specific items, including sponge iron and metallic cloths, were suspended from price control, effective Sept. 25. (SO-184: OPA-6825)

Pig Iron: Effective as of Sept. 1, a producer

of foundry or malleable grades of virt iron, who also has been supplying customers with steel grade pig iron, is permitted to pass on to another producer both the supplying of steel grade pig iron and a part of the premium parment he receives. This will free the original producer to concentrate on making foundry and malleable grades, the only grades for which incentive payments will be made by the government. Present level of ceilings for all grades of merchant pig iron remains unchanged, since the bonus payments will be made before final sale to the consumer, which will take place at ceiling price. (MPR-10; OPA-T-5025)

CIVILIAN PRODUCTION ADMINISTRATION

Cast Iron Soil Pipe: To facilitate producers' conversion to a greater output of housing-size cast iron soil pipe and fittings without loss of total tonnage, CPA has provided for conditional temporary deferment, in certain cases, of the requirement for reducing production of large sizes. (VHP-4; CPA-LD-291)

Bale Tie Wire: Period during which the War Assets Administration is required to channel government surplus of bale tie wire to producers of bale ties has been extended for 60 days to Nov. 30. WAA was required to set aside, out of government surplus, 7500 tons of carbon steel black annealed or galvanized wire suitable for use in making wire bale ties. The extension was ordered because this amount was not reached by Sept. 30. (PR-13; CPA-LD-286)

Republic Offers \$30 Million for Chicago Plant

Four other bids received for surplus alloy steel facilities at second offering. Kaiser-Frazer Corp. proposes lease terms

REPUBLIC Steel Corp., Cleveland, was high bidder for the \$92 million surplus South Chicago steel plant which Republic built for the government in 1943 and has since operated. Republic offered to purchase the plant for \$30 million, which was the highest of the five bids received.

Second largest offer for purchase was \$28,250,000 by Philip D. Fitzgerald, of Chester J. Clark & Associates, consulting engineers, Chicago, acting for an unidentified group. John W. Turkovich, a war veteran from Detroit, and representing no company, offered \$20,233,894. C. A. Depue, president, Central Steel Tube Co., Clinton, Iowa, made a purchase bid of \$19,230,000.

Kaiser-Frazer Corp., Detroit, made a proposal to lease the property.

Last spring, WAA rejected a bid for lease from Republic and a purchase bid from Mr. Depue as too low.

The new Republic proposal for purchase would be payable in annual installments of \$1,500,000 over a 20-year period without interest. At the same time it resubmitted its once-rejected bid to lease the plant for five years at a minimum rental of \$200,000 a year.

Mr. Fitzgerald offered to deliver \$4 million within 10 days after consummation of purchase, the remainder to be paid as follows: Two years after acquisition, \$5,087,-000; and on each of the following three years a similar payment.

Mr. Depue's effer of \$19,230,000 compared with his previous offer of \$17,-500,000.

The Kaiser-Frazer offer of lease proposed a minimum rental of \$875,000 for the first year, \$1 million minimum for the second year, and \$1,100,000 for the third and each succeeding year. Rentals would be based on tonnage output. Operation of the plant would be to supply semifinished steel to other steelmakers.

Several bidde-s pointed out that the plant was built for production of electric alloy steel and is not readily adapted to production of peacetime products without considerable alterations which they proposed to make. Republic estimated improvements would cost \$20 million.

Windows of Washington By E. C. KREUTZBERG Washington Editor, STEEL

German manufactured goods, largely toys, Christmas tree ornaments, china, optical goods, etc., to begin moving to the United States soon. Resumption of trading aimed at helping defeated Germany get on self-supporting basis

IT IS a historical axiom that the enemy nation of today becomes the friend of tomorrow. Despite our attitude before, during and immediately after World War II, our relations with Germany are trending in that direction. For reasons that are well understood by the American public, our policy now calls for restoration of a unified Germany, to be governed by the Germans themselves in the democratic tradition. And now, a little more than a year since American and German soldiers ceased shooting each other, we have taken a step that shows clearly which way the wind is blowing. We have begun to trade with the Germans.

As agent for the Office of Military Govcrment, United States Zone, the U. S. Commercial Co. already has begun shipping German manufactured products which will start to arrive in the United States within one or two weeks. Included is a large consignment of toys and Christmas tree ornaments, and smaller lots of china, porcelain and ear henware, cameras, wine and optical goods.

Two Objectives

The purpose is twofold. Unless we help the Germans to get on a self-supporting basis, there will be no basis for organizing the Germans along democratic lines—and when using that term our people are thinking in terms of United States as opposed to Russian democratic concepts. The other objective is to take from the shoulders of American taxpayers at least a part of the burden of feeding the Germans. Our peoplc want to get some dollars into Germany so as to exchange food for value received.

The U. S. Commercial Co. now is discussing the most effective manner of marketing these commodities in the United States. The toys and Christmas tree ornaments probably will be put on display in New York, with resulting sales either on an auction or negotiated basis, depending on the amount of interest shown. Probably the same general method will be employed in marketing the other types of goods. Later on, leather goods and wood products will be brought in, also silverware and costume jewelry.

The Office of International Trade, Commerce Department, which several weeks ago invited prospective American importers to signify whether they want to journey to Germany to inspect samples of available goods, reports that favorable responses have been received from about 100 firms. These names have been submitted to OMGUS (Office of Military Government United States Zone) and the latter now is trying to arrange effective visits for these American business men.

It may be some time before some of these visits can materialize. This is because of certain obstacles. For instance, although the Radio Corp. of America and Philco recently indicated a desire to buy up to 50,000 Cerman-made radio cabinets, it will take some time before the German manufacturers will be in a position to make any promises. A chief



LT. GEN. R. M. LITTLEJOHN

The War Assets Administrator told a special House committee investigating surplus property disposal that he had recently ordered wholesale "firings" in the WAA as result of irregularities in the electronics division drawback has been finding sources of hinges and other âttings for the cabinets; also there has been some difficulty about arranging for supplies of suitable wood.

OMGUS now is studying the possibilities of permitting American and German business men to communicate with each other. At present personal mail is permitted. This is to be expanded shortly to include so-called "non-transactional" mail. American importers and German exporters would be able by correspondence to exchange information about types, sizes, quantities, details of design, etc. Then the actual deals could be closed quickly either by OMGUS direct or by the U. S. Commercial Co.

The U. S. Commercial Co. and OMGUS are endeavoring to set up a policy of marketing German goods that will be fair to everybody concerned. They do not propose to "dump" German goods at the expense of American industry. And they are prepared to respect prewar patent and contract rights of American concerns. For instance, where an American importer had the exclusive representation for a certain make of German camera, he will receive preferred treatment.

An administration man who has an active part in carrying out this program points out that no huge importation program is necessary to enable the Germans in the United States occupied zone to balance their dollar obligations. Recent estimates, as used by Secretary Byrnes in his remarks at Paris, are that occupation of our zone in Germany is now costing us at the rate of about \$200 million per year.

Venture Capital Comes Out

If the recent expansion in the security market proves to be more than a flash in the pan, proponents of enlarged government participation in activities formerly reserved to private business will have lost one of their prime arguments. That is that private investment no longer is sufficient to expand industry.

A year ago Preston Delano, comptroller of the currency, continued to express the fear that future business expansion might be held up because of insufficiency of investment capital. He pointed out that investment of individual savings in industrial securities had been inadequate for more than a decade previous.

His report for the fiscal year ended June 30, 1946, is much more optimistic.

"It is gratifying to note," he writes "that during 1946 the public began once more to furnish venture capital in substantial amounts. During the year new



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COMPANY

WINDOWS of WASHINGTON

corporate stock issues exceeded \$1,300,-000,000, an amount greatly in excess of any year since 1930. Half this amount was issued for the purpose of providing new capital. During the first months of 1946 equity securities to provide new corporate capital have been purchased by the public at a rate over twice that of the preceding year.

"It is encouraging to observe this resurgence of confidence among investors in the expansion possibilities of our country, and that new enterprises can still gain support from the savings of the public rather than from government funds or from commercial banks which might otherwise feel obligated to step into the breach."

Mr. Delano also writes optimistically about the banks; they have emerged from the war in sound condition "and are participating vigorously in the domestic reconversion program." At the same time they are encouraging stability by seeking to restrain loans "within reasonable limits" and by seeking to discourage borrowing for speculative purposes.

Net profits of the national banks in 1945 equaled 10.97 per cent on average capital accounts.

Home, Sweet Home

Temple Trailer Village, on Telegraph Road, Alexandria, Va., is gaining rapidly as a Mecca not only for trailer manufacturers but for makers of many household and other items in the consumer goods category. Of the many trailer camps scattered about the outskirts of metropolitan Washington, Temple is the most attractive and is regarded as a place where sound ideas about future housing needs may be developed.

Temple has 195 trailer families which shortly will be expanded to 545. Each trailer is on a 30 x 40-foot lot. Each lot has sewer and water connections and with it goes a private bath house. The trailer occupants take pride in their homes and have decorated their lots with fine lawns and shrubs. Some of them have added cozy porches. A monthly rental of \$15 to \$25 covers all charges at Temple outside of the cost of the trailer and its furniture.

While no accurate census has been taken. of the trailer population of Washington it certainly is more than 50,000—including men, women and children—and probably is closer to 75,000. Mature opinion of trailer salesmen who contact the people in these camps is that the trailer trend is not just a fad but is here to stay. For there is no other arrangement, they claim, whereby snug housing facilities may be had at anywhere near the investment represented by a trailer, plus rent and cost of upkeep. Trailer occu-



COL. A. J. McFARLAND Secretary to the Joint Chiefs of Staff, Colonel McFarland was called before the Senate War Investigating Committee recently to explain why files on the Canol project are still labeled "secret"

pants, says a salesman, find their income goes farther when living in trailers, and many of them would resist a reduction in their purchasing power that would result from occupancy of a conventional home.

On More Prosaic Job

Under a \$181,080 contract from the Bureau of Reclamation the General Electric Co., Schenectady, N. Y., will install two 75,000-kilowatt main generators at Shasta Dam, Calif. Originally ordered for Shasta Dam, the generators now are historically significant because of their temporary use at Grand Coulee dam, in Washington, where they furnished power consumed at the Hanford, Wash., atom bomb plant. In their new location they will be used for pumping Sacramento River water up into the Delta-Mendota canal whence it will flow into the San Joaquin River to irrigate farm lands.

Patent Agreement Expected

After conferences for many months past with each other and with representatives of industry, Army and Navy authorities are reported as close to agreement on patent clauses to be incorporated in future contracts covering scientific research and development work. The program is in the hands of the War Department's Offices of Procurement and Judge Advocate and the Navy's Office of Naval Research. It is expected that the principal change, already approved by the Navy, will recognize contractor ownership of inventions used in doing work for the government, but for which patent applications have been filed prior to the performance of the contract. The proposal also entails giving subcontractors the same protection.

Top Level Navy Changes

Navy top command changes include the following which are of interest to many readers of STEEL:

Vice Admiral Louis E. Denfield will become Commander in Chief, Pacific Fleet and Pacific Ocean Areas, in January, 1947, replacing Admiral John H. Towers who will retire in February.

Vice Admiral Edward L. Cochrane, present chief of the Bureau of Ships, will become Chief of the Material Division, Office of the Assistant Secretary of the Navy, in November, 1946, replacing Admiral Ben Moreell, who is leaving the Navy to take a position in private industry.

Vice Admiral Earl W. Mills, now Deputy Chief of the Bureau of Ships, will become chief of that bureau in November.

Commodore Paul F. Lee, will become Chief of Naval Research, Navy Department, in November succeeding Vice Admiral Harold G. Bowen who will retire.

Gas Preferred for Heating

Gas is the favored heating fuel in new homes now being built, according to the National Housing Agency. A survey shows that builders are installing gas heaters in 52 per cent of the new homes, coal heaters in 27 per cent and oil heaters in 21 per cent. The analysis was reached by classifying priority applications for 629,000 dwelling units received between Jan. 15 and July 26.

Navy Helps Contractors

To expedite production under its contracts, the Navy during the war extended the following financial assistance to contractors who were unable to obtain private financing: \$2,021,814,002 in the form of advance payments, and \$2,215,-000,000 in guaranteed loans.

Losses sustained in this program came to \$845,256 on advance payments and \$975,732 on guaranteed loans—an overall loss ratio of only 0.00043. This was much more than made up by interest receipts of \$13,193,644 on the advance payments, and receipts of underwriting fees of \$7,389,000 on guaranteed loans.

Government To Acquire Majority Shares in British Steel Firms

Revises plans for obtaining large measure of public ownership. Purchase of shares will be compulsory at prices fixed by arbitration. Government will provide capital for development. Enabling bill expected early next year

BIRMINGHAM, ENG.

FURTHER developments have taken place in regard to the government plans for the British steel industry. Present indications are that the government has accepted the revised plan prepared by the minister of supply to obtain a considerable measure of public ownership.

The government will not nationalize, as it first contemplated doing, certain branches of the industry. Instead, it will set about acquiring in the principal iron and steel companies a majority of the shares. With the voting power so insured, most of the directors in each company will be nominees of the government. For these purposes an enabling bill giving wide powers will be necessary, and the expectation is that its terms will be published in the early months of next year, though when and where it will be fitted into the legislative program has not yet been decided.

The government intends to provide considerable sums for the development of the industry, and this will be in the form of additional capital that will be held by the state. Such other shares as are needed to give control will be purchased compulsorily at prices to be fixed by arbitration.

However, on Sept. 22, Herbert Morrison, Lord President of Council, confirmed the government's intention of socializing an appropriate area of the iron and steel industry.

Production Rate Above Last Year's

Production in August was lower because of the holidays but was considerably above the same month last year. Steel was at the rate of 11,747,000 tons a year compared with 9,465,000 tons in the like month last year; pig iron was at 7,558,000 tons compared with 6,-358,000 tons.

Supplies of steel are totally inadequate to meet demand and export orders have been curtailed. Manufacturers cleared as much as possible in September in anticipation that export quotas will be reduced further during the fourth quarter. The reason is that priority claims for home industries are so heavy that there is only a small surplus left for shipment. Automobile builders may have to cut production owing to shortage of sheets. The British Iron & Steel Federation which operates distribution for the government has sent a letter to all sheet producers indicating that sheetmakers appear to be fully booked for many months to come, although many requirements which government policy insists on being met are still waiting to be placed for early delivery.

Sheet rollers are in an unenviable position for while they have insistent demands from the automobile builders, they are expected to provide sheets for housing to an increasing extent, this being regarded as priority No. 1. Steelworks are also heavily pressed for plates. sections and bars. Construction engineers are keen to secure delivery of material for rebuilding factories and business premises destroyed by enemy action.

A contract has been placed for the rebuilding of the House of Commons. Structural steelwork comprising 1200 to 1300 tons has been awarded to Redpath Brown & Co. Ltd. who will fabricate it

in their London works at East Greenwich. Dorman Long & Co. Ltd., Middlesbrough, are building a new £500,000 power plant, and construction has also begun on a new central ore unloading and ore preparation plant at a cost of £1,250,000. The latter scheme will serve the Dorman Long project for a new steelworks and universal beam mill on a virgin site between the company's works at Cleveland and Redcar on the northeast coast. Approximately 2400 tons of steel will be used in the construction of the boiler plant itself and another 1000 tons of structural steel framework in the power house building.

The position in the light foundries is still difficult owing to the shortage of skilled labor, a problem which is facing industrialists all over Britain. Total foundry capacity is not yet absorbed despite the fact that housing requirements for castings are at a level higher than for many years. Deliveries of pig iron from the furnaces are strictly controlled on a quota system and users cannot always get what they require. It is clear that when 100 per cent working becomes possible in the foundries making light castings a bigger tonnage of iron from the furnaces will be needed. Power plant producers are seeking heavy castings and steel pressings. Works making heavy castings have added considerably to their order books in recent weeks and work is assured to the end of the year at least.

RUSSIANS BUILDING TURBINES: Recently constructed by the Stalin Metal Plant at Leningrad was this 100,000 kilowatt high-pressure turbine, the first of its type to be built in Russia. NEA photo







1946 Truck-Trailer Production To Set New Mark

Output this year is expected to reach 60,000 units, compared with 41,869 in 1941, the previous record for civilian trailers. Some makers have considerable backlog of orders while others have fairly sizable inventories of some types

By VANCE BELL Associate Editor, STEEL

NEW MILEPOST in civilian production is expected to be passed this year by the truck-trailer industry which in the first seven months of 1946 nearly equaled the all-time year record set in 1941.

With output for the first seven months averaging better than 5500 units a month, the industry is anticipating total production this year of at least 60,000 trucktrailers, compared with the 1941 record of 41,869 civilian units.

For the industry as a whole, supply of new trailers is approximately in line with demand. However, some manufacturers have substantial order backlogs for certain types of trailers, while others may have a fairly sizable inventory of certain types and models. That the supply is not less comparable to demand results from the fact even during the war the

truck-trailer industry continued civilian trailer manufacturing, although at a reduced rate.

Production this year of 60,000 trucktrailers would represent sales value of approximately \$140 million, according to the Truck-Trailer Manufacturers Association Inc., Washington.

Output in the first seven months of 1946 totaled 38,940 units, the U. S. Bureau of the Census reports. The bureau's latest data are based on reports from 114 manufacturers, all of the known companies in the industry. Monthly production figures for the first seven months of 1946 follow: January, 5323; February, 3898; March, 5412; April, 6691; May, 6617; June, 5033; and July, 5966. July production exceeded shipments by

411 units. Value of the July shipments was \$11,153,809. Approximately half of the industry's pro-

duction is comprised of vans, which clas-



sification consists of the following five types: Insulated, refrigerated, furniture, ordinary closed top trailers, and open top. Of those five types, the ordinary closed top trailers comprise approximately 75 per cent of the vans and about 38 per cent of the total truck-trailer production. The remaining 62 per cent of the production is accounted for by eight classifications, no one of which equals the vans group. Among those eight classifications are racks, tanks, pole and logging, platforms, and dump trailers.

Although the estimated 1946 production of 60,000 truck-trailers would set a new record for output of civilian units it would be only 28 per cent of the combined output of civilian and military truck-trailers in 1944. That year, civilian units totaled 24,092, while military trucktrailers numbered 185,349. Nevertheless, the demand for civilian truck-trailers has made a substantial growth in the past decade, as the following figures testify:

TRUCK-TRAILER PRODUCTION

Year	Civilian	Military
1935	18,898	
1937	21,747	
1939	24,182	
1940	27,118	
1941	41,869	
1942	8,408	71,520
1943	8.054	188,811
1944	24.092	185.349
1945	33,266	83,967
1946	60.000°	
9 Fetir	nated	

Of 114 truck-trailer manufacturers only about a dozen can be considered large companies. From 25 to 30 could be considered medium to small com-

/TEEL

Truck-trailers are used widely for speedy movement of steel (photo at left) directly to plants and sites where it is to be used panies, and the rest may be assumed to be very small manufacturers, or companies which make a few trailers along with some other product.

Current figures on total employment in the truck-trailer manufacturing industry are not available but a survey made a year ago indicated an approximate total of 25,000 hourly workers. The Truck-Trailer Manufacturers Association said that unquestionably the industry's employment has increased somewhat since that survey.

In attaining the current high rate of production of civilian truck-trailers the industry has been face to face with the problems of materials shortages, low productivity of employees, shortage of skilled labor, and work stoppages.

Commenting on the outlook for trucktrailer production this year, Julius L. Glick, president, Truck-Trailer Manufacturers Association, said: "Trailer makers will have hurdles to clear, of course, but suppliers of parts and components still assure us they can overcome their own difficulties sufficiently to allow us to produce the indicated number of finished units.

"While suppliers foresee inability to increase present schedules much, if any, for several months," said Mr. Glick, "important sources have told us they can continue past schedules on such items as power brakes, brake linings, wheels, rims, steel tubing, bearings, leaf springs, and axles."

One of the possible limiting factors seen by some suppliers is the acute shortage of pig iron vitally needed for castings, Mr. Glick pointed out.

It may be said, on the basis of supplier reports to our association, that trailer manufacturers will not be able to pick and choose from surpluses of materials, but that, on the other hand, the Illustrative of a type of truck-trailer whose popularity is increasing in states which allow truck-tractor, semitrailer and full trailer combinations are the milk tank truck-trailers in the picture at the left. Typifying the versatility of which the highway transportation industry boasts, this "double bottom" type of vehicle allows considerable flexibility in that either trailer can be "spotted" for loading or unloading and the remaining one taken to another destination. Either trailer can serve as a full trailer when used in connection with the converter dolly. An outlet for additional steel is provided through manufacture of the increasingly popular three-axle type semitrailer (photo at the right) which requires more

materials than previous smaller models with fewer axles

prospect is for a continuance of at least as good a flow of materials and parts as the trailer industry obtained in the first half of this year," Mr. Glick added.

With production of truck-trailers expected to reach a new high in 1946, consumption of steel in the industry would total 190,000 tons, the greatest amount ever consumed in the manufacture of civilian truck-trailers. The amount of steel currently being used represents even more of an increase than the rise in the number of trailers being built would indicate. This is true because revisions in some state laws permit longer trailers and, in a large number of states, tandem axle trailers, both of which require considerably more steel and other materials now than before the war.

The steel consumption figure of 190,-000 tons for 1946 was arrived at by the Truck-Trailer Manufacturers Association through a series of calculations using the material weights per trailer developed by the War Production Board when materials were under wartime controls.

Now that stainless steel is available again, several manufacturers of trucktrailers have resumed offering trailers of stainless construction. Prior to the war, stainless steel had been used to some extent in construction of van trailers, refrigerated and insulated trailers, and milk tank trailers.

The use of refrigerated trailers is increasing very rapidly. This comes about from the large increase in frozen foods and other food products requiring close temperature control and also as a result of considerable technical progress in the design and construction of refrigeration units. Prior to the war, there were relatively few dependable lightweight refrigeration units available for trailers. Now, however, there are a number of such units, and while production of these units is booming, it is far below the demand.

In developing and improving motor truck transportation, those interested in it have had to deal with a great variety of state laws, many of which intentionally discriminated against highway transportation. The chief difficulty with existing state laws, according to Mr. Glick, is that some of them cut across or hamper the natural flow of commercial traffic. In each such instance, the "low size and weight state" necessarily sets the ceiling for the region in which it is located. Although much progress has been made in recent years in removing discriminatory and intentionally restrictive state legislation hampering highway transportation, much still remains to be done, Mr. Glick declared.

Nevertheless, the motor truck transportation industry with its many and varied truck and trailer units, some highly specialized and all possessing high adaptability for different' services, has confidence that its future is bright. An indication of this confidence is the construction now under way of a \$7½ million truck-trailer assembly plant at Avon Lake, O., by the Fruehauf Trailer Co., Detroit. In this new half-mile-long plant, mass assembly techniques will be applied to building of truck-trailers.

99

ONE CAME BACK

One of the legends surrounding the making of Damascus sword blades is that the smiths developed a delayed quench consisting of thrusting the heated blade into the body of a slave. This gave the required properties, but it was prodigal of manpower, and inconvenient besides. The smith usually had to leave town to do his heat treating in quiet. Today, metallurgists can obtain properties they need in steel by simpler, less improvident means. A little molybdenum is one way of doing this. It is a proved means of obtaining the hardenability that assures good performance in service. Practical working data on molybdenum steels are available from Climax upon request.



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



By A. H. ALLEN Detroit Editor, STEEL

> Fairness of certain government statistics questioned by General Motors labor economist. Federal Reserve Board industrial production index cited as example of statistical magic in its treatment of automobile output data

DETROIT

OLD ADAGE to the effect that figures cannot lie but liars can figure may not fit exactly in the case of many current government statistics, but it comes close. The shocking example of the famous Wallace report from the Department of Commerce on automotive wage-price relationships is a case in point, and despite its official repudiation by the ex-secretary, it is still vigorously supported by Department of Commerce underlings. The auto industry may shortly have something to say about this.

Andy Court, General Motors labor economist, took a few verbal swings at the fairness of some other government statistics in a recent New York address, specifically the Federal Reserve Board index of industrial production which sets July automobile production 78 per cent above the 1935-39 average. Actual production in July was about 300,000 cars and trucks, compared with an average of 335,000 for the 1935-39 period. Instead of up 78 per cent, actual output was down 10 per cent.

Man-Hours Determine Index

The way this neat trick is accomplished by Washington slide-rule artists is to develop an index based on the number of man-hours for which the employer pays wages. Thus, the slower the working pace, the less production turned out per hour, the higher the production index goes. Paid lunch periods, paid sick time, pay for smoking on the job, call-in pay and the other methods of remuneration for not working forced upon industry almost at the point of a gun in recent years all contribute to moving the official government production index up, but sadly they do not turn out any more automobiles.

The procedure, according to Court, is not untypical of government index making and is in part the result of the Department of Labor policy of defining man-hours and payrolls in industry so that the official average hours of work appear high and, as a consequence, average hourly earnings show less increase than actually exists. Observes Court: "People waiting for new cars can't ride on government statistics."

Assemblies of cars and trucks have been holding on fairly even keel for the past

three months at around 350,000 units, U. S. and Canada. Considerably short of earlier projections, the performance is causing more than a little embarrassment in industry circles. In the first place inventories are seriously unbalanced, and in the second place there is an overloading of management and supervisory personnel which is even now in the process of correction.

Inventories of many purchased parts, subassemblies, manufactured parts and

1.0		201 I To -
Automobile	e Produ	ction
Passenger Cars	and True	ks-U.S.
and	Canada	
Tabulated by Ward	i's Automotic	e Reports
	1946	1941
January	121,861	524,037
February	83,841	509,332
March	140,777	533,878
April	248,318	489,856
May	247,620	545,321
June	214,511°	646,278
July	330,764°	468,897
August	364,046°	164,793
September	345,250°	248,751
Estimates for w	eek ended	
Sept. 14	88,888	53,165
Sept. 21	80,972	60,615
Sept. 28	85,572	77,035
Oct. 5	90,000	76,820
• Preliminary		-
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components are far in excess of the requirements of the present level of production. They are this way because the industry has been following a policy of buying anything and everything it could lay hands on, for two principal reasons: First as a cushion against further strikes and work stoppages in suppliers' plants, and second to meet the requirements of double-shift operations which most companies have been planning but have not realized because of shortages cf a few critical items and a near-term deficiency in shipments of flat-rolled steel. As long as the latter continue-and there is little support for opinion they will not--inventories of other parts will continue far cut of balance and this may have some interesting repercussions in buying policies. If there should be an appreciable cutback in the buying of parts and materials which are in long supply there might be some early retrenchment in steel requirements for such parts, and this could be reflected quickly in opening up of the steel market. Easing of pressure probably would come first on bars and products other than sheet and strip.

Obviously in a period of rising prices the industry cannot become too worried about a long inventory position on parts if they are eventually usable. Scaling back purchases might in addition help to relieve the drouth in replacement parts which, despite enormous shipments, seem unable to fill the demand. For example, one of the largest car and truck builders delivered to dealers in the first half of the year \$7,593,850 worth of replacement parts and \$4,886,617 in accessories, representing an increase of 116 per cent in service parts.

On the question of nonproductive labor, as mentioned here a couple of weeks ago, it is accounting for much too high a proportion of unit costs. For one thing, all companies have had hundreds of expediters running around the country chasing materials and parts. Little thought has been given to shipping costs and airlines have reaped a bonanza in air express on parts to keep automotive assembly lines going. Beyond that, during the war supervisory and managerial staffs of most companies were built up, both in numbers and in salaries, to an important degree, a necessary step in view of the size of the job to be done. It is not so easy to cut down after the build-up, but it is now beginning to appear inevitable. Double shift operations have not matured, labor and material costs have mounted to the point where profit margins are evanescent. The ax will have to fall on this nonproductive labor.

Downgrading, Salary Cuts Suggested

Two obvious methods suggest themselves. One is outright salary reductions; the other is downgrading. Probably the latter will be the choice. As a matter of fact, some adjustments already have been made in the ranks of most General Motors divisions, although the nature and extent have not been announced.

Another casualty this year for most industrial companies will be management bonuses, in view of slim or nonexistent profits and the reported policy of internal revenue in disallowing such bonuses as a cost item. For many, however, bonuses have meant simply that much more for

MIRRORS of MOTORDOM



RADIO TELEPHONE EQUIPMENT: Installed in a Chevrolet panel truck this equipment permits driver to make and receive local and long-distance calls to and from any Bell System or connecting telephone units in the United States or overseas. The service, developed in the Detroit area by engineers of the Michigan Bell Telephone Co., is an application of frequency-modulation radio principles in the very high frequency range, equipment consisting of a receiver, transmitter, antenna, selective signaling device, instrument holder and handset. An amber light and bell under the dashboard of the truck indicate when the telephone operator is attempting to contact the truck. Equipment is leased to the user, with an installation charge and a monthly rental charge

the income tax collector, so in the final analysis the Treasury Department is the chief loser.

Jet Propelled Boat Seen

"Hydropulsion," or the propulsion of boats by high velocity water jets, was demonstrated here last week by the Gray Marine Division, Continental Motors Corp. The idea is still in the experimental stage and will not be offered to the public in the near future, but it represents a revolutionary concept in the marine field. It is likened to jet propulsion in the aircraft field, since it involves the ejection of a solid stream of water at high velocity under the boat, exerting force against the water in which the boat rides.

Originator of the idea, as far as Gray Marine is concerned, is Keenan Hanley of Prospect, O., who nine years ago introduced a propellerless fireboat used in the Cincinnati flood of that year. This experimental unit was powered with a Continental engine driving a hydraulic pump of special design which was used both to propel the boat and to pump water. Later a 21-ft fireboat of similar design was delivered to the city of Wheeling, W. Va., and subsequently other cities purchased craft of this type.

Test boats using hydropulsion were shown to the press in Detroit last Tuesday, and John W. Mulford, president of Gray Marine, said the first application probably would be in the field now largely held by outboard motors, a typical installation involving possibly a detachable and portable inboard engine for use with a small hydraulic pump and nozzle unit suitable for the volume market.

Spectacular maneuvers are possible with water jet drive. Boats can turn in their own length, move sidewise, operate astern indefinitely and pass through weed beds and shallow water which would quickly foul a propeller. Further, they can be beached and backed off by flooding themselves under the hull like landing boats.

Lincoln Work Orders Placed

Work orders are placed for a \$2 million modernization program at the Lincoln plant of Ford Motor Co. Main office is already undergoing changes, while the plant alterations are scheduled to start around Nov. 1, to be carried on without interference to present production schedules. The program is designed to double present capacity.

Announce K-F Car Prices

Speculation is heard as to the impact of OPA-approved price ceilings on the million or so buyers who have placed orders for Kaiser and Frazer automobiles. Detroit delivered price on the Kaiser Special, including all taxes, delivery and handling charges, but with only standard equipment, is calculated as \$1850.41, while the Frazer will retail on the same basis for \$2008.93. These figures are far in excess of what the K-F partners originally hoped for, but they show the effects of higher material and manufacturing costs in the industry. Assemblies at the Willow Run plant are now running something over 60 per day.

Car Needs 6 Tons of Coal

How much coal to make an automobile? Ford statisticians estimate 6 tons per car, figuring coal used in coke ovens, power house and the railroads of the Rouge plant, plus that used by steel suppliers and in transportation of raw materials.

Willys Display Derided

When told of the elaborate three-dimensional exhibits illustrating the functioning of the national economy, unveiled last week in Toledo by James D. Mooney of Willys-Overland at his big party, certain of the General Motors economic specialists snorted and said, "Hell, that is the same stuff we built for him 15 years ago." It seems a guy just can't introduce any idea without some deflaters coming along.

Speaking of Willys-Overland and the new stress its management is laying on utility and economy in automotive transportation, one wonders how much economy the average buyer will see in the new jcep station wagon which has been assigned a ceiling price of \$1407.

New Tucker Terms Revealed

New lease terms have been approved by the WAA for the Dodge Chicago plant in which the Tucker Corp. is planning a car building program. Contingent upon proof of sufficient financial backing by Mar. 1, rental of the plant has been reduced to \$500,000 annually for two years, starting next March, and \$2.4 million thereafter on a ten-year lease with option to purchase for \$30 million. Tucker is understood to be negotiating currently for a \$20 million securities issue.

DIE CASTINGS

ODD SHAPES-CAST OR BENT

is do

One of the principal advantages of the die casting process is the ability to cast unusual shapes. There are instances, however, where it is more economical to obtain a required contour by a bending operation after casting.

A design change in the zinc alloy die casting shown below required that the end of the pointer be curved, instead of straight as it was originally cast. This could easily be accomplished by altering the die but, thanks to the ductility of the zinc alloy, it proved to be less costly and quite satisfactory to bend the pointer after casting. There are many cases where a simple forming operation of this kind will prove to be more economical than to cast a shape which will involve high die cost or slow up the casting cycle.

KNOCKOUTS ARE OFTEN PROVIDED IN DIE CASTINGS

Knockouts—thin sections which are later punched out to provide openings—are frequently provided in die castings. The designer of such a part will do well, however, to attempt to so locate the knockouts that they will not constitute undercuts which will interfere with the ejection of the casting from the die.

The zinc alloy die cast switch box below has eight knockouts to provide various openings for conduits and screws depending upon the particular type of installation. Six of these knockouts are in the bottom of the box and, since they are parallel to the die parting, they do not constitute undercuts. The knockouts at either end of the casting, however, require the use of slides having about $\frac{1}{16}$ " motion to clear the casting when it is ejected.

Naturally, the slides necessitated a more expensive die and there is some extra flash to be removed from the castings, but the knockouts are absolutely essential at these points and the extra costs were justified on this score.

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Send for TE PAR BUT DEFINI your copy A Few Words About This Advertisement

This is the first advertisement in a new series which will appear in these pages during the months ahead. Because of our close association with the die casting industry, many interesting design and application ideas come to our attention. We propose, in these advertisements, to pass these ideas along to you to help in the solution of some of your problems. Watch for these ads and, in the meantime, ask us—or your die casting source—for a copy of the booklet "Designing For Die Casting"







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



ACTIVITIES

Discusses Basis For Success in Export Business

President of United States Steel Export Co. emphasizes need for having thorough understanding of exporting

SUCCESS of an export business depends on two fundamental organization requirements, George W. Wolf of New York, president, United States Steel Export Co., told the Management Division of the American Society of Mechanical Engineers last week in Boston.

Those requirements, he said, are a thorough understanding of the nature of foreign trade, and a particular and specialized knowledge of the specific branch of export that a prospective exporter is considering entering.

Discussing the nature of foreign trade, Mr. Wolf pointed out that not all regions or nations are favored equally as to resources, manpower, climate, and location of centers of production, and stated that a nation should therefore, with the exception of uneconomic activities vital to its defense or protection, produce only the commodities or services it can manufacture or supply most cheaply.

"Peoples of nations poor in resources will produce less wealth with their efforts than the people of rich nations, but if they avail themselves of the opportunities of foreign trade, the volume of goods available to them through exchange will be far greater than if they attempt to produce all things," Mr. Wolf said.

Striking at the well-established belief that a nation should sell more than it buys, Mr. Wolf stated that imports arc more benedicial to the economy of a nation than exports. "After all," he pointed out, "the final purpose of organized industry and commerce is to place at the disposal of man the largest possible amount of needed and desired economic goods. This optimum level in the enjoyment of wealth can be attained solely through imports of foreign commodities and services," he declared.

Steel Distributors Form New West Coast Chapter

Formation of a new Pacific Coast chapter of the Association of Steel Distributors Inc. was announced recently



BROADCASTS GOOD NEWS: Clarence B. Randall, vice president of Inland Steel Co., Chicago, and chairman of the National Association of Manufacturers' committee on industrial relations, is shown rehearsing the script for the "Good News About Jobs" broadcast recently over an NBC hookup

by Mauray I. Cohen, president of the association. The new chapter's activities will cover northern California and the Pacific Northwest area.

Officers of the new group are: Philip Scheibner, Associated Iron & Metal Co.,

Oakland, Calif., chairman; Hans Popper, California Iron & Metal Co., San Francisco, vice chairman; P. W. Keen, Los Angeles, secretary; and Harold Levin, Salco Iron & Metal Co., San Francisco, treasurer.

BRIEFS....

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

American Stove Co., Cleveland, has purchased a plant in Cleveland containing over 250,000 square feet of floor space which it will use for production of heavy duty cooking equipment. The plant was formerly operated by Ohio Crankshaft Co., Cleveland.

Wire Division, North American Philips Co. Inc., New York, recently moved from Dobbs Ferry, N. Y., to Lewiston, Me., where all its wire drawing, enamelling and plating operations will be conducted.

Carnegie-Illinois Steel Corp., Chicago, is sponsoring courses in metallurgy of iron and steel and in general accounting principles for its employees in co-operation with Illinois Institute of Technology and Indiana University.

Miller Moter Co., Chicago, has ap-

pointed the following as sales representatives: P. W. Rice, Cleveland; Pump Engineering Co., Seattle; Gordon Equipment & Supply Co., Pasadena, Calif.; and Mutual Industrial Supply Co., Detroit.

Stanford Research Institute, Stanford University, Calif., has been organized by Stanford University to engage in research for all types of industrial problems.

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Pacific Fruit Express Co., San Francisco, has developed a new-type lightweight railroad refrigerator car which has metal alloy exterior sheathing.

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Aluminum Co. of America, New York, has designed, and the Bethlehem Steel Co. plant at Rankin, Pa., has fabricated, an all-aluminum bridge span which has been installed on the new Grasse river Alliance Tool Co., Alliance, O., has incorporated and will continue in the general tool and die business and in addition will enter into the manufacture of special carbide cutting tools. Doubling of present plant facilities is contemplated.

Payne Cutlery Corp., Brooklyn, N. Y., has purchased Compton Shear Co., Newark, N. J., which plans expanded operations as a subsidiary.

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Greenlee Bros. & Co., Rockford, Ill., has produced a 16mm sound movie showing construction and operating features of its 6-spindle automatic screw machine.

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United States Rubber Co., New York, has purchased the outstanding common stock of Dispersions Process Inc., New York, whose activities will be joined with operations of Naugatuck Chemical Division of the rubber company.

Mitchell - Bradford Chemical Co., Bridgeport, Conn., has been appointed exclusive distributor of Iridite in the New England area by Rheem Research Products Inc., Baltimore.

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York Corp., York, Pa., has announced three new models of room conditioners designed particularly for air conditioning homes and small offices.

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Permutit Co., New York, manufacturer of water conditioning equipment, industrial ion exchangers and power plant specialties, has acquired Simplex Valve & Meter Co., Philadelphia.

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Denison Engineering Co., Columbus, O., has appointed John C. Eide Co., Minneapolis, as its dealer for Minnesota and western Wisconsin.

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Heppenstall Co., Pittsburgh, has moved its Philadelphia office from the Drexel building to Room 1446, Broad Street Station Bldg., Philadelphia 3.

General Electric Co., Schenectady, N. Y., has purchased from Reconstruction Finance Corp. the Ft. Wayne, Ind., plant where GE produced turbosuperchargers during the war. The plant, bought at a cost of \$5 million, will be used to produce fractional-horsepower motors.

Superior Foundry Inc., Cleveland, has

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acquired Superior Found: y Co., that city, and will continue production of gray iron castings.

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Climatic Control Corp., Baltimore, has acquired the plant formerly occupied by Eberts Sheet Metal Co., that city, and will use it for sheet metal fabrication.

Fruchauf Trailer Co., Detroit, has begun production of light-weight, welded steel and aluminum doors for trailers.

Landis Tool Co., Waynesboro, Pa., has opened an office at 3091 Mayfield Rd., Cleveland 18.

Indian Motorcycle Steps Up Output; Plans New Line

Orders for motorcycles and parts held by Indian Motorcycle Co., Springfield, Mass., approximate \$5 million or 10,000 units, and with the release of a new sport scout model motorcycle shortly, total production for the fiscal year ending August, 1947, is expected to be about 15,000 units with a sales volume of more than \$9 million. Production schedules are geared to 1250 motorcycles a month.

The company also manufactures a power lawn mower, demand for which has increased 300 per cent, and plans a mass production line for mowers, cutting units, tractors and allied equipment, as well as roto sweepers for industrial use. The company has recently purchased a Springfield war plant, which was operated by Reynolds Metals Co., Richmond, Va.

Foundrymen Name Members Of Cupola Research Group

Appointment of the 1946-47 cupola research committee of the Gray Iron Division, American Foundrymen's Association, has been announced by T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., division chairman.

R. G. McElwee, manager, Iron Foundry Division, Vanadium Corp. of America, Detroit, will continue as chairman of the committee, with A. E. Schuh, director of research, U. S. Pipe & Foundry Co., Burlington, N. J., as vice chairman. E. H. Stilwill, chief metallurgist, Dodge Division, Chrysler Corp., Detroit, will act as secretary.

Other members of the new committee are: A. L. Boegehold, chief, metallurgical department, General Motors Research Laboratories, Detroit; H. Bornstein, director of testing and research laboratories, Deere & Co., Moline, Ill.; and E. C. Jeter, foundry metallurgist, Ford Motor Co., Dearborn, Mich.

Ease Controls, Refrigeration Industry Asks

Manufacturers of refrigeration equipment request government to give them priority status for materials

EASING of restrictive regulations hampering production of urgently needed mechanical refrigeration equipment has been requested of the Civilian Production Administration by the condensing unit section of the mechanical refrigeration industry.

Warning that serious unemployment and widespread spoilage of food will result unless restrictions are eased immediately, the condensing unit manufacturers asked that they be given a materials priority status in relation to their essentiality to the national economy.

The appeal of the condensing unit manufacturers followed a recent statement by H. F. Spoehrer, president, Refrigeration Equipment Manufacturers Association, Chicago, who warned that the entire mechanical refrigeration industry may be forced to close because of restrictive government regulations.

"The government seems bent on pushing the veterans' housing program at the expense of all other industries, regardless of their essentiality to reconversion and the welfare of the people," Mr. Spoehrer said. "Even if the CPA directives would have the effect of expediting construction of veterans' homes, and there's no reason to believe they will to any great extent, nothing will be gained if the veterans are laid off from the jobs which provide the earnings for them to buy new homes," he added.

Mr. Spochrer pointed out production of mechanical refrigeration equipment needed for preservation, protection and transportation of food already is being delayed because of the shortage of pig iron and castings.

Transformer Firm Moves Factory to Canonsburg, Pa.

Pennsylvania Transformer Co., Pittsburgh, has purchased from the War Assets Administration two buildings of the aluminum forging plant in Canonsburg, Pa., 20 miles from Pittsburgh, and will use them to house all manufacturing divisions and many offices of the company.

A few departments, including sales, will remain in Pittsburgh.

WEST COAST

Expansion Pushed by U. S. Steel

Projects on coast moving rapidly ahead despite delays occasioned by m at e r i a l s, equipment and labor shortages

SAN FRANCISCO

U. S. STEEL Corp.'s expansion program in the Far West is moving forward rapidly despite occasional and frequently bothersome delays caused by materials and labor shortages. Newly acquired properties are being co-ordinated and integrated with older operations, and construction of new facilities is being pushed as rapidly as possible.

As examples of how U. S. Steel is broadening its position on the West Coast are these developments as outlined by officers and directors of the company on their recent visit to San Francisco:

The Geneva plant in Utah is preparing to convert the plate mill into a wide hot strip mill as soon as equipment can be obtained. Orders have been placed for mechanical and electrical equipment, but deliveries from suppliers may not be completed for another 15 months. Meantime, the plate mill will continue production. Most of its production now is going into plates for fabrication into large diameter pipe and tanks. Some material is being exported, chiefly to South America.

The structural mill at Geneva, which now is not being operated, is expected to begin production some time this fall.

Still scheduled for construction at the Geneva plant as soon as practicable is a mill to produce hot rolled coils for the new tin plate mill being built at Pittsburg, Calif.

Effective last Oct. 1 all of U. S. Steel's mining and manufacturing operations in Utah were integrated under Geneva Steel Co. management. This centralization brings Columbia Steel Co.'s operations at Ironton under control of the Geneva company. The Ironton plant will continue to be operated, and there is no intention of closing it so long as there is an adequate market for its products, officials said. President William



DISCUSS STEEL SUPPLY: Irving S. Olds, left, chairman of United States Steel Corp., B. F. Fairless, center, U.S. Steel president, and William A. Ross, president of Columbia Steel Co., tell newspapermen at Los Angeles that some months will elapse before steel supply equals demand

A. Ross, of Columbia Steel, said Ironton has orders on hand for the next six months and foresees a continuing heavy demand.

Indicating that further expansion of of operations in Utah will depend on the extent of growth in the western market for steel, Benjamin F. Fairless, president, U. S. Steel, said current budgeted expenditures for new facilities can be considered to be a minimum, not necessarily a maximum. "Diversification of products at Geneva is dependent entirely on the market," he said.

Mr. Fairless also expressed hope and confidence that full-scale operations at Geneva would promote growth of a large number of other industries, chiefly fabricating plants.

"We will certainly do all we can to encourage such a development as the best customer we can have is the one in our own backyard."

Mr. Fairless also is confident that present railroad freight rates on steel from Geneva to the West Coast will be reduced from the present level of \$12 a ton. However, he did not estimate what amount of reduction will be granted. Geneva asked for rates of \$8 a ton. If such a level is granted, the West Coast will be given lower-priced steel than it has ever had, a factor which officials of the corporation expect will greatly expand manufacturing operations of many present and new plants on the coast.

Aside from shortages of equipment needed to complete new plant additions, Geneva is experiencing a scarcity of rnilroad cars to carry coal and iron to the mill. There also is a shortage of labor in some classifications.

The new sheet and tin plate mill now being built at the Columbia Steel plant at Pittsburg, Calif., is expected to be in production by this time next year.

Construction on the first multiple story steel-framed building to be built in San Francisco since 1941 is under way. It is the Matson building in downtown San Francisco.

The framework is being constructed with 800 tons of structural steel fabricated at the Alameda plant of Bethlehem Pacific Coast Steel Corp., and the frame is being erected by Bethlehem's fabricated steel construction division. The structure now being built will be seven stories high. However, the steel members have been designed to support eight additional stories which will be added later.

Plans for construction of 46 new industrial plants costing \$21,241,500 in northern California were announced during August. In addition, 33 existing plants announced plans to expand facilities at a cost of \$16,348,900.

The 12 counties of the San Francisco

Bay area account for 40 of the new plants and 24 of the expansions.

Announcement of new industrial developments in the Bay area since the first of the year greatly exceed those of last year. Through August there have been plans for 425 new plants costing \$40,-524,625 and 328 expansions valued at \$52,696,165, making a total of 753 projects with a value of \$92,220,790. In the first eight months last year the total number of new plants and expansions was 359 projects at \$62,567,700.

Because of materials shortages, a number of the plans are being held in abeyance until scarcities abate.

Westerners Told Shortage Of Steel Is Unavoidable

LOS ANGELES

Steel shortages, which are the principal brakes on manufacturing and construction reconversion the nation over, are the unavoidable results of shifts from war to peace economy, a group of top flight steel men agreed last week in Los Angeles.

This was the opinion given by Benjamin F. Fairless, president, U. S. Steel Corp., Irving S. Olds, board chairman, and others on a tour of company properties in the Los Angeles industrial area.

Electrical appliance supplies are behind demand from 12 to 18 months because of strikes and OPA controls, John H. Ashbaugh, president and manager, Westinghouse Electric Corp., Appliance Division, said last week in Los Angeles.

Copper mining operations are due to begin soon within 10 miles of Riverside, Calif., it was reported last week by Kenneth J. Hines and Donald V. French, mineralogists. They said they have taken 10 claims in the area and that the ore is of sufficiently high grade to be loaded directly to smelters without preliminary milling.

Eighty-five per cent of the lessors of government-owned industrial plants in southern California intend to buy the plants they operated under government ownership, George J. O'Brien, chairman, Los Angeles Chamber of Commerce, Industrial Development Committee, reported last week.

He explained that during the war the federal government invested approximately \$175 million of the \$450 million in new facilities against which the balance of \$275 million was invested by private capital.

Thirty-three basic materials not previously produced in southern California are now in production. They include steel tubing, aluminum, basic copper shapes, powdered metals, abrasives, and tool steel.

Kaiser Says Fontana Steelworks Is Booked Well Into Next Year

West Coast industrialist, in booklet describing his war and postwar activities, says steel plant is operating at capacity. Holds operating cost, less abnormal fixed charges, is below or equal the average of all steelworks in the nation

FONTANA steelworks of the Kaiser interests is operating at capacity, with its output contracted to peacetime users well into 1947, according to a booklet just published by the Kaiser company and circulated to time with Henry J. Kaiser's appearance before the House Merchant Marine & Fisheries Committee investigating the World War II shipbuilding program.

Every major steel fabricator and distributor on the West Coast is a Fontana customer, according to the booklet. Also, it is stated revisions in rolling mills should be completed this year, and set for completion by June, 1947, are a pipe mill for producing half-inch to 4-inch butt-weld pipe, and cold-rolling facilities.

In addition to marketing a dozen byproducts, the Fontana works has contracted to furnish slag to a mineral-insulation manufacturer employing a new process, it is said. The Fontana plant's importance to western industry is stressed in the booklet, especially since steel shipments from the East have decreased.

During the war Fontana produced 1,209,000 tons of ingots, from which were rolled 547,000 tons of plates, 135,-000 tons of shapes, 94,000 tons of shell steel and 17,000 tons of bars. Steel from the plant went into 230 ships, went for 155 mm and 90 mm and 8-inch shells, and 155,000 tons of ingot were shipped to England in 1943. The remainder went to various war uses.

Steel is being produced economically at Fontana, it is claimed. Present operating cost, without abnormal fixed charges, is said to be below or equal to the average of all steel plants in the United States, and it is further stated, that with needed improvements to correct warbuilt deficiencies, the plant will become one of the lowest-cost plants in the nation, and one located in its primary market.

California ore reserves in Eagle Mountain, owned by Kaiser, alone are sufficient to operate the Fontana works for over 50 years, it is claimed.

Postwar activities of Henry J. Kaiser are widespread. They concern operation of 28 enterprises, ranging from automobiles to aluminum, cement to chemicals, ships to steel, hospitals to housing. Kaiserdirected interests operate more than 50 plants, grouped in five major regional centers and producing 130 different products.

In aluminum the Kaiser interests operate three integrated plants with annual capacity equal to 70 per cent of total prewar annual consumption of this metal.

Kaiser is in the housing field with an ambitious program. This year he expects to build 2000 houses, while in 1947 he plans to erect 10,000. In this activity he operates at Los Angeles what is claimed to be the largest pre-assembly plant in existence, and also the largest woodworking plant west of Chicago.

Currently the Kaiser interests are producing automobiles at the Willow Run plant in Michigan but distribution still is only to distributors. Of total Willow Run production two-thirds are Kaiser Specials, one-third are Frazers.

Large-Scale Magnesium Operations

In addition to other activities the Kaiser interests plan large-scale magnesium producing operations. They have plants for this purpose at Permanente, Calif., Moss Landing, Calif., and at Natividad, Calif.

Kaiser entered the gypsum field in 1944 when he concluded an agreement with the Standard Gypsum Co. Inc.

The Permanente cement plant owned by Kaiser, and described as the largest in the world, is now operating at capacity for peacetime users.

Kaiser shipbuilding operations are continuing. Dry-docking, repair work and conversion have been carried on at Richmond Yard 3, and the Swan Island Yard, Portland, Oreg. From January, 1945, to July, 1946, approximately \$38 million of ship-repairs were completed.

Military aircraft, aircraft subassemblies, stainless steel specialties, household appliances, automobile parts and miscellaneous aluminum products are being turned out at Kaiser's Fleetwings Division. Also Kaiser is operating sand and gravel plants at Pleasanton, Antioch, Upton, Felton and Oroville, Calif., and one at Seattle. In addition to producing plants he operates four major batching and ready-mix concrete plants on the West Coast, and several others in conjunction with building materials dealers.

Men of Industry



H. H. FAIRFIELD

Joseph A. Coffey has been appointed general traffic manager, Portsmouth Steel Corp., Portsmouth, O. Mr. Coffey began his career in the transportation field with the Louisville & Nashville Railroad and later was with the Missouri-Kansas-Texas Railroad. In 1915 he became associated with Southwestern Bell Telephone Co. and later with Missouri Portland Cement Co., St. Louis, where he was general trafric manager. From 1932 to 1935, Mr. Coffey engaged in private commerce practice and in 1935 joined Continental Steel Corp., Kokomo, Ind., handling all traffic matters for its three plants. He is a member of the American Iron & Steel Institute and has taken an active part in the National Industrial Traffic League. J. B. Lee has been appointed assistant general traffic manager of the Portsmouth company. Mr. Lee has had charge of the Portsmouth traffic office of Wheeling Steel Corp., Wheeling, W. Va.

James C. Hartley has been appointed chief metallurgist, Barium Steel & Forge Inc., subsidiary of Barium Steel Corp., Canton, O. Mr. Hartley was director of research for Heppenstall Co., Pittsburgh. During the war, in addition to his duties as director of research, he served with the National Academy of Sciences, War Metallurgy Committee on Magnesium Forgings, Society of Automotive Engineers War Engineering Board, and Committee on Aluminum Forging Tests. Mr. Hartley will carry on his research work at Barium's Canton, O., plant.

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H. H. Fairfield has been appointed foundry consultant, H. W. Dietert Co., Detroit. Since 1940, he had been a metallurgical engineer with the Physical Metallurgy Research Laboratories of Canada, and conducted research and con-

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THOMAS CRUTHERS

sulting wo:k for Canadian manufacturers. His main interest was in the field of quality control in metallurgical processes.

Thomas Cruthers has been elected a member of the board of directors, Electric Machinery Mfg. Co., Minneapolis, subsidiary of Worthington Pump & Machinery Corp., Harrison, N. J. Mr Cruthers is a vice president of the Worthington corporation.

James P. Cunningham, vice president in charge of production, Luscombe Airplane Corp., Dallas, Tex., has been elected to the board of directors of the company. Mr. Cunningham joined Luscombe in 1942 as a member of its tool design department.

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Chester D. Jones has been transferred from the purchasing department of Diamond Alkali Co.'s general office at Pittsburgh to Houston, Tex., where he will become purchasing agent for the company's proposed new \$5 million plant. He will have charge of purchases of all construction materials and equipment as well as processing and operating equipment for the new plant.

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H. Russell Wilson has been appointed sales manager, Radiator Division, Perfex Corp., Milwaukee. Mr. Wilson joined Perfex 10 years ago and was named assistant sales manager in 1945. Ernest H. Panthofer has been named chief engineer of the division. Mr. Panthofer joined the company in 1941 and in 1944 was made staff assistant to I. G. Bohrman, vice president in charge of the division.

A. P. Lerch has been appointed chief tool design engineer, Hyster Co., Portland, Oreg. Mr. Lerch, who has been with the company for six years doing



JAMES C. HARTLEY

tool designing and tooling work, will be in charge of all tool designing for the company's three plants. R. W. Ager has been appointed personnel manager of the company's Portland plant. He has been with the company for ten years, serving most recently as assistant export manager.

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Robert M. Arnold, president, Arnold Engineering Co., Chicago, a wholly owned subsidiary of Allegheny Ludlum Steel Corp., Pittsburgh, has been elected a member of the latter company's board of directors. Mr. Arnold, a graduate of Massachusetts Institute of Technology, served as secretary and chief engineer of the Arnold company from 1935 to 1941 at which time he became president. Previous to joining the Arnold company, Mr. Arnold had been chief engineer, Grigsby-Grunow Co., and later, chief engineer, Philco Corp. of Great Britain.

George L. Ridgeway, director of economic research, International Business Machines Corp., New York, has been appointed chairman, Import Committee, World Trade Foundation of America Inc., New York. Mr. Ridgeway had been an assistant in the U. S. Department of State, 1942 to 1946.

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Charles L. Huisking Jr., recently released from the Army, has resumed his duties as treasurer, Aircraft Screw Products Co., Long Island City, N. Y., and has been appointed assistant sales manager of the company.

Clarence G. Stoll, president, Western Electric Co., New York and Oliver E. Buckley, president, Bell Telephone Laboratorics, New York, have been awarded the Medal for Merit, which is conferred

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MEN of INDUSTRY

by President Truman for "exceptionally meritorious conduct in the performance of outstanding services to the United States." Presentation of the medal was made by Maj. Gen. Harry C. Ingles, Chief Signal Officer, U. S. Army.

Herbert L. Piasecki has been appointed office manager for Stearns Magnetic Mfg. Co., Milwaukee. He was with Color Print, Milwaukee. Frank Brunner has been promoted to superintendent of the Stearns company's brake factory. He was assistant superintendent of the main plant. Curtis H. Stout, of Little Rock, Ark., has been appointed sales representative for the firm, to cover the state of Arkansas.

D. E. Golden has been appointed executive vice president, Schlage Lock Co., San Francisco. Marron Kendrick has been appointed vice president and secretary of the corporation.

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D. W. McNaugher Jr., vice president, has also been appointed treasurer, Robert W. Hunt Co., Chicago. S. C. Sexauer, assistant secretary, has been appointed secretary of the company.

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Elmer G. Davis has been appointed sales manager of the recently formed Buckeye Division, Cleveland, General Grinding Wheel Corp. The division will service the state of Ohio on General's vitrified, rubber and resinoid bonded wheels.

G. A. Mueller has been appointed contracts director, Consolidated Vultee Aircraft Corp., San Diego, Calif. He will be in charge of both military and commercial contracts.

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George A. Hoopes has been appointed isconsin and upper Michigan sales and

Wisconsin and upper Michigan sales and service representative for J. E. Rhoads & Sons, Philadelphia.

E. C. Smith Jr., civil engineer, has been appointed special assistant to F. H. Dryden, assistant administrator in charge of construction, supply and real estate services, Veterans Administration; Washington. He will have much to do with planning the construction of nearly a billion dollars worth of VA hospitals for disabled and ill veterans.

Harry Carnick has been named credit manager, Copco Steel & Engineering Co., Detroit.

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William Watson Niven Jr. and George L. Tuer Jr. have joined the technical staff of Midwest Research Institute, Kansas City, Mo. Mr. Niven, formerly

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Bruce W. Schafer has been appointed manager, sales and service department, Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich. For the last 3 years, he was traveling sales engineer for the division. Prior to that, he had served for 4 years in the magnesium research department, Dow Chemical Co., Midland, Mich. Assisting Mr. Schafer in sales engineering in the field is Charles V. Kilburn, new head of the research and engineering department of Detroit Electric Furnace Division. He had been design engineer with the division since 1939.

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Algot J. E. Larson, president, Art Metal Construction Co., Jamestown. N. Y., has been appointed community chairman of the Committee for Economic Development for that city.

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Wesley N. Cordon has been appointed manager of the Alloy Sales Division in the general sales department, United States Steel Supply Co., Chicago, subsidiary of United States Steel Corp. Mr. Gordon, recently released from the Army, will have jurisdiction over company alloy sales in Boston, Newark, N. J., Baltimore, Pittsburgh, Cleveland, St. Paul, Milwaukee, St. Louis, and Chicago. He will maintain headquarters in Chicago.

Kenneth Austin has joined the public relations staff of United States Steel Corp., New York. He had been a Janacial writer for the New York Times since 1927. Mr. Austin, who joined the staff of the Times in Paris in 1925, has handled news of the steel industry for his newspaper for many years.

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Frederick A. Purdy has been appointed manager of the new Los Angeles plant, Joseph T. Ryerson & Son Inc., Chicago. Warehouse operations at this new plant are scheduled to begin in October. Mr. Purdy joined Ryerson in 1931, serving first as an engineer at the Buffalo plant, and later representing the firm in New York state. He headed the Rochester, N. Y., district sales office for 4 years. Theodore L. Kishbaugh has been named assistant plant manager (STEEL, Sept. 23, p. 98). Thomas E. Williams has been placed in charge of Operating and Service Divisions for the plant. He has been with the company 23 years, having arst seen service at the Chicago plant, and later at the Buffalo Vernon D. Rogers, recently plant. released from the Army, has been appointed office and credit manager. He originally joined Ryerson in 1936. George W. Gilliland, who has been in charge of the company's Los Angeles office, will continue in a sales capacity. Other members of the field sales staff are: John Fennie, Harold Christian, Richard De-Land, Merle Anderson, Milford Tiner, and Ernest Lindgren.

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George A. Doolin, who has been production manager, Racine, Wis., plant, Massey-Harris Co., Racine, since 1932, has been appointed director of purchases for the Racine and Batavia, N. Y., plants of the company. R. L. Jersted succeeds Mr. Doolin as production manager.

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Lawrence C. Johnson has been named Milwaukee branch manager, Minneapolis-Honeywell Regulator Co., Minneapolis, succeeding Harold Pride, who has resigned to join Boyd Engineering Co., Milwaukee, a Honeywell distributor.

Daniel P. Murphy, formerly general manager, Gould Coupler Works, Depew, N. Y., has been appointed vice president in charge of operations for Symington-Gould Corp.'s two plants at Rochester and Depew, N. Y.

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C. M. Taylor has been elected executive vice president, Lincoln Electric Co., Cleveland. Mr. Taylor has been with the company since 1916. Granted a leave of absence in 1917, he enlisted in the Air Corps until the end of World War 1, at which time he returned as a foreman. He advanced to assistant superintendent, then superintendent, and in 1928, was appointed vice president in charge of sales. Mr. Taylor has served on the board of directors since 1927. He is a member of the American Welding Society, the Cleveland Chamber of Commerce and the Union Club. -0-

Ben W. Bittner has joined the Industrial Division, Bryant Heater Co., Cleveland, as a sales engineer. A member of the American Society for Metals, Mr. Bittner has previously been associated with General Alloys Co., Boston, and North American Mfg. Co., Cleveland, in a sales engineering capacity, and with Crucible Steel Co. of America, New York, as a combustion engineer.

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George Kemper, who has been active in setting up distributor sales for A. O. Smith Corp., Milwaukee, has been transferred to the company's district office in

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EASTERN

Stack Drilling? What drill feed should be used in drilling %-in. holes through clamped stacks of 20-gage, E-S 18-8 Mo stainless (Type 316) sheets?

Bevel Milling? In beveling E-S 18-8 low-carbon stainless (Type 304) plate edges before welding, must we decrease the speed or feed of the milling cutter as the cut widens?

Hole Size for Tapping? What diameter reamer should be used on holes in titanium-bearing E-S 18-8 plate (Type 321) to be tapped for 1/4"-32 threads?

Saw Tooth Set? Is any special set required in the teeth of a band saw for cutting light-gage E-S 18-8 stainless sheet (Type 302)?

Punch-Marking? Can we punch-mark drill holes in E-S 18-8 chromenickel plate (Type 304)? What is the best way to start holes at an angle with this plate?

Counterboring? Is reaming likely to harden E-S 17-7 Stainless (Type 301) so much that counterboring is difficult? What is the remedy?

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MEN of INDUSTRY

Atlanta, where he will assist Walter K. Graham, administrator for the seven states of the company's southeastern district. Mr. Kemper came to the Smith company three years ago from Glidden Paint Co., St. Louis.

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L. D. Harkrider, president and general manager, General Malleable Corp., Waukesha, Wis., has been appointed Wisconsin state vice chairman of the Committee for Economic Development, New York. Mr. Harkrider is a director of Hein-Werner Motor Parts Corp. and Waukesha Motor Co., both of Waukesha, Wis. He is also a director and vice president of the Wisconsin Manufacturers' Association.

Herman W. Steinkraus, president, Bridgeport, Brass Co., Bridgeport, Conn., has been named chairman of the Y. M. C. A.'s National Committee on Industrial Program Services. Mr. Steinkraus is president of the Westport, Conn., board of finance and is also president, United War & Community Funds of Connecticut.

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Wayne G. Norton, Eastman Kodak Co., Rochester, N. Y., has been awarded the Adolph Lomb medal by the Optical Society of America. The award is made annually "to a person under 30 years of age who shall have made a noteworthy contribution to optics." Mr. Norton, following graduation from the University of Rochester in 1941, has been employed by Eastman engaging in production engineering, research, design and development of fire control instruments.

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Henry F. Smyth Jr., Ph. D., senior fellow of Mellon Institute, Pittsburgh, has been named chairman of the newly formed committee on chemistry and toxicology, Industrial Hygiene Foun-

dation, Pittsburgh. Other members of the committee are: Francis R. Holden, Ph. D., head industrial hygienist, Industrial Hygiene Foundation, committee secretary; E. C. Barnes, industrial hygiene engineer, Westinghouse Electric Corp., East Pittsburgh, Pa.; W. R. Bradley, industrial hygienist, American Cyanamid Co., New York; Warren A. Cook, director, industrial hygiene and engineering research, Zurich Insurance Co., Chicago: D. D. Irish, Ph. D., Dow Chemical Co., Midland, Mich.; F. A. Patty, head, industrial hygiene department, General Motors Corp., Detroit; D. A. Russell, chief chemist, Youngstown Sheet & Tube Co., Youngstown; H. H. Schrenk, Ph. D., chief, Health Division, U. S. Bureau of Mines, Pittsburgh; and W. P. Yant, Sc. D., director of research and development, Mine Safety Appliances Co., Pittsburgh. -0-

Max Sidell, president, Seattle Iron & Metals Corp., Seattle, has been elected president of the Pacific Northwest Chapter, Institute of Scrap Iron & Steel Inc., Washington. Other officers of the chapter are: First vice president, Moe Michaelson, Riverside Junk Co., Everett, Wash.; second vice president, Leo Bloch, M. Bloch & Co., Seattle; secretary, David Sidell, Seattle Iron & Metals Corp.; and treasurer, Harry Sidell, Seattle Iron & Metals Corp.

Homer W. Derby has been appointed works accountant of General Electric Co.'s new laminated plastics plant at Coshocton, O. Mr. Derby has been serving in a similar capacity at the Lynn, Mass., plastics works, which is being transferred to the new plant. Mr. Derby joined the company in 1929 following graduation from the Bentley School of Accounting and Finance, Boston, and held various accounting assignments at Schenectady, N. Y. He joined the plastics divisions in 1933 and was made works accountant of the Lynn plant in 1940.

Dr. Robert W. Sandelin, formerly chief metallurgist, Atlantic Steel Co., Atlanta, Ga., has assumed his new duties as assistant professor of metallurgy, University of Illinois, Urbana, Ill. Dr. Sandelin is a graduate of the University of Minnesota, Minneapolis.

Raoul E. DuQuette has been appointed to the newly created position of director of purchases of the Rudolph Wurlitzer Co.'s North Tonawanda, N. Y., plant.

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Eugene W. Smith, for more than three years works manager, Lindahl Foundry Division, American Gear & Mfg. Co., Chicago, has become associated with Western Materials Co., Chicago. He will represent the company in the metropolitan Chicago and northern Indiana area. From 1929 to 1943 Mr. Smith was president and general manager, Eugene W. Smith Inc., Evansville, Ind., and for six years prior to that was sales manager, Hougland & Hardy Inc., Evansville.

Harvey A. Raasch, assistant to the foreign sales manager, Le Roi Co., Milwaukee, has left on a 2-month trip to Mexico and Central America. In countries in the latter area, he will establish a distributorship system to supplement that existing in Mexico.

William C. Dunn and N. O. Scourfield have been elected to the board of directors, Harris-Seybold Co., Cleveland. Mr. Dunn is president and director of Ohio Crankshaft Co., Cleveland, and vice president and director of Park Drop



NORBERT C. RUBIN Who has been named vice president in charge of sales, Yader Co., Cleveland, noted in STEEL, Sept. 30, issue, p. 56.



WILLIAM J. KERR Who has been named vice president in charge of production, Yoder Co., Cleveland, noted in STEEL, Sept. 30 issue, p. 56.



GEORGE EICHELSBACH Director of manufacturing and engineering. American Stove Co., Cleveland, noted in STEEL, Sept. 30 issue, p. 61.

MEN of INDUSTRY



C. EDWARD PRICE Who has been elected president, Peninsular Grinding Wheel Co., Detroit, noted in STEEL, Sept. 30 issue, p. 61.

Forge Co. of that city. He is also a director of Ohio Seamless Tube Co., Shelby, O. Mr. Scourfield has been with the Dayton, O., plant of Harris-Seybold since 1936, and was named manager 2 years ago.

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D. F. Sawtelle, metallurgist, Malleable Iron Fittings Co., Branford, Conn., has been named chairman of the 1946-47 sand shop operation course committee, American Foundrymen's Association, Chicago. R. H. Jacoby, plant metallurgist, Key Co., East St. Louis, Ill., has been chosen co-chairman of the committee.

Francis J. Curtis, vice president, Monsanto Chemical Co., St. Louis, has been elected chairman of the Industrial & Engineering Chemistry Division, American Chemical Society, for 1946-47.

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J. C. Lungerhausen has been appointed chief development engineer, Industrial Pump Division, Ft. Wayne, Ind., Bowser Inc. For the last 5 years he had been development engineer for Blackmer Pump Co., Grand Rapids, Mich.

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William S. Knudsen has been elected chairman of the board, Hupp Motor Car Corp., Detroit. He became a member of the company's board last June. Mr. Knudsen will be actively associated with the business at the central office of the firm at Detroit.

W. J. Woods has been named purchasing agent, Rolling Mill Division, Salem, O., E. W. Bliss Co.

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Edward R. Stettinius Jr. and Robert T. Stevens have been elected directors of General Electric Co., Schenectady, N. Y. Mr. Stettinius, former secretary of



E. U. LASSEN Chairman of the committee on industrial control devices, American Institute of Electrical Engineers, STEEL, Sept. 30 issue, p. 58.

state, retired as chairman of the board of United States Steel Corp., New York, in May, 1940. Mr. Stevens is chairman of the board of J. P. Stevens & Co., New York.

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J. Bryan Williams Jr. has been appointed a member of the executive sales staff, Stamford, Conn., Division, Yale & Towne Mfg. Co., New York. Mr. Williams joined the company last January, following his release from the Army, and spent the ensuing months visiting the various divisions of the organization.

William B. Cushing, works accounting supervisor, American Steel & Wire Co., Cleveland, has retired after 46 years of service with this United States Steel Corp. subsidiary. In 1925, he became chief clerk of the zinc works in Donora, Pa. In 1943, he was named chief accountant, and in Oct., 1944, was transferred to the company's headquarters in Cleveland as works accounting supervisor.

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John J. Kenny has been appointed manager of sales promotion, International Business Machines Corp., New York. He had been IBM field operations executive, and prior to that, manager of the postwar planning department. Mr. Kenny joined the company in 1917, and has held various sales and executive positions in New York, Cincinnati, Boston, and Newark, N. J.

Marshall Ward has been appointed New York district manager, Phoenix Iron Co., Phoenixville, Pa. He succeeds J. L. Vaupel, who has returned to Boston as New England district manager, a position that he has retained all along.

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W. E. Lewis, vice president, Pittsburgh Lectromelt Furnace Corp., Pitts-



C. E. FRUDDEN With Allis-Chalmers Mfg. Co., Milwaukee, elected 1947 national president of Society of Automotive Engineers, STEEL, Sept. 23, p. 103.

burgh, has been placed in charge of the company's newly opened Chicago branch office. Mr. Lewis has been with the company for the last 25 years.

Milton Lewis, vice president, has resigned from Fluor Corp. Ltd., Los Angeles.

OBITUARIES....

F. J. Littel, 74, president and general manager, F. J. Littel Machine Co., Chicago, died recently in that city.

Roy C. Arter, 56, chief engineer, North Electric Mfg. Co., Galion, O., died recently in that city. He was the inventor of a mechanism to detonate the atomic bomb.

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James E. Jopling, 84, surveyor, explorer and mining engineer, died recently at his home in Marquette, Mich. He was among those who pioneered the discovery and development of iron deposits in the upper peninsula of Michigan. He was chief mining engineer for Cleveland Cliffs Iron Co., Cleveland, from 1894 to 1927. Mr. Jopling had been a member of American Institute of Mining & Metallurgical Engineers since 1884. He was president of Lake Superior Mining Institute in 1925.

Edward F. Hutchens, 77, president, Utility Mfg. Co., Cudahy, Wis., died recently in Indianapolis.

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John E. Robinson, 67, who retired in 1945 as supervisor of metallurgy, International Harvester Co., Chicago, died Sept. 26 in that city. He had been with the company 20 years.

By P. M. HUME Metallurgical Engineer Air Reduction Sales Co. New York

Most efficient and economical method of removing harmful gases from molten metals, known as "flushing", consists of bubbling a dry inert gas through the metal just before casting. Dissolved gas passes from solution by diffusion into rising bubbles and is carried out of metal mechanically. Process is discussed in two installments of which this is the first

MOLTEN metal poured into castings should solidify with a deep pipe rise, overflow the mold and result in sound castings. But frequently the metal when poured refuses to obey and gives castings of a cheesy, porous structure.

Terms are used in each of several metal industries to describe this phenomenon. Steel men call them wild heats or bleeding ingots. Copper refiners refer to unhealthy, rainy or overpoled copper. Aluminum founders describe the results obtained in the castings as pin hole porosity.

Until recently the general run of plant operators and metallurgists were inclined to blame this type of trouble on the shift before theirs, Mike Spototsky's fondness for fire water, some mysterious element in the furnace charge, gremlins, or the weather. As a matter of fact weather actually has a real bearing on the case, and it makes an excellent alibi as no one can possibly be held responsible or do anything about it.

Dissolved gas, however, is the real cause of all these troubles and, until recently, there were little data available on gas-metal reactions. As far back as 1862 Percy¹ discussed the phenomenon of overpoled copper and attributed it to the evolution of sulphur dioxide. Early in this century Sieverts and his co-workers started work on gasmetal solubilities. During the twenties other research men attempting to improve on Sieverts' methods published a whole series of papers, the results of which were so conflicting that progress on the subject was set back 10 to 15 years. More recent work by Allen, Prytherch, Hanson, Zapffe and Chipman have confirmed much of Sieverts' work. Although the entire broad subject has hardly been scratched, there are sufficient data available to enable us

(1) All references are presented at the end of this installment.



to use at least some degree of intelligence in developing practical methods to combat the effects of dissolved gases.

Fig. 3 is a diagrammatic representation of Sievert's apparatus for determining the solubility of gases in metals at various pressures and temperatures. A sample of the metal is placed in the reaction tube. A vacuum is pulled on the entire system and gas introduced until the desired pressure is attained. The metal then is heated and, after allowing equilibrium to be reached at each temperature gradient, the change in gas pressure is a measure of the amount absorbed by the metal. Various refinements to prevent leakage, to obtain more accurate temperatures in the system, and to eliminate other extraneous factors have been introduced from time to time. One of the best is Allen's apparatus, Fig. 5. In this case, Allen was investigating the reaction 2 Cu + $H_2O = 2H_2 + Cu_2O$. Fig. 2 shows the reaction tube in more detail.

The result of this work has given us a series of solubility curves2, the first of which are shown in Fig. 1. These represent the solubility of hydrogen in aluminum, silver, platinum and molybdenum at varying temperatures but at constant pressure. The aluminum curve is particularly interesting. Notice that for all practical purposes hydrogen is completely insoluble in the solid metal, but the solubility increases enormously as the temperature is increased above the melting point. Obviously if molten aluminum contains dissolved hydrogen, free gas will be rejected at the freezing point causing porosity in the solid metal. Silver, molybdenum and platinum on the other hand can retain

MOLTEN METALS

hydrogen dissolved in the solid phase and, while the solubility decreases as the metal cools, there is no sharp break in the solubility curves that would cause sudden evolution of the gas. Consequently, when these metals are cast the gas diffuses out of the solid metal without causing undue stress.

Fig. 8 shows the hydrogen solubility curves for nickel, iron and chromium³. Here the gas is appreciably soluble in the solid state but there is a sharp discontinuity at the melting point and, with iron, a sharp break at the phase change from austenite to ferrite. If any of these metals in the molten state contain hydrogen in concentrations above their capacity to retain the gas in the solid metal after freezing, a strong evolution of gas will occur on freezing causing porosity, bleeding heats or whatever else you care to call it. The discontinuity at the phase change from austenite gives rise to another sudden evolution of gas. When the rate of cooling is rapid, diffusion cannot dissipate this relased gas fast enough. The result is internal stress that may be sufficient actually to rupture the metal. This point will be discussed further under flaking.

With the same apparatus Sieverts and his followers have been able to determine the variation in solubility with pressure. Henry's law states that the quantity of gas dissolved in a given quantity of solvent or solution is directly proportional to its partial pressure over the solution. This law does not hold for gases and metals. Most gas metal systems follow what has grown to be known as Sieverts' Law which states that the solubility of a gas in a metal varies directly as the square root of its partial pressure over the metal. Fig. 6 shows the hydrogen absorption isotherms for nickel, iron cobalt and silver². Notice that these are practically straight lines when the solubility is plotted against the square root of the pressure.

Results of Sievert's work also established the fact that the solution of gas in molten metals differs from normal solution in that the gas dissociates from the diatomic to the monatomic state when it goes into solution.

Variation of gas solubility with temperature is also different from normal liquids. In metals, the solubility increases as the temperature increases. Since solubility of gas in a metal requires dissociation, which in itselt is endothermic, the dissociation of gas occurs more readily as temperature increases. The hydrogen absorption isobars are shown in Fig. 4.

The methods which have been illustrated were used to determine gas metal relations under equilibrium couditions, and because of the great care needed to obtain accurate results, this work was done under laboratory conditions. While much useful data were obtained, there is still a great need for methods and apparatus whereby the gas content of metals can be rapidly determined in the shop.

The first attempt by Ellis¹ to determine the gases evolved from commercially melted copper as it solidified is illustrated in Fig. 7. Copper was poured from a ladle into a sand mold, and the silica tube lowered into the metal. The bulb was previously evacuated, and the stop cock "A" was opened when the silica tube was immersed. After a short time "A" was closed and "B" was opened, allowing the gas from the copper to be trapped in the bulb from whence it could be measured and analyzed. There were several sources of error in the method, but qualitative results at least were obtained.

Hare, Pederson and Soler⁴ developed the equipment shown in Fig. 9 to measure the gas content of molten steel.





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This equipment is rugged, simple to construct and manipulate. Briefly, the whole system is evacuated, and the bottom end, which is plugged with a copper disk, is plunged beneath the metal. The copper disk melts allowing the molten metal to be drawn up into the tube and the gases evolved are collected. By weighing the equipment before and after the sample is taken, and by measuring all volumes and pressures, a quantitative measurement of gas in the molten steel per unit weight of metal is claimed. There is some doubt that all the gas from all the metal weighed is actually trapped by this method. However, the apparatus represents the best attempt to date.

Importance of measurement of gas content of metals under shop conditions is further emphasized by the fact that gas-metal relations depend upon pressure and temperature. Thus, while we have isobars and isotherms for many gas metal systems, the fact remains that in determining the curves one variable was held constant and readings taken for equilibrium conditions. In actual practice equilibrium is never obtained, and the variation in pressures is not known.

The method in general use for determining the gas content of metals is vacuum fusion. This consists of determining the gas evolved from a solid metal sample melted in vacuum. However, the gas, liberated because of the change in solubility on freezing and because of the solubility change at transformation points, diffuses when the sample is solidified and cooled. Consequently, when a solid sample is used to determine the gas in the original molten metal much of the gas is lost upon cooling the sample and the results of the vacuum fusion method may lead to completely erroneous conclusions⁵.

To summarize: Laboratory investigations give us a fairly complete picture of gas-metal relations and have established the general laws for predicting the behavior of gases in metals. Unfortunately, as yet there is no reliable or rapid method for directly determining gas in molten metals. Therefore, in order to determine the effect of dissolved gas as well as any methods used for its control, it is still necessary to examine the castings themselves for the presence or absence of defects.

From the solubility curves it is easy to see that the sudden decrease in gas solubility when the metal goes from the liquid state to the solid state causes an evolution of gas which is liable to be trapped in the freezing metal.

The susceptibility of alloys to gas porosity seems to be related directly to solid and liquid gas solubilities in the constituent metals. Referring again to the curves of solubility of hydrogen in iron, nickel and chromium at varying temperatures and constant pressures (Fig. 8) it will be seen that the solubility of hydrogen in solid chromium is lower than that in solid iron, while the solubility of hydrogen in solid nickel is the highest of the three. We would expect, therefore, that an alloy containing appreciable amounts of nickel in iron would not be as prone to gas porosity in the resulting castings as an alloy compounded of chromium and iron.

Moreover, as Zapffe and Sims³ point out, the ability of solid metals to dissolve hydrogen depends upon the crystal structure. Face-centered cubic metals, such as nickel and gamma iron, will hold more hydrogen in the solid state than body centered cubic metals, such as alpha and delta iron and alpha chromium. This fact is clearly shown on the iron-hydrogen curve, where there is a definite break at the transformation point.

After hydrogen-contaminated steel is cooled into the gamma range, a further drastic cooling into the alpha phase will result in rapid hydrogen evolution. The release of this hydrogen, coupled with the stresses due to volume change at the transformation point, may result in flakes, fissures or internal cracks. There is still a considerable amount of speculation as to the exact part that hydrogen plays in causing flaking, but it is known that steel which is free from hydrogen is not susceptible to such defects. Even the proponents of the theory that flakes are due mainly to stresses seem willing to concede that dissolved hydrogen has some effect on their occurrence.

There are numerous instances of defects in nonferrous castings which can be attributed to dissolved gas, even though obvious porosity is not present. Cracking in the fillet of chilled-cast copper wire-bars has definitely been traced to sudden evolution of dissolved gas on rapid cooling.

The most difficult metal in which to prevent hydrogen porosity is one in which there is a high solubility in the liquid state, no solubility in the solid state, and a sharp freezing point. Aluminum metal is of this type, and it must be handled specially in order to get a casting which is free from pinhole porosity.



After having examined the general laws of gas-metal solution and having discussed in general the defects caused by dissolved gases, it would be of interest to review the sources of gases which affect metal castings. Throughout this paper the term gas and hydrogen have been used almost interchangeably. Hydrogen appears to be the most troublesome. Other gases may also cause difficulty but since we know but little about them this vagueness must of necessity continue.

The primary source of hydrogen is moisture. In the presence of metals and at the temperatures encountered in melting and refining the reaction, $2H_2 + O_2 \rightleftharpoons 2H_2O$, is reversible.

Foundry men have long realized the necessity of dry storage for materials and in general take all possible precaution to have completely dry material for charges and flux.

In reverbatory or open-hearth furnaces the metal is constantly exposed to the flame and products of combustion of the fuel which contain either hydrogen or water vapor, or both. Also of primary importance is the moisture in the air. This is carried into the furnace along with the combustion air and at times this presents a troublesome source of moisture.

It should be emphasized again that moisture content in the gases will effect hydrogen pick-up probably in proportion to the square root of the partial pressure of the water vapor. As moisture content of the air increases in hot humid weather, the result is added moisture in contact with the metal. For this reason most melters take extra precautions in the summer to try to avoid all moisture contamination which is under their control, in an attempt to minimize the effect of the extra moisture in the air.

The later stages of handling metal after melting and refining also present opportunities for the molten metal to come in contact with water vapor or hydrogen. Launders and ladles must be thoroughly dried because of the gas which green refractories evolve. In certain instances gas or oil flames are used to preheat ladles and funnels. If this is carelessly done, soot may deposit on the ladles which in turn may absorb hydrogen or hydrocarbons from the gas or oil itself. When the molten metal is poured into or over such a portion, hydrogen pickup with its subsequent porosity will result.

There is always the possibility of moisture being absorbed from the molds or mold dressings. Both improperly dried molds and moisture in mold dressings may cause gas porosity. This phase will be further considered in discussing the flushing process itself.

So far, we have examined the problem of porosity purely from the standpoint of dissolved gases. There are other gases which cause porosity, namely, those which are formed by chemical reactions which take place as the metal solidifies. The classic examples of this type are rimmed steel and tough pitch copper. In making castings of these metals, the refiners deliberately adjust the content of the bath so that the following reactions will take place while the metal is solidifying in the mold.

$$Fe_3C + FeO = 4Fe + CO$$

 $Cu_2S + 2Cu_2O = 6Cu + SO_2$

The CO and SO₂ are utilized (Please turn to Page 160)




By HERBERT CHASE

... offers strength, hardness, wear and corrosion resistance. Increased use of this material is anticipated when high temperature working steels become available for dies

Grass Die Casting

MANY years of experience in producing copper base extrusions, forgings, screw machine products and die castings, have given Titan Metal Manufacturing Co., Bellefonte, Pa., knowledge regarding the advantages and limitations of each product and of the processes by which each is made. Each product has its field of utility and the output of all has grown in recent years. In some respects, die casting of the copper base alloy is the most difficult of the processes, but it yields products that, in general, are not producible by other means or can be made to better advantage and lower cost when die cast.

At present, this company operates 10 machines for brass die casting and could make use of a larger number if current demands for new dies could keep pace with demand. About 70 dies are kept in active use, many others are put into service as required, and a large number is being added as rapidly as the company's own die shop and others serving it can build new dies to requisite specifications.

Brass die casting has not developed as rapidly as the

die casting of metals of lower melting point. This is partly because there are not yet available die materials capable of withstanding the high operating temperatures required with brass alloys. In other words, die maintenance costs are rather high, especially where demands are for castings that must be held to close dimensions and have surfaces free of check marks.

On the other hand brass die castings meet demands for strength, hardness, wear resistance and corrosion resistance that are not met by other die casting alloys and it is where these demands must be fulfilled that brass die castings find their application.

Eight of the die casting machines in this plant are of the Polak type. Originally, several of these machines were operated from a common hydraulic system but they have been modified so that each is now a self-contained unit having its own pumps and accumulator for developing the high injection and die locking pressures required.

All the Polak machines were obtained from Czecho-

Fig. 1—Above, the assembly produced in the die shown in Figs. 3 and 4 and, below, the forged insert having a boss in which both longitudinal and circumferential grooves have been machined. Around this boss, the die casting is made, joining the parts permanently. Flash left on the shank is cut away in later machining process

- Fig. 2—Closeup of the Lester machine, showing a die open and a gate of castings ready for removal Fig. 3—Metal being ladled into injector cylinder of the Hudropress machine
- Fig. 4—Closeup of the "900 size" Polak machine with die open and a gate of two brass shower head die castings ready for ejection into the chute below

Fig. 5—These two Ajax electric furnaces melt most of the alloy used in the Titan brass die casting department. A ladle (on a light truck for delivering the alloy to casting machine) is being filled

Fig. 6—One of the larger Polak machines shown with die a open and casting b ready for ejection. Injection ram c is operated by a piston in the hydraulic cylinder d. At e is the cold chamber from which a plunger not shown has ejected the slug f which the operator will return to the furnace g. Core pulling attachment, using an air-operated toggle to move the core is shown at h, i being the air cylinder. This is the die for making a piston having a forged head j, used as an insert around whose boss a part of the shank is die cast

Fig. 7—Die for casting the shank of the piston shown in background. In center is a slide that fits adjacent die recesses. Far end of slide carries cores that form side holes in the shank. Plunger in foreground holds flange in the die. A core, not shown, is centered in the recesses at the top edges of the die block and forms the hole in the upper end of the casting. It is this core that is operated by the pulling mechanism shown in Fig. 6





Fig. 8—The Lester-Phoenix die casting machine is the only machine at Titan that uses molten metal

Fig. 9—Half of one of a multiple-cavity die used in the Lester machine. This die makes 13 hex-shaped fittings at each filling. Hole in center is for the end of the injection ram. Runners radiating from the hole enter each cavity through thin gates. When the die is filled, a slug remains in the hole and is ejected along with the whole gate of castings

Fig. 10—Five brass die castings including instrument, typewriter and fluid handling parts from which flash has been removed

Fig. 11—Typical brass die castings as they appear before flash is removed. All except the three parts at the right are in yellow brass. Of these three, the two at top are in Tombasil and the spoon casting is in nickel-silver called Tinicosil slovakia and have vertical injection cylinders designed for handling semimolten or plastic rather than liquid metal. This has the advantage of employing metal at a somewhat lower temperature than for liquid metal but does not permit using certain dies that can be filled only when liquid metal is injected.

A large Lester-Phoenix machine has been recently added. It uses liquid metal and has powerful toggles that exert high die locking pressures. In consequence, larger dies, including some having long runners, are accommodated.

Latest die casting machine installed at Titan is a size 3 Hydrocast unit built by Hydropress Inc. This machine has a vertical arranged injection chamber, full-hydraulic and self-contained. It exerts a total clamping pressure of 315 tons and a total injection (*Please turn to Page* 164)

		COMPOSITION AND P	ROPERTIES OF F	RASS DIE CAST Nickel Silver Tinicosil	ING ALLOYS Silicon Brass	Nickel Silver Tinicosil	Naval
	Yellow Brass	Redaloy	Tombasil	No. 20	(Eclipsaloy 10)	No. 21	pro-
Composition (per cent) Copper Silicon Lead Tin Nickel Iron Manganese Aluminum Zinc Tensile strength psi Yield strength psi Compressive strength psi Shearing strength psi Per cent elongation in 2 in. Per cent of reduction of area	62 1 0.5 Bal. 58,000 36,000 6.2 7.6	53 0.5 1 Bal.	80-82 3.5-4.5 Bal. 85,000 50,000 8.0 10-15	46 1.5 16 1.5 Bal. 85,000 65,000 15.0 10-18	63-66 0.75-1.25 0.50 max. 3al. 70,000 35,000	46.0 1.0 10.0 1.0 3.0 Bal.	60 0.75 Bal
Rockwell hardness B Brinell hardness Melting Point, deg. F. Specific Gravity	45 120-130 8.5)	170 1575 8.3	160 1675 8.45	120 8.6		

OVER THE BORDER: When this page is being printed, I will be renewing old acquaintances and making new ones in Montreal and Quebec, following three days at the fall meeting of the American Society of Mechanical Engineers in Boston.

I always like to go to Canada. I believe that machinery men generally do like to go to Canada. Invariably we get a royal reception over the border and invariably we come away with the conviction that machinery men in Canada know their business and cope ably with some problems which do not exist to any such degree here in the United States.

One thing in particular which always impresses me, is the manner in which they attain mass production efficiency in many cases on products which are identical or very similar to ours, but for which their markets are considerably smaller—and therefore the production lots correspondingly smaller. Production men here in the States can afford far more elaborate and costly tooling than can the Canadian engineers, so the latter have become highly proficient in devising low cost tooling and in performing repetitive operations without resorting to any kind of special tooling.

On many occasions I have heard Canadian engineers state that there should be clearer understanding of this situation on the part of production executives in the States who have some degree of jurisdiction over manufacturing policies of branch plants or affiliated companies in Canada. Before attempting to "export" a ready made tooling plan across the border, it should be weighed carefully in terms of the volume of production across the border. There are no geographical boundaries to ingenuity here in America. Don't overlook the fact that it flourishes north of the border to fully as great an extent as it does south of the border.

TRANSFER OF SKILL: There seems to be growing interest in methods by which machine tools can be made to reproduce intricate shapes through template and other pattern and model control. In part this is due to increasing use of dies (a subject hinted at elsewhere on this page). Also, it is due to increasing use of highly accurate mathematical curves on parts used in such devices as prime movers, process control apparatus, instruments, etc.

Several generations of inventors have dreamed of machines which would translate mechanical drawings into finished parts without taxing the skill and intelligence of the machine operator to any extent. Some of the achievements in contour control come very close to achieving that direct translation from "dream-to-reality".

WASTE NOT. WANT NOT: During the war there was tremendous emphasis on conservation of materials—metals in particular. That condition of things went on so long (in fact, it still continues in connection with numerous commodities) that something new and permanent may have been added to the economics of design, tooling and production methods.

The economic history of America to a large degree has been the story of wasteful methods induced by plenty, which in due time have brought about scarcities which have demanded broad revision of processing methods. Forests were destroyed to obtain potash, charcoal and

Seen and Heard in the Machinery Field

By GUY HUBBARD Machine Tool Editor

paper pulp. By the same token, many a steel bar has been reduced to chips to obtain a mere tote box full of finished parts. Nor were the chips themselves salvaged until within recent years. I well recall that during the first World War, untold acres of land were "filled in" with machinery steel chips.

I detect a growing tendency now on the part of designers and production men to ask this question in connection with new products: "In making this part, isn't there some way in which we can get the desired shape by 'pushing the metal around' rather than by whittling a lot of it away in the form of chips?"

As a matter of fact there are many ways in which metal can be moved around to shape—extremely accurately to shape oftentimes—and machine shop practice is becoming colored by such techniques. Remarkable things were done in shell plants on hot and cold forging, forming, piercing and drawing of shells and shell cases. Many of those processes can and are being applied to peacetime products. Instead of the material in the hole going onto the scrap pile, it becomes a part of the product. That certainly makes sense.

Forward-looking machine tool builders are watching this trend—not with jealous fear, but with keen appreciation of the fact that it is a challenge to their ingenuity. They have no desire to be partners in wastefulness, they want to be partners in conservation.

Therefore, they are devising new machines to turn out work from large tubing instead of bars. They are devising machines to finish forgings, stampings, etc., instead of roughing corresponding parts out of the solid. They are building machines which form parts and threads by rolling instead of by cutting tools.

The end result is going to be that America will make its metal resources go much further than otherwise would have been the case. Also, I am convinced that a much closer liaison is going to exist between builders of machines which push-metal around and those which remove metal in the form of chips. The two methods will be cooperative rather than competitive—and smart machinery builders are destined to have more business, although it will be somewhat different in character from that of other days.

GRINDING SINGLE POINT TURNING TOOL Front Clearance

Side Clearance

Lead

Back Rake

5° to 10°

Angle

Cutting Edge Angle

Top Roke Angle

Top or Rake Angle

5° to 10°



By E. VON HAMBACH Research and Development Engineer Carpenter Steel Co. Reading, Pa.

TABLE VII-TURNING SPEEDS AND FEEDS

	Surface Fee	t	
	per Minute	Approximate	
	(Low	Feed	Nearest Comparable
Type No.	and High)	in Inches	Equivalent in Ordinary Steel
410	80/115	0.003/0.008	SAE-3140, 4140, 8140, etc.
420	40/80	0.003/0.008	SAE-1095, 8150, 8312, 6150
420F	80/110	0.003/0.008	SAE-2315, 2340, 2345
140	40/60	0.003/0.008	High Speed Tool Steel
440F	70/90	0.003/0.008	SAE-1060, 1070, 1095
143	80/110	0.003/0.008	SAE-3145, 3250, 4650, 6150, etc.
302	40/85	0.003/0.008	Copper-nickel alloys-except that
			302 work-hardens
416	110/140	0.003/0.008	SAE-1030, 1120, X1340
430	85/115	0.003/0.008	SAE-3140, 4140, 6140, etc.
430F	120/150	0.003/0.008	SAE-1030, 1120, X1340
829	60/80	0.003/0.008	Copper-nickel alloys
303	85/120	0.003/0.008	SAE-3120, 3145, 4615
NOTE.	Figures she	a have and	anana Or some labe it may be

possible to use even higher speeds. However, on certain work the nature of the part may require slower speeds than are recommended here. All recommendations are based on the use of standard high speed tools.

TABLE VIII-TURNING CHECK CHART

Trouble	Correction
Tool heats badly.	Is tool heavy enough? Does it have enough mass to carry off generated heat? Check lubricant as it might be too rich in sulphur base oil and should be cut back with a coolant such as paraffin base oil.
Cutting edge breaks off.	Tool ground with too coarse a grinding wheel. Not enough mechanical support due to grinding large con- cavity in front clearance. Use straight angular grind with minimum clearance, usually between 7° and 10°. (See Fig. 8).
Chips pile on top of tool.	Top rake angle not steep enough, should be 5° to 10° angle. Also indicates need of "chip curler." If curler is used, it is not deep and wide enough. Stoning top rake to a fine smoothness helps chips slide off.
Work cuts with taper	Rough turn to 0.003/0.005-in. of finished size and shave with tool steel, using light cut at a fast speed. Check lubricant to be sure mixture has enough paraf- fin oil to serve as coolant for dissipating heat.
Poor or rough finish.	Check cutting tool. If ground on coarse grit wheel and not stoned, this is natural result. Cut may be too heavy. Stock may be too soft, and is "picking up."
Cannot hold close tolerance.	Close tolerances are not readily obtainable on heavy cuts. Machine to 0.003/0.005-in. of finished size and tolerance required and then take a shave or finishing cut with fairly fast speed. Have lubricant on thin side for cooling purposes.
Tool "rides" work.	Tool not sharp enough. Top rake angle not steep enough, causing "bugging." Look for "play or loose- ness" in machine or tool.
Work glazes or hardens.	Tool either dull or riding too far above center of work. The use of a solid type steady-rest will glaze or work- harden jobchange to roller type steady-rest.
Tools "hog in."	Rake angles too small. Also check side clearance. Stock may be extra dead soft. Carriage may be loose. Cutting edge of tool below center line. See Fig. 9.
Circular form tools gall and bind on sides.	Cut too deep for side clearance allowed. Increase angle of side clearance. If this goes beyond allowable limits of finished piece, a shaving operation will have to be added.
Cannot take	Stock too soft or out too heavy Add shaving operation

Stock too soft or cut too heavy. Add shaving operation taking a light fast finishing cut (0.005/0.008-in.). Ex-perionced operators are doing this and eliminating grind-ing before thread cutting for Class 3 fits.

Lubricant may be too thin. Add more sulphur base oil. Spindle speed too high. Check with Table VIL Material too hard for type of turning tool being used. Generally an indication of too rich a mixture of sulphur base oil. Add paraffin oil until excessive wear is reduced. Requirements for satisfactory economical results in turning, threading and milling these steels are covered by the author in the second article of this series

TURNING operations on automatic screw machines and turret lathes involve so many variables that it is impossible to make specific recommendations which would apply to all conditions. Tool angles, cutting speeds and feeds given here are primarily starting points for working out each job.

Table VII gives the high and low range for turning and cutting various stainless steels. A good starting point may be taken halfway between the range given-adjusting the speed upward or downward until the best results are obtained. These speeds are recommended for stainless grades in various conditions, such as hot rolled, cold drawn or centerless ground, with hardness ranging from 187 to 250 brinell. Dead soft annealed material is very tough

cases reported higher than this.

Correction See Stoning, Part III for data on grinding and stoning of cutting edge. Following these recommendations has generally increased tool life from 10 to 60%. Several

Look for a "bug" on cutting edge. Sometimes a small one remains alter grinding. This starts building up metal right away, resulting in undersized cut. Stoning after grinding will eliminate this. Mechanical adjust-ment of machine may be required.

Tool is not being held tight in fixture, causing vibration. Tool is not properly set with center line of work. Er-cessive clearance angles tend to cause chatter. Too heavy a cut or too light a machine. A roller steady-rest will help to prevent chattering.

Not enough clearance angle. Tool rubbing against work, creating friction heat. This requires more pres-sure to feed tool and the rubbing causes poor finish.

This occurs when tool has chip groove which is carried through the front of tool or cutter. This can be over-come by proper regrinding.

Surface Feet per Minute-Low and High

Tapered Pipe

18

18

18

18

18

18

18

18

18

18

18

18

General

10/20

10/20

12/25

10/20

12/25

10/20

10/20

12/25

10/20

12/25

10/20

12/25

Fine

Threads

5/10

5/10

5/10

5/10 5/10 5/10

5/10

5/10

5/10

5/10

5/10

5/10

TEEL

TABLE IX-THREADING SPEEDS

Threads

10/20

10/20

10/20

10/20

10/20

10/20

10/20

NOTE: The wide range of the above recommendations is due to the

possible use of any one of four types of chasters and the variable condi-tions of material threaded. Slightly harder material (210-240 brinell) will

thread easier than dead soft annealed stainless steels. Each job has to be developed for best production results, keeping in mind speeds should

be increased or decreased in small steps. All recommendations are based

10/20/25

10/20/25

10/20/25

10/20/25

10/20/25

Nat'l Fine Nat'l Coarse or

Trouble

Tools won't hold edge.

Tool cuts undersize after grinding.

Chatter marks.

Tool heats excessively and finish

Double chips.

Acme

Threads

12

12

12

12

12

12

12

12

on the use of standard high speed tools

is rough.

Type No.

410

420

420F

440

440F

443

802

416

430

480F

329

303

and draggy; all stainless steels will machine somewhat better when they are slightly harder than the dead soft annealed condition. Where higher physical properties are required, stainless can be machined in hardnesses up to rockwell C1 34.

Due to the slightly lower heat conductivity of stainless steels, they will generate more heat than ordinary steels. This heat is held locally in the work and tool. Therefore, these five simple points, carefully checked, often represent the difference between a slow or fast job-and a good or poor finish:

First, select as large a tool as possible, because the life of the cutting edge depends on good heat dissipation in the body of the tool, as well as into the work and cutting oil.

Second, to insure giving cutting edge maximum mechanical support, it is best to hold front clearance angle to the minimum, roughly between 7° and 10°.

Third, top rake should be fairly steep. Tools with a 5° to 10° angle will generate less heat and be freer-

TABLE X THREADING CHECK CHART

Sharp chasers cut better threads. Don't run chaser too long; # costs less to grind them oftener.
A die head clogged with chips or having weak springs will result in poor threads and possible breakage of chasers.
Trouble is avoided if throat angles in the set are ground exactly alike.

alize. 4. When sharpening chasers burning is prevented by taking light cuts with a soft wheel. Grinding too slow with heavy cuts, or a hard wheel, will burn the chaser and cause grinding checks. 5. A had start of the die head on the work is most likely the reason for getting a thin first thread. If all your threads are to be good, check work and threading spudle for proper alignment and be sure they and the possible, chanfer or bevel the work so all chasers will start cutting at the same time. Die head and work must line up properly to avoid eccentric threads. A good bevel on the work is im-portant in getting concentric threads.

7. Rough threads often result when cutting at too high a speed; cutting oil is not properly blended; or dirty oil is loaded with fine chips that act as an abrasive. On circular chasers, rough threads can also result from too much face angle; it is best to hold to the recommended angle of 142

8. If there is not enough hook angle on face of the chaser, top of the threads will be rough.

TABLE XI MILLING SPEEDS

Гуре №.	Surface Feet Per Minute (Low and High)	Nearest Comparable Equivalent in Ordinary Steels
420 420F 440 440F 443 802 416 430 430F 529 503	70/105 35/70 70/100 85/80 70/100 35/95 100/125 70/105 110/135 55/70 75/110	SAE-3140, 4140, 6140, etc. SAE-1095, 3150, 3312, 6150 SAE-2315, 2340, 2345 High Speed Tool Steel SAE-1060, 1070, 1095 SAE-3145, 3250, 4650, 6150, etc. Copper-nickel alloys—except that 302 work-hardens SAE-1030, 1120, X1340 SAE-3140, 4140, 6140, etc. SAE-1030, 1120, X1340 Copper-nickel alloys SAE-1039, 3145, 4615

NOTE: Above speeds are average. For some jobs the higher speeds may be used and on other jobs—depending on the type of work— it may be preferable to use speeds on the lower side. All recommenda-tions are based on the use of standard high speed tools.

117

Angle 10°10 15° 5° 108°-7º to 10º Cutting Edge Side Clearance Front Clearance Angle 8º to 15º $(\mathbf{6})$ GRINDING CIRCULAR CUT-OFF TOOLS 7º to 10* Back Rake 8" Above Center to Suit Job Work 7 7º to 10º Clearance GRINDING STANDARD BEVEL CUT-OFF BLADE - BOCK Roke **Correct Grind** 7º to 10º Front Clearance Clearance False Clearance **Concavity Does Not** Bock Up Cutting Edge (8) GRINDING FORM TOOLS Circulor Doveto 7°1010° I* Relief Bock Rake Vs Above Cente 9 7º to 10º Clearance

finish cut close enough

Tools burn.

Excessive

tool wear

for threading.



cutting. Generous chip curlers or chip breakers are also a decided advantage.

Fourth, use "finishing cuts" for very close tolerance. If the work cuts to a taper, it is recommended that turning be carried to 0.003-0.005-in. of finished size, then finishing with a light cut with the machine set at a fairly fast speed.

Fifth, all stainless steels take a good finish easily and on the light cuts a good coolant that will carry away the heat is more important than a lubricant.

Grinding tools properly is particularly important in machining stainless. Generally, the straight chrome freemachining types such as Type 416, Type 430 F, and Type 420 F machine easiest of all. The regular chromenickel (18-8) types however, due to their tough, draggy condition and work-hardening characteristics, require turning tools ground with the top rake angle on the high side (see Fig. 6). Smaller (*Please turn to Page* 150)

TABLE XII-MILLING CHECK CHART

Trouble Cutter "hogs in." Excessive vibration.

Cutter wears badly without galling or heating up. Cutter "bugs" up and burns. Cutter burnishing behind cutting edge. Plain milling cutter binds in deep slots. Cuts not cuts raight. Work piece

slips. Chatter on

straight tooth cutter.

Shell end mill won't cut accurately after grinding. Cutter does not run true.

Work cuts out-of-square.

Work burnishes. Poor or rough finishing cut. Indication of high pressure on cutters. Too much rake. Vibration. Correction

Check rake angle. Too much rake will cause "hogging in." Check speed.

Check clearance, especially on cutters with more than one cutting surface. If clearance is not enough, rubbing will cause vibration. Check lubricant. Binding may be result of too heavy an oil, not carrying away heat fast enough.

Add paraffin oil to lubricant. Too much sulphur base oil wears away cutting edge, as sulphur is abrasive. See ubrication, Part III.

Check lubricant. Mixture may be too thin. Assuming cutting speed is not too fast, add more sulphur base oil. See lubrication Part III.

Check width of land and clearance. This is definite indication the land is too wide.

Change to a staggered tooth side mill with alternating spiral teeth.

Check how work is clamped. Work piece can be sprung from over-tightening of clamp or vise.

Some pieces, due to shape, are hard to hold. Often, a piece of paper slipped under work will help to prevent slipping.

If cutter is sharp and clearances sufficient, plus good jubrication, this job requires a helical tooth cutter which has a shearing action that cuts more freely. If you are using a helical tooth cutter, look for back lash in machine, a loose arbor or a worn shank on miller. Check solid shank cutters for nicks. A nick leaves a high spot and a cutter works loose.

This is an indication that cutter was removed from arbor for grinding. Once a shell end mill or face mill is on arbor, don't take it off. You can seldom reset it as it was.

Generally this is due to "poor housekeeping." Cleanliness is of major importance. Dirt or a fine chip can be caught between the arbor and the spindle or between the cutter and the arbor. This will cause the cutter to run several thousandths out of true. Also a "sprung" arbor or a "burred" spacer will cause same trouble.

Again "good housekeeping." This can be from chips between the work and the fixture or chips and dirt m the "T" slots, causing misalignment when clamping firture. Brush or blow all chips away before a new work piece is mounted.

Cut is too light. Cutter not biting into steel. Increase depth of cut.

Your last cut was too heavy. Take a lighter cut and increase speed for better finish.

Change to a coarser tooth cutter. Too many teeth cutting at same time. A coarser tooth cutter will allow more space between teeth and relieve chip packing.

This will show up by cutter "hogging in." Use smaller rake angle.

Not enough clearance on top and sides. Cutter is binding. Grind for more clearance.

118

Skilful designers take advantage of REVERE'S many metals

THIS large evaporator equipment affords an excellent example of skilful designing to take advantage of the special characteristics of two of the Revere Metals. For high heat conductivity and corrosion resistance, Revere copper tube and tube sheets were used for the steam chest. For the strength of mild steel and the corrosion resistance of copper, Herculoy plates were used.

There are many different Revere Metals, because no one metal can possibly serve all purposes. The important thing is to select among these metals those most suitable for each given set of conditions. Sometimes this is not easy, requiring a skilful balancing of such factors as corrosion resistance, strength, weight, cost per pound, cost per cubic foot, cost of fabrication, time consumed in fabrication, service expectancy, and even appearance. We will gladly discuss with you the many, varied, and sometimes contrasted virtues of Revere Metals, either in general terms, or in relation to a specific product or piece of equipment.

Revere Mill Products include—Copper and Copper Alloys: Sheet and Plate, Roll and Strip, Rod and Bar, Tube and Pipe, Extruded Shapes, Forgings; Aluminum Alloys: Tube, Extruded Shapes, Forgings; Magnesium Alloys: Sheet and Plate, Rod and Bar, Tube, Extruded Shapes, Forgings; Steel: Electric Welded Steel Tube.



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Catchall, 90" x 5' 5" face to face, made of Herculoy.



49 91

Engineering News at a Glance

GRINDING wheels using a new abrasive developed by Norton Co. at Worcester, Mass., have a definitely faster and cooler cutting action, longer life and require fewer dressings, according to the firm. Grains of the abrasive, through a new special electric furnace process, are formed as individual crystals that do not require crushing to size. In the process they assume a chunky, nubbly shape with many plane surfaces forming both exterior and re-entrant dihedral angles—the latter making definite rake angles which increase cutting efficiency of the grains. Electric furnace invented by the company makes the abrasive by fusing high purity aluminous ores so individual crystals are formed in a fluid matrix. Crystals are separated from the matrix by a complicated, continuous chemical process, then screened into standard grain sizes.

EXTENDED facilities now enable Sam Tour & Co. Inc., New York, to provide industry field service in nondestructive testing, it was learned recently. The company now offers the use of trained service engineers to cope with problems encountered in connection with corrosion, erosion, liquid level and dezincification. These men are reported skilled handlers of the Penetron and Probolog instruments—used in nondestructive testing, for example, examining high pressure pipe lines from the outside for dangerous internal corrosion or erosion and to explore ship hulls and tanks for thinning of walls.

SOME 37,000 lb of high-strength nickel-chromiummolybdenum steel castings were furnished recently by Crucible Steel Casting Co. to Wellman Engineering Co., at the order of the general contractor, National Engineering & Construction Co.—all of Cleveland—for the reconstruction of the Center street bridge in the same city. The order consisted of 44 roller castings, weighing 400 lb each 18 in. in diameter and 10 in. wide across the face, and 10 tons of track castings, each 10¾-in. wide, 6 ft 4 in. long and 35%-in. thick.

MORE than 1200 obsolete Navy and merchant ships will be scrapped under a plan of the Civilian Production Administration and other government agencies to provide iron and steel scrap for industry. Some of this metal is scheduled to go into plumbing fixtures, cast iron soil pipe, radiators and other home-building materials and equipment.

NOVEL water-cooled rotor turbine, capable of using normal material at normal temperatures, and at the same time utilizing high gas temperatures for the turbine cycle, was developed by German researchers, according to a report in possession of the Department of Commerce, Washington. Rotor is essentially a hollow drum with blades attached radially. Holes drilled in the blades connect with the interior of the drum, but at the blade tip they are blind. Water introduced into the rotor fills the blades and drum to a predetermined depth. A slight density change in the water, caused by centrifugal force, results in circulation of the water. Circulation also is initiated by the high temperatures, which raise the water level to where its specific heat is theoretically infinite. This permits considerable heat transfer for a very limited surface.

BY dipping metal parts in a solution of cellulose acetate butyrate and hot castor oil, a continuous, tough coating is formed that protects such parts from corrosion and abrasion in transit and storage, according to Tennessee Eastman Corp., Kingsport, Tenn. Polished mild steel plates coated 0.1-in. thick with the material held in a closed container over water at 100° F for 150 days with no sign of rust. Dipping operation is simple, and the transparent coating permits complete visual inspection and identification of the part. Not only can the coating be stripped easily off parts, but it can be reused by melting.

WARTIME mechanization in handling materials is now paying off during peacetime production in the foundry of Union Steam Pump Co. at Battle Creek, Mich. Here a 3-wheel towing tractor with dump body carries molding sand from stock pile to mixers, hauls coke and wood for starting fires and does miscellaneous heavy handling jobs. A Clark Trucktractor carloader fork truck with a bucket attachment handles bulky castings, helps to load the tractor and handles shakeout sand, burned molding sand and refuse. During the night, the same truck is used to carry hot castings up to 2000 lb per load in the bucket attachment from molding floors to cleaning room and tumbling mills.

PARTS to be finished can be processed directly after forming and trimming operations, providing die or stretcher marks do not penetrate too deeply into the surface of the work, by means of an improved mechanical finishing method called Britehoning. Developed by Sturgis Products Co., Sturgis, Mich., the process is basically a tumbling method involving the use of mineral chips and suitable compounds for developing a fine semilustrous finish on practically all types of metal parts. It is ideally suited as a preplating operation for finishing small zinc base die casting or brass stampings prior to bright nickel and chromium plating.

OFTEN, in circular products such as crane wheels, it is desirable to have a hard, wear-resistant rim, while a ductile web is required for best impact properties, and a soft hub to facilitate boring operation. For such requirements, Bethlehem Steel Co. reveals in its booklet 216, it developed a specially designed quenching device generally known as a spinner. Sections with sufficiently large hub and rim dimensions are clamped between two disks and spun around their axes at high speed, while water is sprayed against their rims. During this quench-





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October 7, 1946

ENGINEERING NEWS

ing, both web and hub are protected from the water's action. All spinner operations are controlled by time clocks, and arranged so water cannot be applied except when the blank rotates at full speed. Thus water is prevented from impinging on a stationary blank, which would cause nonuniform hardness. After treatment, rim attains high hardness and wear resistance, while web and hub are in normalized state.

OXYGEN at one steel plant is being piped like water into the blooming mill, welding shop, open hearth and stockhouse departments according to "Steel Facts." It is produced by separating nitrogen from common air. The air is taken into the plant, compressed, cleaned and sep-



GIGANTIC lathes, such as the 50 x 33-in. machine shown in the accompanying illustration, are being built for export to France, it was learned recently from R. K. LeBlond Machine Tool Co. in Cincinnati. Equipped with two carriages and a newly developed special face plate on the tailstock, the lathe can cut simultaneously four different diameters on stock up to 3 ft in diameter and 33 ft in length. In spite of its huge proportions, the machine handles effortlessly because carriages and tools are electrically operated. Exact use of the lathes in France is not yet known.

arated. During the process a temperature of 300° below zero is produced. Final product is a bone-dry oxygen gas of 99.6 per cent purity which is then ready for storage in the company's three banks of 800 cylinders, having a total capacity of 200,000 cu ft. From here the gas is fed into pipe lines that lead into the various departments.

OPERATIONS such as spinning, deep drawing and welding sometime partly destroy the finish of stainless steel, hence repolishing may be necessary. Proper polishing methods vary with the type of job and the equipment on hand. There are, however, several "do nots" which apply to polishing in general, according to "News and Views," published by Chicago Steel Service Co. in Chicago. Some of these are: Do not use wheels or buffs that are contaminated with other metals. Do not use any buffing or greasing compounds which contain iron oxide, and do not use Turkish emery because of possibility of iron contamination which will result in discoloration of the stainless.

IN a recent demonstration, a jet-propelled plane was launched at 116 miles per hour in about 4 sec after a run of only 340 ft with the aid of an electropult designed by Westinghouse engineers for Navy carrier and landbase use. Unassisted the plane would have required a run of 2000 ft for the takeoff. Device is essentially a huge electric motor laid out flat. Its 1382-ft track corresponds to the rotor of a conventional machine, and the small shuttle car which runs along it acts as the stator. The plane is shot in the air by the car as it speeds down the track. According to Westinghouse, the development has no apparent limitations in speed or capacity within range of requirements now foreseen. It gains in effectiveness as size of the aircraft increases. Designs already are completed for a device capable of launching the largest existing air liners at 120 miles per hour with a takeoff run of 500 ft.

FROM New York, Charles Hardy Inc. reports that a new low-carbon stainless steel powder is now being produced in commercial quantities. It appears to be exceptionally well suited for the manufacture of porous filters, acid and corrosion-resistant parts. According to the concern, a stainless steel flake powder also has been developed for use in the coatings industry. Suitable for spraying applications, it can be mixed with the usual vehicles. Preliminary tests indicate the product has good acid and corrosion resistance.

GEAR tooth pointing production may be jumped to 1800 gear teeth per minute under average conditions by using a machine referred to as the "Sixty" produced by Cross Co. of Detroit. With the machine, small shops. handling short runs on a variety of work, can make changeovers from job to job within 20 min it was learned. Its operation is automatic. Work is clamped by means of a foot pedal control. This frees the operator's hands to feed and unload the machine.

DEVELOPED specifically for high-current capacity, and especially applicable for electroplating and battery charging, but not limited to this use, are the new 5 x 5^{34} in. selenium rectifier plates built on aluminum, now manufactured by the Seletron Division of Radio Receptor Co., New York. Featuring maximum heat dissipating value, these stacks when arranged in suitable combinations of series or parallel plates provide continuous service.

IN CLEVELAND, Speco Inc. reveals development of a new type industrial finish that can be applied directly over rusty surface without cleaning or scraping. The black paint is said to seal corroded surfaces, stopping further rusting permanently. According to the company, regardless of submergence in water or exposure in moist or fume laden atmosphere, the paint prevents further oxidation, and provides an ideal base for decorative paints.



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SPRAYING of porcelain enamel on the interior of hot water tanks can be accomplished automatically and uniformly by a machine developed by Ferro Enamel Corp., Cleveland, for which a patent has been applied. The machine, shown in Fig. 2, consists of a spray cylinder which passes down and up inside the tank shell, coating the inside of the tank while in motion.

Liquid porcelain enamel flows from the two nozzles into the spinning spray cup located on the end of the spray cylinder (Fig. 1). The enamel, upon coming in contact with the rapidly revolving spray cup, is broken up into a fine mist and deposited on the tank interior. Quality and thickness of enamel coating is determined by feed nozzle size and enamel feed pressure.

To begin the operation the spray head is at top position and spray shield is raised to allow placing of tank in spray chamber in such a manner that the spray head is centered over it. After closing the spray shield, the down switch on the control board at right is closed, thus starting the motor which turns the drums, unreels a cable and in turn lowers the spray unit. A high-speed air motor, located inside the 4-in, pipe which suspends the spray unit, revolves the spray head cup at high speed.

As the unit descends, a spring-con-



trolled valve engages an adjustable bar tripper, opening the valve and permitting liquid enamel to flow from a controlled pressure storage tank through copper tubing to the feed nozzles which feed it into the spinning spray cup. Centrifugal force of the spinning cup breaks the enamel into a fine mist at spray points determined by slotted construction of the cup.

When the spray unit reaches a point where the cup is below the lower edge of the cylinder after having deposited a continuous, uniform coating, a tripper engages a reversing switch, which causes motor to change direction, reel up the wire cable and raise the spray unit. Spraying is continued until enamel flow valve disengages with first tripper bar, closing valve and stopping flow of enamel to the cup. At this point, or slightly higher, the second tripper engages the adjustable switch, shutting off the motor and stopping all vertical motion. Machine has duplicate outside switches acting as safety limit switches and designed to act in event of failure of either of other switches.

Although still in the experimental stage, Ferro visualizes use of this machine in a continuous plant using conveyors to place articles to be coated in the spray chamber. Motion of the conveyor would have to be intermittent so as to co-ordinate the motion of the spray unit with the conveyor. Forward motion of conveyor would be in effect only while spray unit was in its raised position and would be of sufficient duration to bring piece to be coated under spray unit.

By integrating motion of the two units, the switch that stops the upward motion of the spray unit starts the conveyor. When conveyor motion is halted by means of a timer or a tripper set to stop it after it has traveled a certain distance, the same control can be used to activate the starting switch and start the spray unit and thus repeat the cycle.

Fig. 1 (left above)—Closeup of spray unit.' Porcelain enamel in liquid form is ejected from two nozzles into slotted cup which is rotated at high speed by air motor inside shaft. Centrifugal force deposits enamel in uniform coat on wall of tank

Fig. 2 (left) — Overall view of automatic tank spraying machine. Spray shield is raised to show tank shell in place and spray unit lowers into spraying position. Control panel is at right and control switches are above panel and cn left of machine



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By H. J. CHAMBERLAND

GRINDING PRECISION TOOLS

Fig. 1-Parts on magnetic

chuck represent 20 vernier cali-

few seconds of arc

ments are fully used

Factors which contribute to microinch accuracy in grinding gage blocks and other precision tools upon which modern mass production depends are reexamined in this resume

> IN ANY analysis of our system of producing interchangeable machined parts, the fundamental importance of efficient grinding operations cannot be overlooked. This is especially true of the horizontal spindle-traverse table type surface grinder without which precision gage blocks (Fig. 2), measuring devices, tools and instruments, all of which make mass production possible, could not be economically processed.

Ground surfaces of microinch accuracy are the result of a combination of factors, including design for scientifically balanced weight, convenient means of operation, simplified hydraulic mechanism and lubrication system, co-ordination of grinding wheel and spindle for continuous rather than intermittent performance, dust control, development of coolants and chuck holding power.

To eliminate vibration for 100 per cent balance, it is imperative that all components be designed for relative weight and be expertly machined and assembled. There must be perfect coordination between traverse, transverse and vertical movements; these must respond uniformly throughout the entire range of travel. "Liquid" powered or hydraulically functioning traverse or transverse feeds are of particular importance since only hydraulic power can provide the desirable cushioned cut-off at the end of each longitudinal stroke and

TEEL





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TORRINGTON NEEDLE BEARINGS

an infinite range of table speeds. Hydraulic systems are now simplified to the point that all actuated movements are controlled by means of a single unit. thus eliminating all customary piping and previously required adjustments.

Forced feed lubrication as applied to a surface grinder has many advantages, since oil flow to the ways can be controlled to lubricate them adequately.

When a spindle is the source of vibration, many surface grinders are raised to full efficiency simply by substituting the original spindle with one substantially more rigid and modern. As the heart of the machine, the spindle governs to a large degree the outcome of all surface grinding operations, Fig. 3.

We refer, of course, to ball bearing type spindles, assuming that they function in perfect static and dynamic balance. The fact remains that design varies; this is especially true in regard to mounting the bearings. Precision steel balls will retain their spherical shape permanently only when the ball bearings are mounted so that the point of contract between bearings and races changes with each revolution of the bearing.

Balance of Wheel Maintained

A grinding wheel even slightly out of balance will not produce a microinch finish no matter how carefully it is dressed. Wheels for wet grinding should not be used for dry grinding. Preserving the original dimension of the wheel bore is as important as preserving the size of a reamer. So important are the grinding wheels that they are now really "tailor-made" for surface grinding. Static balance to the accuracy of a small fraction of an ounce is considered as important as grain, grade, bond and structure.

Although chucks of the electromagnetic type have had little change in design for several years, electronics makes them more versatile, than ever, Figs. 1, 4. It is now possible to regulate the amount of magnetic pull to suit the size of the work; and all residual magnetism is removed in less than 15 sec. Heavy work is easily released without injury to the chuck, and thin flat pieces may be accurately and parallel surface ground. This latter operation has heretofore been a real problem on both production and tool work.

Except for the scientific development of improved dust-collecting devices, and grinding coolants, microinch precision grinding would not be realized. There are four types of dust collectors now industrially used namely, bag, filter, centrifugal force and oil bath.

Cutting tool life and performance are continuing to benefit from improved straight cutting and soluble oils that were great assets to war production. Most significant in reducing cutting fluid costs and improving production are the new graphitized soluble oils. Particularly important is the colloidal or artificial graphite type cutting medium.

When mixed in correct proportion, the specially processed oil serves for general cutting purposes except for a very few applications. This product is the result of a unique method of homogenizing whereby the colloidal graphite becomes perfectly and permanently suspended in the highest grade of carrier oil. Used for compounding as a grinding coolant, the improved soluble oil has numerous properties in line with modern precision grinding requirements.

The oil readily emulsifies with water in any of the standard proportions up to and including one part oil to 80 parts water. Such properties as fine wetting action and freedom from foaming are helpful for rapid removal of heat and its uniform distribution throughout the piece being ground. The emulsion has reasonably low surface tension casing particles of abrasive and metal in the stream to be readily precipitated at the bottom of the tank. This is essential because the least amount of grit recirculated through the system will impair the surface being ground. The emulsion has maximum rust inhibiting properties, and ground surfaces will not darken even if not wiped dry.

The advantages of a good coolant system are manifold and cannot be over-estimated. Not only must the coolant be selected with care but the flow must necessarily be adequate, uniform and clean, if temperature to minimize distortion is to be maintained. Regardless of the fineness of the grinding operation, without proper coolant, minute scratches will appear when the surface is being lapped.

When it is realized that, taking a normal depth of cut, temperatures at the point of wheel-work contact often reach 2200° F for hard steels and 1500° F for mild steels, it is easily understood that these temperatures must be absorbed so as not to spoil accuracy.

For a typical example, let us consider what actually takes place in surface grinding a piece of steel used to make a 3-in. gage block. For every temperature rise of 1°, the piece increases in size by $6\frac{1}{2}$ millionths of an inch. On removing the piece from the magnetic chuck, it might have been heated to 150° or approximately double normal temperature. Since the piece being ground can easily increase 0.0005-in. in size, it is not surprising that so much attention must be paid to functioning of coolant system.



RAIL CROPPING: Three point contact automatically square-cut positions this portable rail cropping machine manufactured by Air Reduction Sales Co., New York, for use by railroad maintenance departments. Supplied with upper and lower torches, machine requires two cuts to crop a rail. First cut is made across ball and half way down the web; second is made across bottom of the base and up through the web to meet the first cut. Torches are joined together by 5/16-in. hose with tee connections so that both can be operated from a pair of pressure regulators

Jim Smith's Son COST JIM'S EMPLOYER \$4()

Jim Smith's son was born last week. He cost Jim's employer over \$4,000. Jim has had pretty heavy expenses lately. His little girl was taken to the hospital three months ago for an emergency operation. Now, the baby. Jim has worried a lot about the doctor and hospital bills. Yesterday he had an accident, because

his mind wasn't on his work. Workmen's compensation insurance will pay Jim's doctor and hospital bills. It will pay his weekly compensation benefits. But it will not pay him for his suffering. Nor will it pay for the damage to the machine or the material spoiled. That will cost his employer \$4,109.16—which does not include the lost time of dozens of other men who saw the accident and stopped to talk about it, and who will worry about it for days afterwards.

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Manufacturer Says Unfair Tests Restrict Arc Welding Applications

September 16, 1946

Mr. Irwin H. Such, Editor Steel Penton Building Cleveland 13, Ohio

My dear Mr. Such:

Arc welding has been of decisive importance to America. Arc welding did more than most other manufacturing processes in the producing of the tools of war during World War II. Arc welding has produced a record for reliability in billions of welds, made over many years, that is unmatched by any other manufacturing process, yet arc welding is being attacked in a way which is tremendously handicapping its application, and promises still more to interfere with its future use.

This attack is aimed not at the process, as such. It is obvious such tactics would fail. The attack consists in throwing suspicion on the process by writing into specifications expensive and impractical tests which have little to do with the excellence of the weld. Most of them have to do with infinitesimal variations of no possible importance, but of great cost. The attack has already eliminated the economic use in many proper applications. If continued, it will soon eliminate many others.

We see, for instance, the ruling that welds must be x-rayed, which increases the cost by several times, yet the commercially welded joint is always of greater strength than the parent metal and is tremendously stronger than any riveted joint, where x-raying never has been suggested.

We see riveted joints which are made tight by caulking. This process is accepted without question. The resulting undercut is enormous, yet a welding undercut that is infinitesimal is frequently made reason for rejection of welds.

We see welds chipped out, rewelded, and welded vessels rejected because of trifling defects such as infinitesimal porosity either on the surface or beneath, yet parent metal in the same structure with defects much greater, and whose weakening effect would be tremendously more serious, are accepted without question.

We see welding electrode specifications being written which enormously increase the cost of production with no increase in either the reliability nor in the excellence of electrodes. Rivets have no such test to handicap them. While welding electrode is tested in every conceivable and nonsensical way, no one suggests any test on a rivet, yet the riveted joint is always the weakest spot in any structure. This is never true of a full-sized welded joint.

Much time and expense is used in testing electrode deposit to make sure it has great ductility and the weld is rejected if the ductility is low, yet riveted joints have no elongation and are accepted without question.

The contour of the deposit of a weld is a matter of very close inspection, yet no one examines the contour of any rivet or the hole it only partially fills.

All insured vessels must have their welds x-rayed and any weld is rejected if any infinitesimal defect is found, yet no one x-rays a riveted joint nor rejects it because of the voids between the rivets and the rivet holes which are known to be always present.

Because of the higher elastic limit of the weld metal, there is no load that can be put on a welded structure in which the weld is of equal or greater section than the parent metal which can affect the weld in any possible way until great distortion of the rest of the structure has taken place. Such distortion would make that structure valueless for its intended purpose, yet all this testing and rejecting listed above is made mandatory in many welded structures—never in riveted structures.

Further instances of the same kind can be cited by the scores. The examples shown are sufficient for the author's purposes.

Welding over the years has done a more reliable job than the rivets it has replaced. That record is conclusive. The engineering profession, which relies so completely on welding in so many cases, must recognize and resist this studied attempt to eliminate the arc welding process. The attack has already eliminated the economic use of welding in many structures. The success of such an attack on this tremendously valuable method is neither good advertising for the engineering profession nor good ethics for those involved in the attack. It is time we dealt with reality.

Very truly yours, (Signed) J. F. Lincoln President THE LINCOLN ELECTRIC COMPANY

Vapor Sand Blast Unit Cleans Ships' Hull

Importance of removing old, wellanchored layers of paint on ships' hulls before refinishing was recently demonstrated by research conducted by Bakelite Corp., 30 East 42nd street, New York, working under contract with the Office of Scientific Research and Development. Old paint which had formerly been considered a protection was found to cover up considerable corrosive action.

Combination wet abrasive impact method, using vapor and sand blast unit developed at Mare Island Navy yard was found to produce an exceptionally clean surface in short time. Other processes tested by researchers included an impact cleaning tool consisting of a high-speed revolving master wheel and groups of cutter wheels which flaked off coatings of rust or paint.

Report of the study is available, at \$3 each for photostats and 50c for microfilm, from Office of Publication Board, Department of Commerce, Washington.





WITH FINE FINISH ish is holes. Squaring is done from the sides of vertical

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

METHODS of handling work into the galvanizing kettle have been adapted to the sal ammoniac used as a fused flux on the zinc. Generally substances like bran, oatmeal, sawdust, tallow or glycerin are added to the fusion in small amounts to stabilize the froth, reduce fuming and economize in its use. A suitable technique has been evolved for all types of objects galvanized which varies only slightly, probably to gratify the whim of an operator. Such a system is weak, however, in that it is not easy to anticipate flux exhaustion and this condition is learned from the appearance of faulty work or is avoided by extravagant use of the sal ammoniac at frequent intervals. Too much is left to the operator to assure work of uniform quality at reasonable costs. An automatic supply of new flux producing material as a film on the entering work is helpful in solving this probelm. Such a flux film may provide all the material or less than half, depending on the rate of supply resulting from the conditions under which the work is placed in the zinc kettle.

An important difference between the customary use of sal ammoniac on the kettle and the supply of zinc ammonium chloride is that sal ammoniac added periodically is used not only to supply new cleansing material but also as it volatilizes, to stir up the heavy exhausted flux and distribute it through the mass of the fusion and thus reduce the adhesion of the flux to the work passing through. Since with a zinc ammonium chloride flux wash each entering piece of work carries substantially all the flux required for its galvanizing, the flux box technique becomes one of more frequent skimming to remove exhausted flux and avoid spotting. This is not troublesome or costly in the use of flux.

Not infrequently galvanizers have considered it economical to prepare a zinc chloride flux wash by dissolving zinc in hydrochloric acid. This would be satisfactory if a zinc chloride solution could be produced with no free acid. Having extra undissolved zinc present in the tank does not meet this situation fully, with the result that there is free acid available to create iron chloride on the work. A zinc chloride produced as a chemical product which, in solution, will show an analysis as being possibly 0.2 to 0.5 per cent basic (calculated as zinc oxide) is preferable. Such a zinc chloride makes suitable flux washes but has less value as a kettle flux. Such a flux wash requires the use of sal ammoniac or zinc ammonium chloride on the zinc kettle and tends to complicate the process without having any economic or technical advantage.

ractice

aldanizin

Some galvanizers have considered it an economical advantage to use their dross pigs to make zinc chloride. This is unsatisfactory because the iron in the dross again appears in the system to make more dross. One manufacturer using dross to make zinc chloride found upon investigation that his dross production was at the rate of about three times the average of the industry for his product before he remedied his practice.

Zinc chloride solutions are seldom as dilute as 35° Be (1.3182 sp gr) and generally are more concentrated in order to provide a flux film on the work that will have sufficient rust retarding value to be effective.

Zinc ammonium chloride, and preferably the specific form of this compound containing 3 mol of ammonium chloride commbined with 1 mol of zinc chloride, is increasing in use both as a flux wash, and as a volatile kettle flux. As a wash, it provides an effective rust retarding film on the work and on the kettle acts efficiently as a volatile flux. As before indicated, the essential steps to secure the highest quality galvanizing possible



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through the use of zinc ammonium chloride, are thorough pickling and rinsing, followed by the prompt coating of the work in process with a protecting film of the salt by use of a flux wash. Present day practice falls within the various steps shown diagrammatically in Fig. 29 which is a typical layout. Duplicate tanks for a single step in the cycle are preferable for the sake of thoroughness of treatment or for working capacity.

Zinc ammonium chloride flux washes are made by dissolving the proper weight of the salt in cold water. An all-wood tank is to be preferred but if this is not available then a lead-lined steel tank may be used. If the flux wash is to be heated, lead pipe should be employed. Since the flux wash is in reality an electrolyte, corrosion between pipe and fittings or along the weld seams of the iron pipe will soon start and result in contamination and operating inconveniences. No attempt should be made to heat the flux wash by use of an open steam line because of the difficulty in maintaining a uniform concentration of the flux wash, a desirable feature. Table III gives data on zinc ammonium flux wash densities and composition.

Dissolving zine ammonium chloride in water yields a solution of larger volume than that of the water used. This effect increases as the concentration of the zinc ammonium chloride increases. It is hardly noticeable below 10°Be. At 20°Be the volume increases beween 20 and 25 per cent and at about 30°Be the volume is increased about 50 per cent. This means, therefore, if 3.26 lb of zinc ammonium chloride is dissolved in 1 gal of water at 20°C (60°F) the resulting solution will not read 21.4°Be (see Table III) because there will be almost 1¼ gal of liquid containing 3.26 lb of the salt and the hydrometer will read more nearly 17°Be. On the other hand if 3.26 lb of the salt is dissolved in 0.8-gal of water the result will be about 1 gal of a flux wash which will have a strength reading about 21.4°Be.

It may be of interest to note here that to a limited extent some galvanizers treat their exhausted flux skimmings with water and attempt to use these leachings as a flux wash. Almost invariably these leachings will contain zinc chloride and ammonium chloride present in the molecular ratio of 1:1, that is, there will be app:oximately 71.8 parts of zinc chloride found for every 28.2 parts of ammonium chloride present in the leachings. This water soluble part of the spent flux is in reality the unconsumed residue of the original flux, the remaining portion being the infusible and insoluble complex zinc-oxy-compounds. In practice these leachings perform about on a par with zinc chloride as a flux

TABLE III-ZINC AMMONIUM CHLORIDE DENSITY DATA AT 20° C Wt. of Grams Salt in 160 C.C. Water Salt in 1 Specific Gravity % Salt By Weight Wt. Per Gal Solu °Be Gal, Lb tion, Lb 8.76 10 20 7.45 1.052 9.09 16.67 0.79 11.8 15.5 18.7 30 40 2.16 1.120 23.08 9.34 28.55 2.73 1.148 9.57 33.33 3.26 50 21.4 1.173 9.78 23.6 25.9 1.194 9.95 8.73 60 37.50 10.15 4.18 70 80 1.21741.17 44.45 47.40 27.8 .237 10.3 10.48 29.6 1.272 90 1.280 50.00 10.02 5.31 100 31.0

wash. Replacing them with zinc ammonium chloride leads to galvanized coatings with greater adherence and ductility.

The 1:1 molecular ratio of zinc chloride to ammonium chloride confirms conclusions reached that it is the most stable ratio for these two compounds at the temperature of the zinc kettle and leads to the belief that this more tightly bound ammonium chloride is not readily available for such cleansing work as must be done in the flux box. Also it supports the recommendation of frequent removal by skimming of the hard, infusible, totally-exhausted flux thus giving this more stable fluid fusion a better chance to function properly.

Since the most important duty of the flux wash is to protect the pickled and rinsed work the wash must be held at a fairly constant strength so that the film formed as the work is removed from the flux wash tank will be uniform. The effect of water being introduced into the flux tank by the rinsed work, of flux wash removed from the work and of evaporation can be controlled by a simple method. The proper solution level on the side of the flux tank should be marked and the desired flux wash strength establish by experience. These two standards should be maintained by making addiTABLE IV

PH VALUES THROUGH USEFUL RANGE OF CONCENTRATIONS IN DISTILLED WATER.

°Re	Zinc ammonium chloride,	nH
200	to ber Pararoo O	Pas.
6		4.76
8	0.89	4.56
10	1.20	4.41
12	1.53	4.28
14	1.90	4.17
16	2.24	4.09
18	2.60	4.03
20	2.99	3.97
22		3.93
24	3.81	3.90
26	4.22	3.86
28	4.65	3.84
30	5.15	3.82
-		

tions once daily or at less frequent intervals as operating conditions indicate just so that the concentration does not vary more than about 1°Be total range.

Water solutions of zinc ammonium chloride of the 1:3 ratio have pH values in the acid range so that they should be looked upon as acid electrolytes. This means that some attack can and does occur between various pieces of iron or steel in any flux wash. This stops as soon as the flux-dipped work has dried in air on removal from the flux wash tank. Table IV gives these pH values through the useful range of concentrations in distilled water. These data have been obtained by electrometric measurements. Fairly consistent and accurate readings may be made in comparator

(Please turn to Page 172)

Fig. 30 — Small parts galvanizing with electric controls



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The maintenance of RB&W's high standards for strength, accuracy and finish are assured by such complete facilities for production and by RB&W's policy of subjecting the product in process to a progressive system of quality control.



For bolts, nuts, screws, rivets and many allied fastening products, thousands of industrial firms rely upon the RB&W EMPIRE brand. Experience has shown that the extra effort RB&W puts into engineering the accuracy and dependability of its product, results in savings in assembly time, in maximum holding power and excellent appearance.



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Demagnetizer and Etcher

Fine deep etching on polished steel surfaces is performed by tungsten marking point on combination etchtool and demagnetizer, immediate left, designed by Luma Electric Equipment Co., Toledo 1, O. As a demagnetizer, the 20-lb unit is especially valuable for demagnetizing tools that have been in contact with a magnetic chuck. Flat top grid construction spreads and fades the magnetic field to zero, thus demagnetizing small and irregularly shaped parts as well as long bars and blocks.

Steel 10/7/46; Item No. 9837

Dial Snap Gage

Demountable heads and extension spacers are features of Decimatic dial snap gage, immediate left, developed recently by Standard Gage Co., Poughkeepsie, N. Y. Using an extension spacer, gage is adjustable over a range of 1 in. It is operated by passing over work piece and noting greatest deflection of dial hand. Both gaging pins are surfaced with cemented carbide to reduce wear. Steel 10/7/46; Item No. 9833

Sandblaster

Self-feeding sand blasting machine, immediate left, recently developed by Leiman Bros. Inc., Christie street, Newark 5, N. J., handles small articles such as bolts. It is equipped with a motor-driven rotating basket for tumbling work, and a sand magazine from which sand is sprayed on the work by means of a nozzle.

Feature of the machine is a combination door including armholes with cuffs that can be readily opened for loading or unloading either the work or the rotating basket. When sandblasting larger pieces of work, basket can be detached quickly from the cabinet. Operator then



holds the pieces under the nozzle in the cabinet, turning them over until cleaned. Steel 10/7/46; Item No. 9764

Electronic Tachometer

Speeds from 300 to 50,000 rpm are measured by new electronic tachometer, left below, consisting of a small pick-up head, 6 ft of flexible cable and a measuring unit with a panel-mounted indicating instrument. Recently announced by the Special Products Division of General Electric Co., Schenectady, N. Y., the new 19-lb instrument is useful for production testing equipment instantaneously without need for permanent attachments. Steel 10/7/46; Item No. 9836

Lead Check

Adjustable truncated cylindrical gaging anvils on new production load checking instrument shown below, are said to make possible precision checking of thread lead within a range of 4^{1} ₂ to 60 threads per inch to an accuracy of 0.00-01-in. Developed by Sheffield Gorp., Dayton, O., instrument is useful in checking production parts such as aircraft components, studs. small shafts and similar units. Inset shows tapered truncation which permits gaging of various pitches without changing anvils. Steel 10/7/46; Item No. 9832

Plating Apparatus

Entire layout of the plating barrel, tank and pumping equipment, immediately below, shows new combination plating apparatus and pump developed by Hanson-Van Winkle-Muuning Co., Matawan, N. J. According to the company, tests show that plating time is reduced when plating unit is furnished with pumping equipment. One such installation cut cadmium plating time 20 to 25 per cent. In working with cyanide solutions, cyan-



(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 148.)

TOMORROW'S High Production

88

with FITCHBURG Automatic Size Control to +.00005"...

ON MULTIPLE DIAMETERS in a SINGLE PLUNGE!

With FITCHBURG'S Automatic Size Control and Multiple Grinding you can easily beat the steadily rising costs of operation. These combined features are exclusively Fitchburg's—no other manufacturer of cylindrical grinding equipment has them . . . because no other manufacturer has been asked by industry to create and develop so many high-production, single-purpose, cylindrical

The Automatic Size Control is not a dial to be grinding machines. operated by the operator . . . it's not a costly electronic gadget which can get out of order easily and needs an expert to maintain. It is an inexpensive, simple, mechanical arrangement employing the principle of low increment feed which goes into operation automatically at the completion of the automatic cycle Bowgage wheel feed. A push-button starts the grinding-the

machine automatically stops when the exact size The FITCHBURG illustrated has a Heavy-Duty is reached.

Bowgage Head employing two wheels on the same shaft: one 6¹/₄" and the other 2" wide. It grinds two diameters on the illustrated washing machine shaft at the same time in a single plunge. The tolerance, in this case, $\pm .0001''$ on both diameters is no problem for the Automatic Size Control. Customers' engineers from headquarters couldn't

believe their own eyes, but it still is a fact. We may already have a Special Fitchburg

designed to meet your specific needs. You'll be surprised at the number of operations that can be done at one setting, size held to tolerances previously not attempted—and all on a very high-production basis. Drop us a line today.



INDUSTRIAL EQUIPMENT

ide consumption is cut, and carbonates in bottom of tank are reduced in volume. Steel 10/7/46; Item No. 9831

Threading Tool

Announcement of a new line of standard carbide tipped thre ding tools, Style M-15, is made by Metro Tool & Gage Company, 4240 West Peterson avenue, Chicago 30. Tools in the line are of the 60-degree, V-nose type. Primary clearance at the nose is S degrees, with a secondary clearance of 6 degrees.

Tips are of a tough, wear-resistant grade of carbide suitable for long run threading cf steel parts.

Steel 10/7/46; Item No. 9719

Booster Cylinder

Latest development of Askania Regulator Co., 1603 South Michigan avenue, Chicago, is an oil-operated hydraulic booster cylinder for air operated controllers. Using a standard diaphragm top it provides high power amplification and



permits exact positioning of heavy dampers, valves and the like in accordance with the applied pneumatic loading pressure, usually 0-15 psi.

Cylinder may be of the crank type. as shown, or of the straight reciprocating type. Straight cylinders are offered up to 8 in. bore and 30-in. stroke. Other types of remote positioning cylinders are also offered using electric instead of pneumatic transmission.

Steel 10/7/46; Item No. 9680

Welder Control

Automatic control of air-operated resistance welding machines is provided by the Class 8992 combination control unit designed by Square D Co., 4041 North Richards street, Milwaukee 12. A Syncro-break welder contactor and Safront sequence-weld timer are both included in a single enclosure arranged to mount on right hand side of machine with all control elements within reach of operator.

Foot switch, pressure switch, no-weld

switch and timer control circuits operate at 110 v and are isolated from the power supply to give the operator added safety. Solenoid air valve may be energized from either power or control supply sources by simple reconnection. Con-



trollers have tapped primary control transformers which can be connected for cperation at 110, 220, or 440 v, 60 cycles; or for 380 v 50 cycles. Steel 10/7/46; Item No. 9674

Grinding Machine

A bench-type grinding machine for sharpening carbide tools with a steelbonded diamond wheel is announced by Wickman Corp., 15533 Woodrow Wilson avenue, Detroit 3. Widely accepted in



England, machine is now available in United States and Canada.

Ample power for full use of a steel-

bonded diamond wheel is provided by the 1-hp spindle motor. A coolant pump is furnished as standard equipment, with a reservoir cast in the base of machine.

For convenience in sharpening both right and left-hand tools, the directdriven grinding wheel is reversed by a switch on the top of the motor. Wheel guard can be swiveled to right or left as required and clamped in position by a thumbscrew. The 8×12 in. table of the machine is quickly set at any angle from 5 degrees above horizontal to 15 degrees below.

Steel 10/7/46; Item No. 9661

Multiple Speed Grinder

Standard Electrical Tool Co., 2504 River road, Cincinnati 4, announces a multiple speed snagging grinder available in sizes for 18 to 30 in. wheels.

Illustration is of No. 30 for 30 in. diameter, 2 to 4 in. face by 12 in. bore grinding wheels. Three spindle speeds are provided so that grinding efficiency may be maintained throughout wheel life



merely by changing spindle speed as wheels reduce in diameter.

Power is transmitted to the grinding spindle through multiple V-belt drive. The adjustable sheave on grinding spindle is accessible through a hinged cover. Guards are of boiler plate steel, with adjustment to compensate for wheel wear, each fitted with adjustable spark breaker and shatter proof glass eye shield. Cut-away views are of 3-step sheave on grinding spindle and motor drive.

Steel 10/7/46; Item No. 9672

Live Center

Live center with hardened and ground interchangeable points and heavy duty, precision combination bearings which absorb both radial and thrust loads is announced by Royal Products, 68 Spring street, New York 12. Centers are lubricated with grease through the opening formed by removing the shank. They are sealed against foreign matter and cutting oils. By turning at higher speeds, these

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 148.)

what every forgings buyer should know

TUBE TURNS is a good source for forgings of this type. Forgings which require a maximum of *forged* tensile strength. Forgings which must be economically turned out in massproduction quantities. TUBE TURNS' forge shop is exceptionally well organized for this specialized work with a complete range of modern high-speed mechanical presses and upsetters, including the largest. These are closely coordinated under one roof with TUBE TURNS' own first-rate die design, die-making, laboratory, and rough machining facilities. Tube Turns (Inc.), Louisville 1, Kentucky.

District offices at New York, Washington, D. C., Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, Houston, San Francisco, Los Angeles.



INDUSTRIAL EQUIPMENT

centers allow deeper cuts to be made, and eliminate burned-out and scored center holes.

Steel 10/7/46; Item No. 9582

Die Casting Machines

Mold clamping, metal injecting, core pulling and ejecting units are all operated hydraulically in the model 400-A and 400-M die casting machines being built by Hydraulic Press Mfg. Co., Mt. Gilead, O. Straight-line hydraulic mold clamp assures accurate mold alignment, keeping scrap loss at a minimum.

Machines are capable of injecting from

over the drum and pulls the entire T-arm assembly forward on the main conveyer frame channel, thereby elevating the delivery head end.

Steel 10/7/46; Item No. 9644

Circular Cutter Bit

Fearless Tool Co., 1234 Gramercy place, Los Angeles 6, announces the production of the shearcutter boring, turning and facing tool with a precision tool holder, for use on lathes, screw machines, drill presses and boring machines. Feature of tool is circular cutter bit which is fastened to end of a holder that is



12¹/₂ to 100 cu in. of aluminum, copper or magnesium alloy per cycle in a projected area of casting including gate of 19 to 126 sq in. Horizontal by vertical mold space is 23 x 38 in. and injection pressure is up to 50,000 psi. Effective plunger stroke is 10 in.

Steel 10/7/46; Item No. 9675

Conveyor Elevator

Cable-lift device for facilitating elevation of delivery head end of Stevedore Jr. series of portable power belt conveyors is reported by Rapids-Standard Co. Inc., Grand Rapids, Mich. Adjustment of conveyors now is accomplished by turning the lifting crank handle. Improvement is designed so present users of the above conveyor may purchase the complete front cable-lift assembly for modernizing their equipment.

The cross-supporting T-arm of the standard support is fitted with a rachet pawl, a rachet and a drum. The steel, flexible cable is wound on the drum and is securely attached by a cable hook to the traveling cross T-arm. Clockwise turning of the crank winds the cable specially designed for this purpose.

Penetration angle is such that a shearing action is attained and as a result of this knife-like action, mirror-like finishes are produced. From 20 to 50 new, sharp cutting edges may be presented to work by rotating the bit, thus eliminating necessity of stopping production to resharpen cutting tool.

Steel 10/7/46; Item No. 9716

Switchboard Tachometer

Speeds as low as 1 rpm or ¼ fpm may be measured with the series of 40B tachometers which are available for continuous indicating or recording application. Manufactured by Metron Instrument Co., 432 Lincoln street, Denver 9, they are useful for measuring extrusion speeds in metal processing mills.

Device consists of a tachometer head and an indicator or recorder which may be mounted any distance from the head. While electric in nature, the tachometer is based on a new principle. Head is a simple contact-making mechanism which is connected in series with a reactance and the indicator to a voltage source so that the current flowing through the indicator is directly proportional to the speed. Operating power is obtained from



110 v 60 cycles and the calibration is unaffected by changes in line voltage. Steel 10/7/46; Item No. 9679

Magnetic Starter

Master Electric Co., 126 Davis avenue, Dayton, O., is announcing an across-theline magnetic starter with single push button feature for starting and stopping. With single control, button is pressed once and the motor starts. Pressed again, the motor stops.

Starter provides: Low voltage and overcurrent protection; solenoid construction with vertical straight line motion; long wearing silver alloy bridgetype movable contacts with each bridge



having contacts on both sides so the bridge may be removed and turned over to provide new contact surfaces; sturdy silver stationary contacts on arc resisting insulating block.

Standard voltage ratings are 115 and

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 148.)





FOR HIGH VACUUM DUTIES

In molecular distillation, and for certain electronic applications, a vacuum as high as one-tenth of one micron is not at all uncommon. That starts to get pretty close to the theoretical "perfect" in vacuum language. The problem of piping, however, is another matter for engineers, especially wherever flexible connections are needed for such purposes as coupling mechanical pumps to the system being evacuated.

American Flexible Bronze Scamless Tubing has turned out to be an excellent solution to the problem for various reasons: first, being absolutely seamless it is fully capable of holding such high vacuum; second, because it is uniformly corrugated it offers extreme "bend-ability" providing simplicity of installation; third, since it possesses such flexibility it becomes an absorber preventing transmission of pump vibration to the vacuum system. In addition, American Seamless can be assembled to withstand unusual abuse and will serve long and dependably with a minimum of maintenance. Because of its construction, American Seamless can take up slight expansion and contraction, thus making it possible to maintain pumping speed — an important consideration in pulling a vacuum.

American Seamless Flexible Metal Tubing can be supplied in many styles from the simplest unbraided flexible tube to a rugged wire braided assembly with moldedon synthetic covering such as shown above.

Where the requirements for a flexible vacuum or suction line are somewhat less exacting — such as for sucking away fumes, chips or light dry materials — American manufactures other styles of Flexible Metal Hose from practically any workable alloy and in sizes ranging from $\frac{1}{2}$ " to 12" inside diameter.

The whole story is given in our catalog, a copy of which will be sent on request. Specific information on industrial applications is given on the reverse side of this sheet.

46338



THE AMERICAN BRASS COMPANY — AMERICAN METAL HOSE BRANCH General Offices: Waterbury, Conn. Subsidiary of Anaconda Copper Mining Company In Canada: Anaconda American Brass Ltd., New Toronto, Ont.





FOR SPECIFIC INDUSTRIAL APPLICATIONS

STEAM LINES

Full-interlocked bronze for toughest steam hose requirements, sizes up to 8" I.D.; extra flexible wire-braided steam hose where extreme "bend-ability" needed, sizes to $1\frac{1}{4}$ " I.D.; seamless flexible bronze steam hose for connecting moving parts, sizes to 4" I.D.

OIL LINES

Full-interlocked galvanized steel for hot tar or asphalt, road oils, unloading fuel oil, etc., sizes up to 8" I.D.; extra-flexible wirebraided steel for high pressure grease lines; oil feed and coolant lines for machine tools; scamless for lubricating moving parts.

AIR AND GAS LINES

A complete line of flexible connectors for carrying air and gases (propane, butane, manufactured, natural, hydrogen, oxygen, acetylene and others) is available in a full range of sizes and in various alloys.

CHEMICAL LINES

Distilleries, filter press manufacturers, medical and chemical firms regularly use American for handling or transferring chemicals.

CONDUITS

A full line of conduits for covering electrical wiring on domestic appliances, machine tools, etc. can be furnished in brass, bronze, stainless, aluminum or galvanized steel.

VIBRATION ABSORBERS

Where compressor or pump vibration constitutes a serious menace to rigid piping, a short section of American Seamless absorbs the vibration, eliminates possible trouble. Likewise on Diesels, *American's* flexible exhaust hose takes up vibration, prevents shearing of bolts, cracking of castings.

MISALIGNMENT CONNECTORS

Assembling components of heavy machinery, such as sectional boilers, oftentimes can be accomplished more quickly and more economically where tappings are slightly out of line — American Seamless does the trick.

CONNECTORS FOR MOVING PARTS

Wherever moving parts of machinery must be heated with steam, cooled with water, or lubricated, no better way has been found than to convey the heating, cooling or lubricating agent through Flexible Metal Tubing.





THE AMERICAN BRASS COMPANY — AMERICAN METAL HOSE BRANCH General Offices: Waterbury, Conn. Subsidiary of Anaconda Copper Mining Company In Canada: Anaconda American Brass Ltd., New Toronto, Ont.



230 (dual voltage) for single phase, and 110, 208, 220, 440 and 250 for polyphase motors.

Steel 10/7/46; Item No. 9664

Bending Brake

Material clamping action in the Di-Arco brake No. 4, manufactured by O'Neil-Irwin Mfg. Co., 304 Eighth avenue South, Minneapolis 15, makes possible extremely sharp bends. Its double edge



vertical folding plate allows close reverse bends to be formed.

Brake has a material capacity of 16gage sheet steel and a maximum forming width of 24 in. Roller bearings increase speed and ease of operation, and adjustable material gage assures precision in all duplicated parts.

Unit will readily duplicate complicated parts in a great variety of ductile materials including such metals as copper, bronze, stainless steel, aluminum and bimetals.

Steel 10/7/46; Item No. 9681

Die Closure Safety Guard

An easily adjusted swinging die closure which affords operator protection and at the same time permits easy and safe



accessibility to dies is recent development of Junkin Safety Appliance Co., Tenth and Hill streets, Louisville: Guard is adjustable vertically and horizontally and swings out of the way. Once gate is out of position, the press cannot cperate until guard is returned to position.

Splinter proof telescoping transparent plastic front shield affords full unobstructed view of operating zone and formed individual wire side shields permit close operation to the die. Wire shields are removable. Die closures are custom built to fit the press on which it is to be used.

Steel 10/7/46; Item No. 9683

Vertical Boring Machine

Vertical boring machine for precision rough and finish boring of large cylinders up to 40 in. in length and from 6 to 8



in. in diameter is announced by Giern & Anholtt Tool Co., 1315 Mt. Elliott avenue, Detroit 7. The machine, identified as TR model, is equipped to bore cast iron, steel or nonferrous tubes employing the use of a multiple blade boring cutter.

Hydraulically operated the machine has a feed of 8 in. ID tubing of 4 ipm in roughing and 4½ to 5 ipm in finishing. Power requirements on the operation are approximately 10 hp. Coolant provisions are incorporated with the direct flow of coolant over cutter for entire depth cf cut. Fixture is of the self-equalizing type.

Steel 10/7/46; Item No. 9660

Handling Equipment

Monroe Auto Equipment Co., Monroe, Mich., is producing a line of materials handling equipment built of weight-saving high tensile steel. Included in the line are three wood and steel pallets,



two steel pallets and two wood and steel platform skids. Said to effect weight savings up 40 per cent, a platform box, offered in three sizes, also is offered. The unit illustrated above is the basic platform skid and that below is the nestling ring, both offered in two sizes. Steel 10/7/46; Item No. 9638

Peening Hammer

An air-powered model 7002, peening and scaling hammer, is being produced by Aro Equipment Corp., Bryan, O. Capable of removing scale and rust on



welded parts, it can also be used for removing sand on small castings and peening tubular rivets and other small parts.

Tool delivers 5000 blows per minute, yet will not distort light sheet metal

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 148.)

when removing scale. Overall length of the hammer head is 2½-in, and the tool is 7 in, in length. Body of tool is cast aluminum with automatic throttle valve.

Steel 10/7/46; Item No. 9671

Turntables

Whiting Corp., Harvey, Ill., introduced a turntable recently which, due to the weight being carried on a ring of 1-in. diameter ball bearings, allows the load to be turned to any position, almost without effort. The turntable top (plain, grooved, raised track, or checkered) is carried on hardened steel balls, running in a specially machined ball-race to permit wide distribution of load and easy operation.

A quick-acting, foot-operated release lock, at table top level, holds table securely in position. Top overlaps bottom casting to prevent accumulation of dirt. Standard sizes range from 42 to 96-in. diameter.

Steel 10/7/46; Item No. 9621

Grinding Wheel

DoAll Co., Minneapolis, announces a new all-purpose grinding wheel capable of grinding any kind of material, including hardened alloy tool steel, annealed steel and stainless. Wheel works equally well for heavy fast roughing cuts and fine finishing. It produces a finish comparable to that of a 300-grit wheel on all types of grinding machines.

Bond used in making these wheels is insoluble. Open structure is such that the work remains cool even when dry grinding. Wheels are available in types No. 1, (straight), No. 5 (recessed one side) and No. 7 (recessed two sides) with sizes ranging from 1 to 14 in. in diameter by ¼ to 3 in. in thickness.

Steel 10/7/46; Item No. 9718

Tool Grinder

Tool grinding machine that makes radial-helix relief grinding easier than angular back off relief grinding is announced by D-S Grinder Division of Royal Oak Tool & Machine Co., Royal Oak, Mich. Using this machine any de-



sired margin may be left on the side blades. Radial and helical relief can be produced simultaneously and can be varied to suit all practical requirements.

Cam and index plates provide for grinding any tool of 1 to 12 flutes with identical relief on each blade. Machine can be used for relieving end cutting, form, taper and side cutting tools as well as for grinding flutes or any other tool grinding operation. Tools are supported rigidly between centers or in a collet.

Steel 10/7/46; Item No. 9670

Carbide Reamers

New line of heavy duty solid shank and shell type expanding reamers, featuring full-length carbide cutting edges to permit reaming operations at high speeds, is announced by Metro Tool & Gage Co., 4240 West Peterson avenue, Chicago 30.

Reamers are designed with a low expansion angle to lessen outside diameter grinding when resharpening, and have a 1/16-in. blade overhang to increase rigidity without loss of chip clearance, permitting long reamer blade life. Reamers are available in cutting diameters of 1 to 6 in. Shell arbors are furnished with straight or Morse taper shanks.

Steel 10/7/46; Item No. 9717

Pressure Gage

Large dial size pressure gage is announced by United States Gauge Division of American Machine and Metals Inc., Sellersville, Pa. Designated as Supergauge, it is for heavy duty industrial service. Internal parts are of noncorrosive metals, and working elements are designed to withstand repeated pulsation and vibration as well as abnormally high over-pressures.

Gages are made in pressures ranging from 30 to 10,000 psi and come in $4\frac{1}{2}$, 6 and $8\frac{1}{2}$ -in. dial sizes. They are suitable for use on boilers, diesel engines, hydraulic equipment, and compressors. Steel 10/7/46; Item No. 9612

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

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9837	0661	0683	COMPANY	
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9×36	9673	9671	PRODUCTS MADE	
98:12	9644	9621		
9531	9710	9718	6 TO F FT	I FALL STILL STATE STATE
9719	9679	9870	SIREEI	
9650	9664	9717		
9674	9681	9612	OPTY I TOND	
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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.)

We are in a position to handle your order AT ONCE



WELDED - STEEL CONSTRUCTION Weldments fully stress-relieved

Mechanical Press Brakes Warco mechanical press brakes are built in capacity range from 100 to 1000 tons, to handle lengths up to 24 feet and longer. Low overall height, compactness and extra long gibways are features.



Warco Advantages: THE MOST MODERN OF WELDED-STEEL PRESSES

PROMPT DELIVERY

LHE NEW and complete line of Warco welded steel presses and press brakes is designed and built to give fabricators full advantage of the most recent improvements in press construction. Stress-relieving of all weldments helps assure unchanging rigidity, maximum accuracy, strength and endurance.

Welded steel construction makes it possible to embody special features of design for special manufacturing. The wide range of sizes provides a Warco welded steel press for virtually every type of stamping, drawing, blanking and coining requirement.

Check our prompt delivery policy today, or arrange to visit our huge plant, the most modern of its kind in the world.

SEE OUR DISPLAY ATLANTIC CITY SHOW BOOTH F125

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ECCENTRIC GEAR PRESSES - OBI PRESSES - HYDRAULIC PRESSES

Machining Stainless Steel

(Continued from Page 118)

rake angles tend to "hog in" causing the chrome-nickel grades to work-harden. To prevent rubbing, side clearance angles may have to be increased.

Here is a tip on sharpening cutting tools. The finer the cutting edge is ground and stoned, the longer the life between grinds and the better the finish on the job. It has also been found that better finishes, closer tolerances, and longer runs can generally be obtained by using standard high speed tools. On some jobs, however, tungsten carbide tools may be desirable.

The nonfree-machining stainless grades will tend to produce long, stringy chips which can be troublesome by piling up on the tool and clogging the work. By using a chip curler, this difficulty is quickly overcome. In addition to controlling long chips, a properly ground chip curler produces a lifting effect on the chip, so that there is less friction on the cutting edge of the tool. Freemachining types do not require as deep a chip breaker or curler as do the nonfree-machining types. There are no standard rules or designs regarding chip curlers. The depth of cut and feed governs the width and depth of the chip curler, because the heavier the chip the deeper the curler will have to be to break it. Proper grinding of chip control grooves is as important as grinding the tool.

One of the most widely used machine

tools is the engine lathe. It is extremely versatile and will produce an infinite variety of work economically. While it cannot compete with automatic screw machines from the standpoint of speed, it is the dependable work-horse of every shop. With ordinary precaution, problems are seldom encountered in machining stainless on this type of equipment.

Should the lathe have "play" or "looseness", the cutting tool may "ride" the work and glaze or harden the surface. It is recommended that very sharp tools be used and that they be kept cutting continuously throughout each operation. If a chip curler cannot be ground into the tool, it is advisable to have a very steep top rake. Here again, stoning the tools is essential, not only for sharpness but to get smoother finishes and longer tool life.

Parting or cut-off tools of the standard type (either flat blade or circular), are widely used and offer few, if any, problems on any stainless job. These tools are usually supplied with sufficient bevel for side clearance. They must be ground (see Figs. 7 and 8) to provide for top rake and front clearance. Circular cutoff tools are usually employed in automatics on large production screw machine jobs for small diameter work. Top rake is usually the same as for beveled blade cut-off tools. Because cut-off tools are frequently fed into drilled or threaded holes, the circular type will be more rigid and withstand proportionally greater shock than the flat blade type. If the cut-off or parting is deep,

NEW LITERATURE

VIBRATION DAMPENER BUSHING By Manhattan Rubber Division of Raybestos-Manhattan Inc., Passaic, N. J. Bulletin No. 6678 available from Abrasive Wheel Department.

TRANSMISSION BELTING

By B. F. Goodrich Co., Akron. A 4-page illustrated bulletin.

"PRECISE PRODUCTION"

By George Scherr Co. Inc., 200 Lafayette street, New York 12. Publication introduces new gage block utility set. Illustrated.

"PRODUCTION ROAD"

By Twin Disc Clutch Co., Hydraulic Division, Rockford, Ill. Publication illustrates and explains each type of drive in a variety of applications.

AMPCO METAL IN DIES By Ampco Metal Inc., 1745 South 38th street, Milwaukee 4. A 4-page bulletin— No. 58 describes and illustrates the use of aluminum bronze alloy for die service.

PRE-CAST BEARING BRONZE ON STEEL By Johnson Bronze, 508 South Mill street, New Castle, Pa. A 4-page illustrated folder.

WATER LEVEL CONTROL By Northern Equipment Co., Erie, Pa. Descriptive bulletin 451 which tells of controlling water level on hoilers which heat a city within a city at Parkchester.

BRAKES FOR CRANES, HOISTS

AND MILL MACHINES By Victor R. Browning & Co. Inc., Mentor avenue, Willoughby (Cleveland), O. An 8-page bulletin describing type "SW" electric brakes.

DRY SEAL GAS HOLDER By Stacey Brothers Gas Construction Co., Cincinnati 16. A 30-page bulletin D-46

Cincinnati 16. A 30-page bulletin D-46 covering detail and engineering data.

PLASTICS FOR LIGHT CONDITIONING By General Electric Co., Plastics Division, Pittsfield, Mass. A 12-page booklet describing uses of plastics for reflectors and shades.

TOOL CATALOG By Carboloy Co. Inc., 11155 East 8 Mile road, Detroit. Revised edition-GT-175R.

ALL-METAL RAIL CARS By The Buda Co., Harvey, Ill. A 16-page booklet describing and illustrating line of cars.

X-RAY AS A FOUNDRY CONTROL TOOL By North American Philips Co. Inc., 100 East 42nd street, New York. A 4-page booklet No. R1023 describing principles of operation. causing binding or galling of the tool, it may be necessary to grind 1° to 2° additional side clearance.

Form tools are usually of the dovetail or circular type as shown in Fig. 9. The circular form tool works to best advantage on screw machines, and is therefore preferred by many screw machine operators.

The tool designer can play an important part in the life and efficiency of form tools because the speeds and feeds of form tools are largely governed by the width of the tool in relation to the size and diameter of the bar-plus the amount of overhang and the contour or shape. The circular type, when used for deep forms, must be designed to compensate for lack of side clearance. Frequently, it is advisable to allow side clearance beyond the allowable limits of the finished piece. When this is done, a shave tool will have to be added as another operation, or if extra spindles are not available, incorporate the shaving tool with the cut-off operation. Where close tolerance and fine finish are necessary, it is decidedly advisable to use a shave tool with a light cut at a fast speed. Selection of the tool steel for this operation is important.

Good lubricants and coolants are important in machining stainless and increasing tool life. Finish can also be materially improved by directing the flow of lubricant correctly, and with enough pressure to flush away small chips. Table VIII gives possible causes for troubles arising during turning and their corrections.

Threading: Thread chasers for selfopening die heads are made of high speed steel, and the standard commercial chasers generally have a long and satisfactory life—when they are kept sharp and correctly ground for the materials they are to cut.

Maximum production and smooth finish threads are the two important requirements in thread chasing. To secure best results it is frequently necessary for the operator to adapt his setup to each particular job. If the speed is too slow and an increase of 10 per cent or 20 per cent does not cut down the tool life, this will mean that production can be greatly increased simply by changing speeds. There are times, however, when the job is set up too fast and if such is the case, reducing the speed will prolong tool life, show a gain is production and improve the quality of the work produced. See Table IX for recommended speeds.

The four principal types of chasers used for threading stainless steel are:

1. Most generally used chaser for close tolerance threads is the tangent type, Fig. 10. It is particularly adapt-
MEEHANITE ASSURES BETTER PROPERTIES!

58 TONS or ...

The 68-ton Meehanite Casting illustrated forms the bed of a stone crusher capable of reducing large pieces of rock to crushed stone. Meehanite was selected because it provides the required high strength and wear resistance. Since the casting was machined at the quarry easy machinability was required.

ARREL-BAED

In the small 2-ounce shuttle part, Meehanite manufacturing techniques provide the metallurgical control of structure and the "know how" in the other elements of foundry practice necessary to produce this casting in quantity and with the required characteristics.

Write for our new four-page bulletin "Meehanite Quality Control Assures Uniform Dependability."



Pershing Square Building, New Rochelle, N.Y.

October 7, 1946





The SUSY GOOSE Line "Toys that Mold Character"



The Kiddie Brush & Toy Company has long been associated with the finest in children's toys. A unique factor incorporated in these toys is the education-through-play feature, which duplicates "grownup" household appliances.

Sturdy . . . well built . . . they withstand the hard usage expected from "mother's little helper."

The wire handles, wheel pins and other points required to withstand strain are all made of Keystone wire.

No matter what the specifications, Keystone wire can normally supply it.

> *Kiddie Brush & Toy Co., Jonesville, Michigan

SPECIAL ANALYSIS WIRE for all industrial purposes able for heavy duty jobs such as Acme threads or long coarse threading. The tangent type chaser seems to hold the thread better on heavy-duty work and gives good chaser life between grinds. Wherever possible use a 20° throat. For National Coarse and National Fine threads, where the threads do not run into a shoulder, a 15° throat is desirable. Single Acme threads require a 12° throat angle and double Acme threads a 7° throat angle.

2. The circular type is really the universal thread chaser, as it is adaptable to all types of threads and will work equally well on tubing. This type of chaser, Fig. 11, generally works well with a 25° throat angle.

3. Insert type of chaser is widely used because it produces very good threads and at a low cost. A 20° throat angle is usually recommended for this type of chaser. This type is shown in Fig. 12.

4. The radial type of chaser has been more widely used on ordinary steels. It will produce very smooth threads, inasmuch as this type is ground to follow the shape or contour of the threaded piece. On screw machine jobs, where extremely fine threads are required on stainless parts, this type of chaser has been used successfully. Radial chasers seem to work best on average jobs with a 20° throat angle.

Throat angle or chamfer will vary slightly for each of the chasers described, according to the type of thread being cut and the grade of stainless used. In general, it is advisable to use 1½ to a 3 thread chamfer on the throat. This will usually produce a smooth, fine finish thread—and increase chaser life between grinds.

Advantage of using a long throat angle is that each tooth takes a smaller bite and consequently produces cleaner threads. An examination on one job, for example, shows that a 45° throat angle produced a chip approximately 0.018-in. thick—while a 15° throat angle produced a chip only 0.0065-in. thick.

Where the job calls for threading close to a shoulder and a long throat angle cannot be used, it may be necessary to grind only ½ or 1-thread chamfer on the chaser. If this short throat angle produces a rough thread, a smooth finish can be obtained by running the chaser over the job a second time—or the thread can be cut in two operations by first taking a rough cut and then finishing with a second cut.

Due to the many variables involved in threading stainless, our recommendations for each type of chaser must of necessity be general. For best results, each job should be set up to meet your particular

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requirements. Variables that must be taken into consideration are-

- Any one of four types of chasers may be used.
- (2) There are many types of stainless some free-machining and others nonfree-machining.
- (3) Hardness characteristics may range from soft annealed to a hardness as high as 240 Brinell.
- (4) Cutting speeds vary with the type of thread required and the amount of metal to be removed.
- (5) Consideration must be given to diameter of thread, pitch of thread, and length of throat on the chamfer being used.

General "rule-of-thumb" recommendation for cutting threads is 18 surface feet per minute. However, regardless of the type of chaser being used, speeds will vary somewhat with the type of thread being cut. Acme threads are usually cut at 12 SFM; American National Coarse threads or tapered pipe threads at 18 SFM; and National Fine threads up to 20 SFM. While these are not the maximum speeds, they are the speeds that usually give longest chaser life per grind.

Where extremely fine threads are required, it might be desirable to drop the speeds down to 5 or 10 surface feet per minute. Also, when cutting fine threads, an advantage will be found in cutting back the heavy sulphurized oil with paraffin oil—generally one part sulphurized oil to five parts paraffin.

The importance of checking cutting oil can not be overemphasized. It should be properly blended or cut back for the particular job on hand. Oil must be kept clean and free of chips. If fine chips float in the oil and get into the chaser, they will ruin the threads. Refer to Table X for the "must" conditions necessary for satisfactory threading.

Milling: The principle of milling is exactly opposite to that of lathe turning or screw machine work. That is, milling machines cut the metal by feeding it into a revolving cutting tool rather than revolving the metal against the tool. Speeds for milling are very nearly equal to those for turning. Roughly, a good starting point for milling stainless is 10 to 15 per cent slower than speeds for the nearest equivalent in ordinary steels. Recommended speeds are shown in Table XI.

Since feed will vary with different types and designs of cutters, it is not practical to make specific recommendations. As a guide—if the cut is too light, the tool will burnish the work and the cut should be increased; if the cut is too heavy, tool life is shortened and

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a lighter cut should be taken. Depth of cut and speed of feed are also regulated by the type of machine tool being used. On the regular milling machines, cuts can usually be increased to the maximum power of the machine.

As a general rule, smoothest finishes are obtained with helical or spiral tooth cutters running at high speed. They cut with a shearing action and as a result cut more freely, and with less chatter than the straight tooth types. And the coarser the teeth, the better. Coarse tooth cutters work under less stress and permit higher speeds than fine tooth cutters. They reduce cutting pressure and the fact that there is more space between the teeth is added help in clearing away the chips.

Heavy cuts must run slower than light cuts since they generate more heat. For example, a roughing cut would be run with heavier feeds and slower speeds than those used for the lighter finishing cuts. But no matter what the operation, both work and tool must be flooded with a good sulphurized base oil properly cut back with paraffin base oil. Milling generates considerable heat which must be carried off by the lubricant or the work will distort and the tool edges will dull or chip rapidly.

Once a milling cut has been started, don't stop unless it is absolutely necessary. The tool will undercut when starting up again. When it is necessary to "back out," go two or three turns behind the work before starting up again. This eliminates the danger of "back lash" and guards against undercutting.

Action of milling cutters is intermittent. Each tooth is starting with a zero chip thickness and ends with maximum cut. Therefore, sufficient clearance behind the cutting edge of every tooth is necessary to avoid a rubbing or burnishing action. "Hogging-in" and excess vibration generally indicate too much rake or not enough clearance and possibly too high a cutting speed. Use short stubby arbors with large diameters wherever possible. Rigidity improves the job.

Fig. 13 shows rake angle, width of land, as well as primary and secondary clearance. This is standard procedure for regrinding milling cutters for staiuless steel jobs and gives sufficient clearance and strength. On cutters up to 4 in. diameter, use the maximum clearance shown in sketch, remembering that small cutters take a greater clearance angle than large cutters.

When using plain milling cutters (cylindrical shape), with teeth on outer surface only, it is advisable to go to a helical too!h cutter on mills over 34-in. wide. Helical teeth cut with a shearing action and not only lessen chatter bu:

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give a finer Anish. Under 3/4-in. wide, cutters with straight teeth are satisfactory.

Straddle or side mill cutters have cutting teeth on each side, as well as on the circumference or periphery. Such cutters will mill on both sides of a part or mill shallow slots. For milling shoulders it is common to use half side cutters that have teeth only on one side and on the circumference.

Milling deep slots in stainless steel sometimes presents the problems of chatter, binding and jamming of wide chips. These difficulties can be eliminated by using a staggered tooth cutter. Its alternating teeth cut only one-half of the slot, thereby taking a smaller bite and producing a shorter chip.

For end milling stainless, the solid shank end mill is to be preferred because of its high strength. Angular, gear tooth, convex and concave cutters are being used on stainless by many producers of stainless parts.

Milling is a very satisfactory method for machining stainless steels if these few recommendations are heeded. Faster cuts and better finishes result if a rigid fixture can be securely bolted to the table. Means for locating the piece accurately and the use of an easily operated clamping device are desirable.

Just one final word of caution. In milling one must be a good "housekeeper," because cleanliness is important. A chip or speck of dirt between the spindle and arbor end or between the cutter and the arbor can cause the cutter to run several thousandths out-of-true. Chip; or dirt in "T" slots can cause the fixture or clamping blocks to be out of alignment and so force the resulting cut outof-square. Table XII lists possible milling troubles and their remedies.

(Continued next week)

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Removing Dissolved Gases

(Continued from Page 111)

to give the proper chracteristics to the two types of metal and the end result is considerable porosity in both rimmed steel and tough pitch copper. In steel this can be seen by eye in any cross section. The porosity in copper is finely disseminated at the grain boundaries, and can be detected only under high magnification.

Until about two years ago, the practical control of dissolved gas in melting and casting was confined to five general methods. It should be emphasized that the methods given below assume good melting and casting practice and are used only when it is not possible to eliminate hydrogen pickup by the usual operating controls.

Freezing the Metal

The first method is to freeze the metal -usually as slowly as possible-then remelt rapidly and cast. By doing this, much of the hydrogen that was originally dissolved in the molten metal escapes during solidification. This method has been used on special work before better methods were known. Recalling again the hydrogen-temperature solubility curves, it is obvious that greatest absorption takes place at temperatures well above the melting point. Gas solution takes finite time, so any extended refining at superheat will increase the hydrogen content. This process, then, takes advantage of the lower gas content of the solid metal in providing a relatively gas-free charge which is remelted and cast as rapidly as possible to minimize the chance of additional hydrogen pickup. The obvious disadvantages are its slowness and cost.

The second method of controlling gas is by small alloy additions. Two types of alloys are used: The first is one that will form a stable chemical compound with the dissolved gas so that the gas will be removed as a compound in the slag, or will be finely disseminated as a solid compound in the casting. Unfortunately, a rather active metal must be used to combine with hydrogen, and in many instances, the remaining hydride compound will adversely affect the physical properties of the cast metal. The second type of alloy is one which prevents a chemical reaction from taking place. Alloys of this type are aluminum and silicon for killing steels. They combine with the oxygen and remove it to the slag so that the iron carbide-iron oxide reaction cannot take place. There are numerous copper alloys which give the same effect with copper, (i.e., remove the oxygen from the cuprous oxide). Phosphorous copper is used commercial-

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ly. Lithium, sodium, barium and boron have also been tried. The disadvantage of most such alloy additions is that a small residual is left which affects both the electrical and heat conductivity of the metal.

The third method for removing dissolved gases is by the use of solid fluxes. This method has been used in the aluminum industry, although it is rapidly being supplanted by the flushing process. Briefly, it consists of stirring aluminum chloride into the molten aluminum where it decomposes into aluminum oxide and chlorine gas. It is the evolution of the gas which removes the dissolved hydrogen. Originally, it was thought that a chemical reaction between the chlorine and hydrogen was the basis of this mechanism, but that theory has since been proved false. Solid fluxes are all hygroscopic and it is difficult to maintain them free from water. If flux contains much moisture its use is just as liable to increase porosity as it is to prevent it

Melting Under Vacuum

Since the solubility of hydrogen in molten metals decreases as the hydrogen pressure over the metal decreases, various systems of melting under vacuum have been evolved. This method requires considerable costly equipment, and is suitable only for melts of relatively small size.

However, another way of reducing the pressure of hydrogen over molten metal is to keep a hydrogen-free gas over the metal all during the refining and casting process In short: "air condition" the furnace. This method of using a controlled atmosphere requires either a fuelfired muffle furnace or an electric furnace as well as completely hooded ladles, launders and molds. It has commercial application for producing oxygenfree, high-conductivity copper.

The foregoing methods for insuring sound castings free from hydrogen porosity involve either costly freezing and remelting, expensive or obnoxious fluxes, or specially designed equipment, the expense of which can be justified only when some definite improvement of physical properties is obtained.

(To be continued)

REFERENCES

(1) Ellis, O. W., A review of work on Gases Copper, Transactions, A.I.M.E., vol. 106, in Copper,

and copper, Iransactions, A.I.N.E., Vol. 100, p. 487, 1933.
(2) Smithells, C. J., Gases in Metals, John Wiley & Sons, Inc., N. Y., 1937.
(3) Zapffe and Sims, Hydrogen and Nitro-Costings.

gen as Causes of Gassiness in Ferrous Castings, Transactions, A.F.A., vol. 51, p. 517, 1944. (4) Hare, Pederson and Soler, An Improved

Method for Determining Gas Content of Molten Steel, Transactions, ASM, vol. 25, p. 889.

(5) Hatfield and Newell, Determination of Hydrogen in Liquid Steel, Journal of Iron and Steel Institute (London), vol. II, 1943.



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Brass Die Casting

(Continued from Page 114)

pressure of 40 tons. The controls are such that metal injection can only be performed upon full closing of the die. A pressure intensifier, acting during the injection, renders any splash of metal impossible.

A three tie rod arrangement gives full visibility and accessibility of the die setup, leaving ample space for attaching hydraulic core pullers, which receive their pressure through the automatic valve. The valve performs the injection in two steps: At slow speed in the beginning to bring the metal into the die and with a rapid booster movement of the injection plunger at the end of the injection, thus delivering a powerful squeeze and producing pore-exempt castings.

All brass die casting machines are of the cold chamber type. Metal is ladled into the injector cylinder from which it is immediately forced into the die by a hydraulic ram. In Titan's Polak machines, the injector cylinder is vertical and separate from the die. With this type, there is a slug left in the chamber at the end of injection. This slug is sheared off the sprue by a second ram, spring-actuated and operating from below, before the sprue and gate of castings can be ejected from the die.

Slug Returned to Metal Pot

In this shop, the slug so sheared off is returned by the operator directly to the metal pot from which the charge is ladled. Formerly the slugs were sent, after cooling, to melting furnaces that supply the holding furnaces at the machine. At times, scrapped gates of castings may also be remelted in the holding furnaces.

Supplies of molten metal are brought, usually, from Ajax electric furnaces, in an adjacent melting room, in graphite ladles. This metal is above casting temperature and is allowed to cool to about 1550 or 1500° F in the furnace at the machine. Cooling is effected partly by radiation and partly by adding slugs and scrapped gates of castings. The holding furnaces, however, have resistance type electric heating elements that are under automatic thermostatic control and these make up for any excessive radiation losses. Furnaces are well insulated, preventing heat fatigue of operator. The metal is kept in a holding furnace in semiliquid state for the Polak as well as for the Hydropress machines. For the Lester machine, the metal is kept in fully molten condition.

In the Lester machine, the hydraulic ram is horizontal and the cold chamber is charged from a ladle through a top

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port. With this arrangement, the injection ram continues into the die and the slug left at the end of its stroke remains on the gate of castings when it is ejected. No slugs or gates of rejects are returned to the holding furnace at the Lester machine but are remelted along with new metal at the supply furnaces.

Two Ajax 900 lb furnaces normally keep all the die casting machines supplied with metal but, when starting cold or when certain machines must be provided with a different alloy than the other machines are using, a separate oil fired furnace is used. A special carriage is used to shift ladles holding about 500 lb of molten metal to machine furnaces. There, the ladle is raised by a hoist and is tilted by hand to fill these furnaces.

Yellow Brass for Castings

Yellow brass is employed for the largest proportion of brass die castings, largely because it costs less than other alloys. Also, it can be made from secondary metal, is easy to machine and polish and has satisfactory properties for many purposes, although not so strong or so high in corrosion resistance as some other alloys listed in the table. Most of the other alloys die cast are special-purpose types.

Although some alloys have tensile strength of 85,000 psi and yield strength up to 65,000 psi, they are harder to machine than yellow brass. Alloys high in nickel also have high corrosion resistance and a yellowish silver color desirable for some purposes. These nickel-silvers, so called, take a high polish that is quite resistant to tarnishing and are light enough in color to be used in place of nickel plated parts. Tombasil has high strength and a lower melting point than most brass die casting alloys. This renders its use somewhat more favorable in respect to die life, but the silicon content introduced to give greater fluidity and flow of the metal, makes machining considerably harder than for yellow brass.

Accompanying illustrations afford a good idea as to the types of brass die castings produced and some show portions of the dies used. Although sections as thin as 0.040-in, or less have been cast when not of too large an area, the preferred minimum thickness is 0.070-in. This is much below the minimum thickness for brass forgings and shapes considerably more complex than can be forged are feasible in die castings.

Cores are often employed and those that are quite long, as well as those that must be placed at odd angles are often feasible, although both types usually increase both initial die cost and die maintenance charges. Cores should have ample draft and, when quite long, are Strate of the strate of

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likely to require some special core pulling attachment which sometimes is operated by air or hydraulic means.

It is feasible to use inserts of steel or of nonferrous materials but they take time to place in the hot die and, to this extent, increase the time of the casting cycle and correspondingly reduce the output per machine. In general, casting rates range from 100 to 200 cycles an hour, once the die is warmed and ready to run, but, for some castings of large size or where delaying factors arise, rates below 100 an hour may result. Where multiple-cavity dies are used, however, the number of castings per hour is correspondingly multiplied.

All the Polak machines are equipped with Vickers pumps that deliver a pressure of 2000 psi to a gas loaded accumulator but injection pressures range from about 6000 psi on the smaller Polak machines to about twice this on larger machines. On the Lester machine, the pump applies 1000 psi pressure to the piston cperating the injection ram until the resistance encountered counterbalances this pressure. Then the pressure is automatically doubled and pressure of 33,000 psi is applied on the metal as it chills in the die.

High Pressure Applied

This latter arrangement requiring a fairly slow initial injection rate with minimum turbulance provides an opportunity for escape of air gases from the die, results in castings having less porosity. Application of the final high pressure in an instantaneous manner is to insure denser castings by offsetting shrinkage voids and minimizing in volume, any entrapped air or gases present. Both machines produce good castings but no claim for complete freedom from all porosity is made. Where absolute elimination of all porosity is essential, Titan advocates brass forgings rather than castings.

Although a high grade heat-resistant hot-worked die steel is used, most dies show noticeable checking after producing about 5000 castings. Thereafter, checking increases and rougher castings result. The fine cracks in the die surface cause corresponding raised vains or crazing on the castings. These do not adversely affect the strength of the casting but appearance is less satisfactory. In many cases, this is of no consequence, especially on surfaces that are to be machined.

Customers are informed of this tendency toward rougher castings and, when more than 5000 castings are required, are supplied with samples of similar castings to show how surfaces may be expected to appear (if dies are not renewed) after 5000, 10,000 and 15,000 die fillings. This enables the purchaser to determine what, if any, effect continued use of the



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FOR "MATERIAL HANDLING NEWS."



die may have, on appearance and perhaps on dimensions. The practice avoids misunderstandings and possible rejections, say for dimensional changes, that may occur otherwise.

All dies require somewhat frequent surface redressing to remove the zinc oxide that tends to build up on surfaces. In general, however, heat checks cannot be removed by redressing as they penetrate too deeply into the steel.

Since core pins come into direct contact with the molten or semimolten brass over most of their entire exposed surface and there is less chance for the heat to be conducted away than from cavity walls, cores often operate continuously at red heat. This results in relatively rapid core deterioration and pecessitates somewhat frequent core renewal. The cost of this is estimated and is commonly added to the price per casting. On the other hand, cores save much metal besides helping to keep wall thickness more nearly uniform and reducing machine work on castings, hence cores commonly effect a net saving over the same casting made without coring.

Flash Removed by Shearing Die

As with other types of die castings, flash is produced at die partings, around movable cores and where slides join the die cavity. This flash, or a large part of it, is commonly removed by a shearing or shaving die though in some cases other machining is necessary for removing flash. For machine work other than flash removal or simple drilling or tapping, carbide tools are usually advocated although other tools can be used. A coolant generally is employed in machining.

When specifications call for a bright finish, die castings usually are pickled in concentrated nitric acid and then thoroughly rinsed. If the castings are greasy, cleaning in an orthosilicate solution precedes the pickling. A bright surfrce, besides improving appearance, also facilitates inspection, as flaws are more easily detected.

In general, brass die castings cost more than those from alloys of lower melting point; first, because the alloys used generally weigh more and cost more per pound; second, because both die and die maintenance costs are higher; and third, because production involves more difficulties and the rates of production are usually lower. Despite these handicaps however, the die casting of brass has grown considerably and, today, the total output of all plants making such castings totals approximately 2000 tons a year. Still further growth is anticipated and is likely to be accelerated greatly when and if steels affording longer die life become available.



MORGAN "36" TWO-HIGH BLOOMING MILL

Above is shown a Morgan 36" Two-High Blooming Mill on erecting floor. Housings are one piece steel castings of the closed top type. Top roll balance is of the counterweight type. Top roll lift sufficient for rolling 42" wide slabs. Manipulator is of the overhead type, compact and accessible. Tables are of heavy design, equipped with anti-friction bearings.



With this Mill was furnished Auxiliary Equipment as follows — Front and Rear Tables with Manipulator — Approach Table — Ingot Buggy — Runout Tables — Slab Shear with Gauge — Crop Hoist — Pushers — Conveyor — Skid Bed and Furnace Tables.

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Perhaps you should be using Strenes Metal dies. Send in your drawings for study and estimates.



Dayton 3, Ohio



Hot Dip Galvanizing

(Continued from Page 137) sets using Brom Cresol Green for plant control purposes.

In explanation, assume the use of a 16°Be flux wash with a pH of 4.09. If there is no dragover of pickling acid into the flux wash the tendency is for the pH value to become higher, that is, less acid, and it may go above a pII of 5. If, on the other hand, the pII value falls to lower values than that of the new unused flux wash, then it is a safe assumption that pickling acid is being dragged over to contaminate the flux wash and the work being dipped into it. Such a situation should be investigated immediately and be stopped for the sake of quality and economy.

The iron in solution in flux washes of proper pH value seems easy to maintain between 0.10 and 0.3-oz/gal (0.75 and 2.25 g/liter). If, with time, it does increase to values approaching 0.75 oz/gal (5.625 g/liter) a purification may be made by adding ammonium hydroxide to bring the flux wash to a pH of approximately 5.75 and then add hydrogen peroxide slowly to facilitate the precipitation of the iron as a hydrate. Attention to the adequacy of the rinsing after pickling will keep the matter of iron removal as described to a point of minor consideration.

Flux Base Useful

Use of a flux base such as zinc ammonium chloride, to which has been added a suitable frothing agent, serves several useful purposes in a flux wash and on the zinc kettle. Care at this step of the process⁽⁶⁾ yields a flux wash com-posed of zinc ammonium chloride in water which has a reduced surface tension and an increased viscosity. This wash assumes better wetting of the surface of the work, gives a flux film of better protecting characteristics, and is more economical. Since such a film contains some fairly stable colloids, it fuses to a light froth when the work enters the molten zinc. This froth leaves the work quickly and cleanly with the result that less flux is carried over to contaminate the finished work. This condition is especially noticeable on work having more or less inaccessible inner surface, such as pipe.

A zinc ammonium chloride flux wash may be used either hot or cold. Where possible hot flux washes are preferred because excess moisture evaporates rapidly from the flux film on the dipped work and because, under certain circumstances, smoother, more adherent zinc



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⁽⁸⁾ U. S. patents 1,965,759 and 1,965,760, July 10, 1934, A. T. Baldwin, assigned to W. H. Spowers Jr., later assigned to Hanson-Van Winkle-Munning Co.

coatings are formed. Care should be taken to avoid overheating dilute flux washes and too long exposure of the flux treated work in air because these flux films have less rust retarding value. Zinc ammonium chloride flux washes containing 4 lb or more of the salt per gallon of water when heated to the boiling point produce flux films which dry quickly and provide adequate rust retardation.

Many types of work such as castings, pipe, etc., are benefited by allowing them to remain in such hot concentrated flux washes for several minutes, especially if the temperature is 50°C (122°F) or higher. Ilydrogen absorbed by the iron or steel in pickling is forced out rapidly in hot flux washes resulting in smoother, more adherent coatings. Temperature of the flux wash and time of immersion have to be adapted to shop conditions.

Uniformity Aids Production

Use of zinc ammonium chloride crystals already mixed with a suitable frothing agent has many advantages over the plain zine ammonium chloride. Uniformity of the fused flux froth not only aids in production speed but also in the proper fluxing action at all times on all surfaces of the work. A flux froth of the proper height for preheating the entering work, for leaving the entering work quickly and cleanly and for most effective chemical action, is maintained most economically this way. Experience indicates that such flux mixtures are from 15 to 20 per cent more effective than zinc ammonium chloride alone. New fluxes are built in the same manner as with sal ammoniac and additions are made in the same manner as required. Annoyance from fumes is reduced appreciably, thereby affording better working conditions.

The consistency of the fused flux is controlled largely by the frequency of fresh additions of flux crystals. The amount of flux being supplied as the film on the entering work also contributes to this control. The constant supply of an appreciable part of the total flux required in the form of this flux film tends to maintain the fusion in a more active state so that there is no difficulty in maintaining a suitable froth. The only time this condition is not maintained so readily in galvanizing is when the operation is irregular and intermittent; in this event the destructive effect of heat on the idle flux froth causes premature exhaustion. So far no flux has been developed that survives such treatment.

Selection of the proper strength of zinc ammonium chloride flux wash is influenced not only by the type of work being done but also by the handling operation, such as batch sizes and the time of exposure in air. The wash also should be at the highest concentration these fac-

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tors will permit in order to allow the flux film to supply the largest proportion possible of the total flux requirements. This leads to economy in flux use. The actions of the men at the kettles are difficult to control; the natural tendency of the operators seems to be wasteful in the use of flux crystals. Detail differences in galvanizing the same products in different plants lead to rather wide differences in the strength of flux wash required and the total flux used.

Broadly speaking, wire calls for flux washes from 5 to 12°Be either hot or cold; fabricated wire products about 15 degrees; castings and fittings, 10 to 15 degrees; drums, barrels and boilers, 12 to 17 degrees; sheets, 10 to 15 degrees; pipe, 18 to 22 degrees; and, heavy castings and tanks, 20 to 25°Be. These figures are for hydrometer readings at room temperatures. As previously indicated, whether or not the zinc ammonium chloride flux wash must be heated depends on local conditions; it may be heated up to 212° F without loss of anything except water.

Some few operations are carried out most satisfactorily by heating the work *after* it leaves the flux wash and this, if done in closed ovens away from the air, may be carried out safely to temperatures above the fusion point of the flux. The flux film on the entering work may provide all the flux required or as little as 25 per cent of the total depending on the product and how it is handled.

Advantages of Zinc Ammonium Chloride

Generally speaking, the total amount of a zinc ammonium chloride flux used seldom exceeds the amount of sal ammoniac used for the same work by the hydrochloric acid-sal ammoniac system. When galvanizers change from the old method to zinc ammonium chloride, experience leads to use of a smaller amount of zinc ammonium chloride flux.

Products galvanized with the use of a zinc ammonium chloride flux carried out with the due regard for the important operating features have smooth, adherent, ductile zinc coats. Products galvanized this way form more readily, with little or no cracking of the coats. While a rather severe test, exposure to a sand blast of products galvanized this way shows a pounding and flattening effect rather than the typical shattering of coats put on by the use of hydrochloric acid and sal ammoniac. Tempered steel is readily galvanized by the zinc ammonium chloride flux method without loss of temper. The replacement of the hydrochloric acid-sal ammoniac method by a zinc ammonium chloride flux wash and kettle flux does not require expensive additional equipment.

The galvanizer's choice of a flux and fluxing system will be influenced largely by the extent of his desire to produce high-quality work at a minimum cost. The direction galvanizing must follow to accomplish this and the use of a properly prepared zinc ammonium chloride flux wash and kettle flux have been discussed in the foregoing text. While to many with long experience in galvanizing, these suggestions may seem of doubtful practicability, in fact, they are all now well tried and proved and are giving satisfactory results.

The change required in most shops to take advantage of the merits of zinc ammonium chloride is more of the nature of a change of point of view of the operator than of extensive and expensive changes in equipment and operating details. Modern demands for quality in galvanizing have moved so far forward that the old method of finishing the pickling in the fused flux itself is no longer adequate.

(To be continued)

Paper Covers Incentives on Repair Welding Castings

Analysis and practical solution of problems encountered in trying to determine a fair incentive for repair welding steel castings is the subject of a short paper published recently by Harnischfeger Corp., Milwaukee.

According to the paper, three variables which must first be ascertained are: (1) Arc minutes, (2) number of castings welded, (3) weight of castings. While the second and third variables are relatively easy to ascertain the first can be measured and recorded accurately by Harnischfeger's electric arc timer. The accumulated arc time for one welding operator for one shift is obtained by individual readings of each clock. A centralized recording system can be used for mass production welding control.

The arc timer is designed to register only when the machine is welding. It does not register when machine is idling or when there is a short circuit condition such as laying holder on work. System works on two distinctly different hook-ups; one involves a current and voltage relay while the other uses two voltage relays.

Ball Bushing Booklet

Operating principles and features are explained and 20 advantages obtained are listed in the booklet on ball bushings for linear motions recently issued by Thomson Industries Inc., Long Island City, N. Y. Listed are 17 sizes ranging from a ¼-in. shaft to one of 4 in. Standard dimensions, installation data and load ratings are covered along with special designs and fields of applications.

Peak Voltmeter to Study Amplitude Stability

A suppressed-range type recording peak voltmeter designed to study the short and long time amplitude stability of a 1000-cycle power supply was recently developed by Philips Laboratories Inc., Irvington-on-Hudson, N. Y.

Minimum detectable voltage change is 10^{-3} volt, so that with an input of 10 v rms average amplitude fluctuations of 0.01 per cent can be recorded.

Voltmeter compares positive peaks of alternating voltage to be studied, with a series of dry cells used as reference voltage. Comparison is made by applying reference voltage along with alternating voltage to grid of vacuum tube. Tube is biased past cut-off by reference voltage; plate current flows only when positive peaks of alternating voltage exceed reference voltage.

Sound Slide Film Covers Controller Problems

A 35 mm sound slide film showing methods of handling pressure and temperature control problems may be obtained from Leslie Co., Lyndhurst, N. J. Following the steam system of an industrial plant from the high pressure steam at the boiler through the power generating equipment, processing machinery, boiler auxiliaries, heating and low pressure steam systems, the 20 min film covers applications and installations of a variety of regulators and controllers.

According to the company, the film analyzes which type of regulator is best for a given purpose after reviewing general applications.

Legal Aspects of Contracts In Construction Industry

Legal Phases of Construction Contracts, by I. Vernon Werbin; simulated leather, 267 pages, 5¼ x 8¼ inches; published by McGraw-Hill Book Co. Inc., New York, for \$2.75.

Both legal and engineering problems arise in construction contracts, the latter being easily solved by the experienced contractor, engineer or architect, while the former present much difficulty. This volume treats the matter practically so that it will be understood readily by contractors, owners, engineers and architects, as well as by technically trained attorneys. The text is based on actual cases decided by courts. The material facts and contract provisions are set forth, as well as quotations from the court's opinions so that the reader is given a general understanding of the fundamental principles of law involved in the decisions.

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The Business Trend

Gain Registered in Rate Of Industrial Production

INCREASED OUTPUT of automobiles pushed STEEL's industrial production index up 2 points in the week ended Sept. 28, making the index register 153 per cent (preliminary) of the 1936-1939 average of 100.

Little change occurred in the rates of steel ingot production, electric power output, and railroad car loadings. all of them continuing at high levels.

At 153 per cent, STEEL's index is only 1 point below the postwar record of 154 per cent set in the week ended Sept. 14.

CAR LOADINCS—Freight car loadings in the fourth quarter of 1946 are expected to be 9.8 per cent above those in the corresponding period of 1945, according to the Association of American Railroads. This increase would put loadings at 7,599,575 cars for the quarter, compared with 6,924,123 actual car loadings in the corresponding period of last year. Among commodities expected to show increases are: Iron and steel, 3.3 per cent; other metals, 3 per cent; automobiles and trucks, 138.5 per cent; agricultural implements and vehicles other than automobiles, 45.1 per cent; machinery and boilers, 11.2 per cent; and coal and coke 15.1 per cent.

NEW BUSINESSES—Volume of new businesses incorporated in July slightly exceeded that for June, a 47-state tabulation by Dun & Bradstreet Inc. shows. Totaling 11,867 (partly estimated), the July figure increased by 573, or 5.1 per cent over the June incorporations, and exceeded by 7694 the number of charters issued in July, 1945. During the first seven months of 1946, 82,836 stock company formations were recorded, representing a monthly average of 11,834. This substantially exceeded the average of 5963 per month during the last six months of 1945.

COAL—Production of bituminous coal declined in the week ended Sept. 21, compared with the preceding week, but at 12,330,000 tons still was at a high level. This continued high rate of output helped raise the 1946 production to within 51,230,000 tons, or 12 per cent, of the production in the corresponding period of last year.

PRICES—Wholesale prices advanced 1.7 per cent during the week ended Sept. 21 following the declines of the previous three weeks, the U. S. Bureau of Labor Statistics reported. There were increases in most major commodity groups. The Bureau's index for the week ended Sept. 21 registered 123.8 per cent of the 1926 average of 100. The latest index figure is 3.6 per cent below the peak level of four weeks ago.

MANPOWER—Continued increases in demand for manpower are expected in more than three-fourths of the 94 important labor market areas surveyed by the U. S. Employment Service. While manpower shortages still are severe in many sections of the country they are most acute in the building and metalworking industries. The agencies said increases in nonagricultural employment were reported in 72 per cent of the 94 areas early in September.



THE BUSINESS TREND



FINANCE	Period°	Weck	Ago	Ago	a the second
Bank Clearings (Dun & Bradstreet—millions)	\$12.425	\$14,001	\$11,074	\$11,553	
Federal Gross Debt (billions)	\$205.6	\$265.5	\$207.8	\$262.5	
Bond Volume, NYSE (millions)	\$35.4	\$38.8	\$20.7	\$33.1	
Stocks Sales, NYSE (thousands)	8.422	10,088	6,875	6,505	
Loans and Investments (hillions)†	\$39.4	\$59.2	\$60.0	\$61.6	
United States Gov't, Obligations Held (millions)†	\$40,525	\$40,595	\$41,571	\$45,473	
PRICES STEEL's composite finished steel price average All Commoditiest Industrial Raw Materialst Manufactured Productst † Bureau of Labor Statistics Index, 1926 = 100.	\$64.45 123.8 142.5 117.1	\$04.45 121.7 138.4 115.9	\$64.45 128.4 144.9 123.6	\$58.27 104.9 115.5 101.8	



A fighting spirit . . . constantly warring against imperfections . . . has been an important contribution to Worth success. Even though this effort may seem strenuous at times, the final, telling results are satisfying, because Worth steel has the qualities that count, when a product is put to actual test . . . uniformity, quality and finished excellence. Steel Plate up to 150" wide; Flanged and Dished Heads from 9-1/2" to 216" O.D.; in thickness from 3/16" to 4".



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Market Summary

Mills Enter Last Quarter With Order Books Bulging

Uncertain extent of preferred tonnage makes scheduling difficult . . . Production held high in spite of raw material shortages

STEEL producers are making some headway on their arrearages, as compared with three months ago but as they enter the final quarter they still have a substantial volume of tonnage on order promised for delivery by this time, but unshipped. What further progress can be made in the remaining three months of this year depends in no small measure on ability to maintain a high rate of production and, as applied especially to sheets and strip upon their burden of rated orders.

Shortages of scrap, pig iron and coke remain a threat to high production, with an unstable and generally unsatisfactory labor situation, with manpower difficulties outside as well as inside the steel industry leaving their mark. However, despite these handicaps steel operations are hovering about a peacetime peak, still not as high as they could go, and it is possible they may at least be maintained.

The full extent of rated tonnage should be fairly accurately gaged soon, but at the moment sellers of some products still are not able to estimate this volume and this, with the uncertain outlook with respect to fourth quarter production, is causing delay in various quarters in opening of books for first quarter of next year. There is little doubt, however, that when action is taken it will be found that capacity in that period in some products will be well absorbed, because of heavy carryovers and other miscellaneous commitments.

This should be particularly the case in sheets, hot strip and smaller sizes of hot carbon bars, such as are rolled on eight and ten-inch mills, and in light shapes. On some other products, such as plates, boiler and mechanical tubing and rail accessories, books of some producers already are far extended into next year, not only because



Percentage of Ingot Capacity Engaged in Leading Districts							
	Wcek						
	Ended Oct. 5	Change	Same 1945	Week 1944			
Pittsburgh	98	+ 2	74.5	92			
Chicago	91	+ 0.5	91.5	99.5			
Eastern Pa,	. 81	None	76	93.5			
Youngstown	90	None	76	87			
Wheeling	86	- 7.5	88	92			
Cleveland	91	None	82	92.5			
Buffalo	. 90.5	None	86	86			
Birmingham	99	None	95	95			
New England .	92	- 3	82	89			
Cincinnati	78	6	77	87			
St. Louis	72.5	None	68	75			
Detroit	84	+ 3	84	89			
Estimated nation	al						
rate	90.5	None	82	95.5			
				4.57			

of arrearages almost certain to carry over, but also because of orders they have been accepting freely from regular customers. With books now opened by some producers on cold-drawn carbon bars, hot and cold alloy bars, stainless sheets and cold narrow strip first quarter capacity on these items should be fairly well absorbed by the end of the year. Hot alloy bars may be an exception, as they have been lagging behind most other products, shipments now being possible for November.

Decontrol of steel prices is reported under discussion by OPA. While the whole range of products is being considered there is little likelihood of decontrol being effected soon on such tight supply items as sheets and strip. Meanwhile, the steel industry has not yet formally filed with OPA a request for an increase in ceiling prices. Delivered prices on steel products at various points have been increased as the result of a ruling of OPA permitting passing on to consumers of higher freight rates which went into effect last July.

With the opening of fourth quarter the emergency priority CC rating has been reinstated. This was suspended last January when the steel strike broke out. Producers have been accepting these rated orders for fourth quarter delivery for some weeks. They are especially heavy in cold-rolled sheets and strip, galvanized and enameling sheets.

Steelworks operations last week maintained the rate of the preceding week, 90½ per cent of capacity, changes in schedules being few and small. Chicago gained ½-point to 91 per cent, Pittsburgh 2 points to 98 from a revised rate of 96 for the prior week and Detroit 3 points to 84 per cent. Wheeling lost 7½ points to 86, Cincinnati 6 points to 78 and New England 3 points to 92. Other rates were unchanged, as follows: St. Louis 72½, Youngstown 90, Birmingham 99, Buffalo 90½, Cleveland 91, eastern Pennsylvania 81 and West Coast 84.

Scrap supply continues low in spite of government assurance that prices will not be advanced, little tonnage coming out. Some improvement has been seen in cast scrap on which a price advance was granted.

- MARKET PRICES -

COMPOSITE MARKET AVERAGES

	Oct. 5	Sept. 28	Sept. 21	One Month Ago Sept., 1946	Three Months Ago July, 1946	One Year Ago Oct., 1945	Five Years Ago Oct., 1941
Finished Steel	\$64.45	\$64.45	\$64.45	\$64.45	\$64.45	\$58.27	\$56.73
Semifinished Steel	40.60	40.60	40.60	40.60	40.60	37.80	36.00
Steelmaking Pig Iron	27.50	27.50	27.50	27.50	27.50	24.19	28.00
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	19.17

Firished Steel Composite:---Average of industry-wide prices on sheets, strips, bars, plates shapes, wire, nails, tin plate, standard and line pipe Semifinished Steel Composite:---Average of industry-wide prices on billets, slabs, sheet bars skelp and wire rods Steelraking Fig Iron Composite; Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo Chicaro, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:---Average of No. 1 heavy melting steel plices at Pittsburgh, Chilago and eastern Fennsylvania. Finished steel, net tons; others, gross tons Steelworks Scrap

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Ph1 . F

Finished material (except tin plate) and wire rods, cents p.r lb; coke, dollars per net ton; others, dollars per gross ton.

Eintshad Madautat

Timanee Material					Fig IIOn			
Steel bars, Pit'sburgh Steel bars, Philadelphia Steul bars, Chicago Shapes, Philadelphia Shapes, Philadelphia Shapes, Chicago Plates, Pi tshurgh Plates, Chicago Shee's, hol rolled, Pit'sburgh Sheets, cold-rolled, Pit'sburgh Sheets, cold-rolled, Gary Sheets, cold-colled, Gary	Oct. 5 19*6 2.50c 2.86 2.50 2.55 2.48 2.50 2.558 2.50 2.558 2.425 3.275 3.275	Sept., 1946 2.50c 2.86 2.25 2.48 2.25 2.558 2.559 2.425 3.275 4.05 2.425 3.275	July, 19*6 2 50c 2.86 2.35 2.48 2.50 2.50 2.50 2.50 2.50 2.50 2.50 2.50	Oct., 19:55 2:25c 2:57 2:25 2:20 2:210 2:25 2:30 2:25 2:30 2:25 2:30 2:25 2:30 3:70 2:20 3:05 3:05	Oct 19 Bessemer dcl. Pittsburgh \$20. Basic, Valley \$20. Basic, eas' crn del Philadelphia \$29 No. 2 fdry. dcl Psh. N. & S. sides. \$20. No. 2 fourd: y. Chleago \$23. Southern No. 2, Birmingham \$24. S-uthern No. 2, Birmingham \$	5, Sept., 16 1946 17 \$29.77 10 28.00 32 29.93 17 29.27 50 28.50 38 24.88 34 28.91 13 30.43 50 28 50 50 28 50 50 28 50 50 31 00 140.00 140.00	*Ju'y. 19 '6 \$27.69 27.93 27.10 26.50 22.88 26.91 28.43 26.50 26.55 33.00 28.61 140.00	Oct., 1945 \$26,35 26,53 25,53 25,59 21,57 25,50 27,03 25,15 25,19 33,00 25,49 140,26
Mat-rolled strip, over 6 to 12-in., Pitts. Cold-rol ed strip, Pi tsburgh Bright basic, bers. vile, Pittsburgh Wire nalls, Pit sburgh Tin plate, per base box, Pittsburgh Sem finished Material	4.05 2.25 3.05 3.05 3.75 \$5.25	4.05 2 35 3.05 3.05 3.15 \$5.25	4.05 2.35 3.05 3.05 3.75 \$5.25	3.70 2.10 2.80 2.75 2 93 \$5.00	Scrap Heavy melting steel, No.1, Pit'sburgh \$20 Heavy melt, steel, No. 2, E. Pa	\$20.00 75 18.75 75 18.5 25 22.25 00 23.75	\$20.00 18.75 18.75 22,25 20.00	\$20.00 18.75 18.75 22.25 20.00
Sheet bars, Pittsburgh, Chicago Slabs, Pittsburgh, Chicago Recolling bille's, Pittsburgh Whe reds, No. 5 to 3-neh Pitts	\$38.00 39.00 39.00	\$38,00 29,00 39,00 2,300	\$78 00 29 00 39.00 2 30c	\$36.00 36.00 36.00	Connellsville, furnace ovens	75 \$8,75 0 9 50 10 15.10	\$3 75 9.50 15,10	\$7.50 8 25 13.75

* \$2 higher on bessemer, basic, foundry and malleable on adjustable pricing contracts.

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per cross fon, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight. Pricing on falls was changed to net ton basis as of Feb. 15, 1946.

Semifinished Steel

Carbon S'cel Invo's: Recolling quality, stand-ard analysis, \$33, fob mill; forging quality, \$38, Plitsburgh, Chibago, Gary, Cleveland,

ard analysis, \$33, fob mill; forging quality, \$38, Plitsburgh, Chihago, Gary, Cleveland, Birmingham, Buffalo, Youngslown, Alloy Steel Incots: Plitsburgh, Chicago, Buf-falo, Bethlehem, Canlon, Massillon, Coates-vine, uncrop, \$48,69. Rerotilar, Eliles, Blooms, Slabs: Plitsburgh, Chicano, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, \$39; Detrolt, del., \$41; Duluth (billets), \$41; Pac, por.s (bil-lets), \$51. (Andrews Seel Co., carbon slabs, \$41; Northwestern Steel & Wire Co., \$41, Ster-Ing, III ; Granite Clip Steel Co., \$47,50 gross ton slabs from D P C, mill, Geneva Steel Co., \$58 64, Pac, ports.)

Sas of, Pac. ports.) Porging Quality Booms, Slahs, Billets: Pi'ts-burch, Chicago, Gary, Cleveland, Buffalo, Brmingham, Yungstown, S47: Detroit, del., \$49: Duluth, hillets, \$49: forging billets fob Pac. ports, \$59. (Andrew: Steel Co. may quote carbon forging billets \$50 gross ton at established basing poin s; Follansbee S'eel Corp., \$49,50 fob To-ronto, O.; Geneva Steel Co., \$64.64, Pacific ports.)

Alloy PPlets, Stebs, Brooms: Pittsburgh, Chl-cago, Buffalo, Bethlehem, Canton, Massillon, 858.43; del. Detroit 860.43; eastern Mich, 861.43.

She 4 Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstowa, \$38. (Empire Sheet & Tin Plate Co., Mansfield, O., carbon, sheet bars, \$39, fob mill.)

Skelp: Pitisburgh, Chicago, Sporrows Point, Youngstown, Coalesville, lb, 2.05c,

Wre Rods: Pittsburgh, Chicago, Cleveland, Birminghem, No. $5-\frac{2}{3}$ in. inclusive, per 100 lb, \$2.30. Do., over $-\frac{1}{3}$ [-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.; Pl'itsburgh, Youngslown, Cheago, Gary, Cleveland, Buffalo, Birmingham base, 20 tors one size, 2:50c; Dulu'n, base, 2:60c; De-trolt, del., 2:60c; eastern Mich., 2:65n; New York, d.l., 2:86c; Phila., del., 2:86c; Gu't ports, dock, 2:85c; Pac, ports, dock, 3:15c. (Sheffie'd S'cel Corp. may quote 2:75c, fob S', Louis; Joslyn Mig, & Supply Co., 2:55c, fob Chicago.)

Rall Steel Bars: Same prices as for hot-rolled earlion bars except base is 5 lons. Hot-Rolled Alloy Bars: Pitsburgh, Youngs-town, Chicago, Canton, Massillon, Buffalo, Bethlebern, base 20 lons one size, 2.921c; De-troit, del., 3 021c. (Texas Steel Co. miy Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahema.)

AISI	(*Basic	AISI	(*Basic
Series	O-H)	Shries	O-H)
1300	\$0.108	4300	\$1.839
2200	1.8^9 -	4600	1.293
2500	2.759	4800	2.306
2000	0 5/1	5100	0.379
3*00	0.00 0.00	5130 or 5152.	0.491
3200	1.461	6170 or 6152	1.008
3400	3.462	6145 or 6150	., 1.293
-1000	0.487	8612	0.703
4100 (.15	25 Mo) 0 757	8720	0.757
(.20-	30 Mo) 0.812	9830	1.407

* Add 0.25 for acid open-hearth; 0.50 electric.

Celd-Finished Carbon Bars: Pl'fsburgh, Chi-cago, Gary, Cleveland, Buffalo, hase, 20.000-29,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c. 29,999 lb. 3.10c; Detroit, 3.15c; Toledo, 3.25c. Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base. 3 625c; Detroit, del., 3.725c; eastern Mich., 3.755c, Reinforcing Bars (New Billiet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Spar-rows Point, Buffalo, Youngstown, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo,

2.50c; Gulf ports, dock, 2.70c; Pacific ports.

Itcinforcing Bars (Rail S'cel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngs-tewn, Buffalo, base, 2.25c; Detroit, del, 2.45c; eastern Mich. and Toledo, del., 2.50c; Guli ports, dock, 2.70c,

Iron Bars: Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Three Haute, single ref., 5.42c; double ref., 6.76c.

Shects, Strip

SHECKS, SKF P Hot-Rolled Shee's: Pl'tsburgh, Chicago, Gary, Clavelord, Birminsham, Buffalo, Yeungstown, Sparrews Pt., Middletown, base, 2.425c; Gran-ite City base, 2.525c; De'rol', del., 2.525c; eastern Mich., del., 2.575c; Ph'la, del., 2.525c; New York, del., 2.585c; Pacific ports, (Andrews Steel Co. may quote hot-rolled shee for shipment to the Datrolt area on the Mid dietown, O., base; Alan Wood Steel Co., Coa-shohecken, P.a., may quote 3 One on hot car-bon sheets, Sparrows Point, Md.) Cold-Rolled Shee's: Pi tsburgh, Chicago, Cleve

Cold-Rolled Sheris: Pitsburgh, Chicago, Cleve-land, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite Cl'y, base, 3.375c; De-trait, del., 3.375c; crestern Mich., del., 3.425c; New York, del., 3.615c; Phila., del., 3.635c pacific ports, 3.925c.

Grivatized Sheets, No. 24: Pi'tsburgh, Chi-cago, Gary, Birmingham, Bullalo, Youngstow Snarrows Point, Middletewa, hase, 4.05c; Gra-fee Ci'y, hase, 4.15c; New York, del., 4.3ic; Phila, del, 4.24c; Pacific ports, 4.60c.

Corrugated Galv. She ts: Piltsburgh, Chicago, Gary, Birmingham, 29-sage, per square, 3.750 Chicago, Culvert Sheets Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corruga'cd. copper olley, 4.15c; Granite City, 4.25c; Pacific ports 4.60c; copper iron, 4 50e; pure iron, 4.50e; ric-conted, her-dipped, heat-treated, No. 24, Pitts-burgh, 4.60c.

Aluminiz d Sheets, 20 gage: Pittsburgh, he dipped, coils or cut to lengths 9.00c.

Blance Clausland Birming-

Enameling Sheets: 10-gage; Pittsburgh, Chi-	
ago, Gary, Cleveland, Youngstown, Middle-	
wwn, base 3.20c; Granile City, base 3.30c;	
Detroit, del., 3.30C; eastern Mich., 5.50C, 12	
Cary Cleveland Youngstown, Middletown,	
pase, 3.80c; Deiroit, del., 3.90c; eastern Mich.,	
195c; Pacific ports. 4.45c.	

Electrical Sneets NU. z	41		
PI	ttsburgh	Pacific	Granite
	Base	Ports	Cliy
Field grade	3.90c	4.65c	4.00c
Armaturo	4.25c	5.00c	4 35c
Floatrical	4 75c	5.50c	4 85c
Motor	5 1250	6.175c	5.525c
Dunamo	6 1250	6.875c	6.225c
Tremelormon	0.1200	0.0100	
ransformer	6 6250	7 3750	
12	7.6250	9 3750	
ha ,	0200	9.9754	
58	8.1200	0.0150	
52	8.9250	9.0100	

Cold-Finished Spring Steel: Plitsburgh, Cleve-land base, 0.26-0.30 carbon, 3.03c, Add 0.20c for Worcester.

Tin, Terne Plate

OPA celling prices announced March 1, 1946.) Tin Plate: Pittsburgh, Chicago, Gary, 100-lb

(OPA celling prices announced March 1, 1946.) Tin Plnte: Plitsburgh, Chicago, Gary, 100-1b base box. \$5.25; Granite City, Birmingham, Sparrows Polnt. \$5.35. Electroiyile Tin Plnte: Plitsburgh, Gary, 100-1b base box 0.25 lb tin, \$4.60; 0.50 lb tin, \$4.75; 0.75 lb tin, \$4.90; Granite City, Birm-ingham Sparrows Point, \$4.70, \$4.85, \$5.00, respectively. Tin Mill Black Plate: Plitsburgh, Chicago.

respectively. Tin Mill Black Plate: Plitsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granile City, Birmingham Sparrows Point, 3.40c; Pa-elfe ports boxed, 4.30c. Long Ternes; Plitsburgh, Chicago, Gary, No. 24 unassoried, 4.05c; Pacific ports, 4.80c. Manufacturing Ternes (Special Coal:d): Plits-burgh, Chicago, Gary, 100-base box, \$4.55; Granile City, Birmingham, Sparrows Point, \$4.65. \$4 65

34.02. Ronflag Ternes; Pittsburgh base per package 112 sheets; 20 x 28 ln., coaling I. C. 8-lb \$12.50: 15-lh \$14.50; 20-lb \$15.50 (nom.); 40-lb \$20.00 (nom.).

Plates

Plates Carlien Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2:50e; New York, del. 2:71e; Phila., del., 2:558e; St. Louis, 2:71e; Boston, del., 2:86e; Paelfle ports, 3:05e; Guil ports, 2:86e; Paelfle ports, 2:66e; the DPC mill; Geneva Steel Co., Provo, Utah. 3:20e fob Pae. ports; Central Iron & Steel Co., Harrishurg, Pa., 2:80e, has-ing points, Lukens Steel Co., Coatesville, Pa., 2:75e, base; Worth Steel Co., Calaymont, Del., 2:60e, hase; Alan Wood Steel Co., Consho-hocken, Pa., 2:75e hase.) Floor Plates; Pittshurgh, Chicago, 3:75e; Pa-elfic ports 4:40e; Guil ports, 4:10e; Open-Hearth Alloy Plates; Pittshurgh, Chi-cago, Contesville, 3:787e; Guil ports, 4:273e; Paelfle ports 4:49e. Clad Steel Pintes; Contesville, 10% cladding; nckel-clad: 18:72e; inconel-clad, 26:00e; munel-clad, 2:4:96e.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birminsham, Buffalo, Bethlehem, 2.35c; New York, del., 2.5tc; Phila., del., 2.48c; Pacific ports, 3.00c; Gulf ports, 2.70c. (Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.60c, Bethlehem, Pa., on the general range and 2.70c on beams and channels from 4 to 10 Inches.) Steel Piling; Pittsburgh, Chicago, Buffalo, 2.65c; Pacific ports, 3.20c.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and	Birm-
ingham per 100 punnds)	2
Wire to Manufacturers to carloads	
Bright basic or bessemer	•\$3.05
apring (except Birmingham)	•\$4.00
Wire Products to Trade	
Nalls and stanles	
Standard and cement-coated	153.75
Galvanized	183 40
Wire, Merchant Quality	ę
Annealed	189 80
Galvanized	100.00

(Fob Philsburgh, Chicago, Cleveland, D.	
ham, per base column)	70
Woven fence, 151/2 gage and heavier	14
Barbed wire, 80-rod spool	• 79
Barbless wire, twisted	19
Fence posts	74
Bale ties, single loop	1272
and so to for Worcester, \$0.05 for	Duluth

*Add \$0.10 for Worcester, \$0.05 for Databased and \$0.50 for Pacific ports. *Add \$0.30 for Worcester, \$0.50 for Pacific ports. Nichols Wire & Steel may quote \$4.25; Pittsburgh Steel Co., \$4.10. *Add \$0.50 for Pacific ports. \$Add \$0.10 for Worcester; \$0.70 Pacific ports. **Pittsburgh Steel Co. may quote 89.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about \$200 per net ton Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind., 2 points less on lap weld. I point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Welded								
	St	eel		Ir	on			
In	Blk.	Galy.	In.	Blk.	Galv.			
14	53	30	14	. 21	01/2			
78	56	3714	4	. 27	7			
1/ 02 78	4103	48	1-114	. 31	13			
72	621	52	114	. 35	151%			
%	CE1/	5.112	2	3416	15			
1-3	. 0349		World					
		1.41	, iieiu	T	ron			
	SU	eei			Clarke.			
In	Blk.	Galv.	In.	BIK.	GAIV.			
2	58	4616	11/4	20	01/2			
214-3	61	4916	144	. 251/2	7			
211.6	63	5114	2	27 1/2	9			
0.0.0	62	401/	214-314	2816	1114			
(-8	611/	40 72	4 0 71	3014	15			
9-10	. 01 99	40	41/ -8	2012	14			
11-12	. 60 %	40	9 /2 0	051/	`			

Boller Tubes: Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

		-Sea	- Elec.	Weld-	
n n		Hot	Cold	Hot	Cold
	RW.	Rolled	Drawn	Rolled	Rolled
1#	13	ar reonea	\$9.90	\$9.36	\$9.65
11/1	13		11 73	9 63	11.43
11/ "	13	\$10.91	12.96	10 63	12 64
1 2 1	12	12 41	14 75	12 10	14 37
174 .	12	13 00	16 52	13 53	16 19
01/ 7	10	15.50	18 42	15.06	18 03
24	10	17 07	20.28	16 57	19.83
24	12	10 70	90 01	18 11	21.68
2 42 " -	12	10 00	02 54	19 17	22.95
2%".	12	19 82	04 71	20.05	24 02
3″	. 12	20 79	24 /1	26 00	80.29
31/3".	. 11	26 24	31 10	23 30	37 52
4″	10	32 56	37 00	31.34	01.02
41/2".	. 9	43 16	51 29		
5"	. 9	49.96	59 36		
6"	. 7	76 71	91 14		
Plpe,	Cast	Iron: Cl	ass B 6	-in. and	over, anu
per	net t	on, Birm	ingham:	565. Bt	irington,
N	J.: \$6	2 80, del.	, Chicag	0; 4-ln.	pipe, \$5
high	or Ch	ase A pin	e. 53 a	ton over	class B.

Rails, Supplies

Standard rails, over 60-ib, fob mill, net ton, \$43,40. Light rails (billet). Pittsburgh, Chl-cago, Birmingham, net ton, \$49,18. Relaying rails, 35 ib and over, fob railroad and hasing points, \$31-\$33. Supplies: Track bolts, 6.50c; heat treated, 6.75c Tie niates \$51 net ton, base, Standard spikes, 3.65c.

Bolts. Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chi-cago Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow bolts.

Ceiling prices advanced 12 per cent, effective (Ceiling prices advanced 12 per cent, effective July 27, 1946; discounts remain unchanged.) Carriage and Machine

1/ v 6 and smaller	65 1/2	οπ
72 Do & and % x 6-in, and shorter.	6314	off
Do to 1 x 6-in and shorter	61	01
114 and larger all lengths	59	off
All diamotars over 6-in long	59	off
All unamerers, over only tongetterter	50	off
Tire poils	56	off
Step boils	65	0
Plow bolts	00	0.4
Odawa Dolla		

slove fields packages, nuts separate. 71-10 off, nuts attached, 71 off; bulk. 80 off on 15.000 of 3-in and shorter, or 5000 over 3 in., nuts separate.

			N	uts		
Semifin	Ished	hex			U.S.S.	S.A.E.
Lain	and	smalle	r			64
14-In	and	smalle	Γ		. 62	144
12_in .1	I-In					60
R .in .	1.In				. 59	
114 .10	.114 -	In .			. 57	58
156 In	and	large			. 55	
Additio	onal	discou	nt of	10 for	full keg	38.
		Hex	agon	Cap S	crews	
Upset	1-in.	. sma	ller			64 017
Milled	1-in.	sma	ller			60 01
		Sount	e Hei	ad Set	Screws	
Unset	1-In	and	small	er		71 01
Headle	-95	4-In.	and	larger.		60 oft
No. 10) and	sma	ller			70 01

Rivets

Washers, Wrought

Tool Steels

Tool Streis; Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per Ib; reg carbon 15 15c; extra carbon 19 48c; special carbon 23 80c; oil-hardening 25.97c; high carbon-chromium 46.53c. Base

W 18.00	Cr 4	V 1	Мо	per 1b 72 49c
1.5	4	12	8.5 3	58 43c 58 43c
6.40 5.50	4 15 4.50	1.90 4	5 4.50	62.22c 75.74c

Stainless Steels

Base. Cents per lb THROMIUM NICKEL STEELS

CHROMICM N	ICKEL 8	u nana	HR.	C.R.
	731-1-00	Choote	Strin	Strip

	Bars	Plates	Sheets	Sirip	STIP	
200	25 060	29 21c	36 79c	23 93c	30.30	
202	09 12	31 38	38.95	29 21	35 71	
303	20 10	21 28	38 95	25 45	32.40	
304	2100	20 70	41 36	30 84	37 87	
308	31.38	30 19	50 Q5	40.03	50.85	
309	38 95	43 28	01100	80 74	60 59	
310	53 02	56 26	2(.12	52.14	00.00	
312	38.95	43 28	23 02	10 00	K1 04	
•316	43 28	47 61	51 94	9.1 28	41 10	
\$321	31 38	36 79	44 36	31 65	41.12	
t347	35 71	41 12	48 69	35 71	45.44	
431	20.56	23 80	31 38	18.94	24.35	
	UT CH	POMIT	M STEE	L		
STRAIG	00.02	OC 51	31.02	22.99	29.21	
403.	23 93	20 .01	28 67	18 39	23.80	
**410	20 02	23 93	20 01	19 75	25 45	
416	20 56	23 80	29 21	25 70	39 49	
tt420	25 96	30 84	30 20	10 04	94 35	
430	20 56	23.50	31.38	10 54	00 51	
t1430F	21 10	24 35	31 92	20.29	20 10	
440A.	25 96	30 84	36 25	25 70	39 49	
442	24 35	27 59	35 17	25 96	34 62	
443	24 35	27 59	35 17	25 96	34 62	
446	29.76	33 00	39 19	37 87	56.26	
K01	8 66	12.98	17 04	12 98	18.39	
501	0 74	14 07	18 12	14 07	19.48	
Dri2 .	514			0.07.)		
STAIN	Eas C	LAD SI	F.F	don Do	mlate	
(Fob F	Pittsburg	th and	wasning		in places	
prices i	include	annealin	g and p	nekung.		
304		19 48	20.56			
410.		17 31	18 39			
430		17 85	18 94			
100.1		10 10	20 58			

• With 2-3% molybdenum § With titanium. t With columbium •• Plus machining agent. tt High carbon. 11 Free machining.

Metallurgical Coke

Price Per Net Ton

Beehlve Ovens

a furnung	\$8.75
Connelisville, Intilate	0.25. 0.78
Connellsville, foundry	3.25 3 10
New River, foundry	10 25-10 50
Wise county foundry	9 00- 9 50
Wise county, furnace	8.50- 9.00
Wise county, further Roundry	
RA-L.Luntler Lonnera	14.40
Kearney, N J. ovens	14.40
Chicago, outside delivered	14 30
Chloago delivered	15 10
man Hauta dollyarad	14.85
Terre Haute, univered	15.10
Milwaukee, ovens	10.00
New England, delivered	10.00
St Louis delivered	115.10
Dimmingham delivered	12.25
Birmingham, delivered	14 85
Indianapons, denvered	14.60
Cincinnati, delivered	1.4 0.0
Cleveland, delivered	14 30
Buffalo delivered	14.73
Dutato delluored	15.10
Derroit, denvered	14 45
Philadelphia, delivered	7.4.40

• Operators of hand-drawn ovens using trucked coal may charge 59.35; retroactive to May 17, 1946, on adjustable pricing. † 15.68 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal, freight allowed east of C Pure and 90% benzol	maha. 15.00e
Toluol, two degree	22.00c 22.00c
Per pound fob works Phenol (car lois, returnable drums)	11.25c

Naphthalene flakes, balls, bbl, to job-bers, "household use" Do., less than carlots . Do., tank cars ... 10.25e

9.00c

\$30.00 Sulphate of ammonia

WAREHOUSE STEEL PRICES

Base delivered prices, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on mill prices announced March 1, 1946

	Hot-rolled bars	Structural shapes	Plates	Floor plates	Hot-rolled sheets (10-gage base)	Hot-rolled strip (14-zage and lighter 6-in and narrower)	Hot-rolled strip (12-gage and heavier wider (han 6-Inch)	Galvunized flat shee(s (24-gnae pase)	Dold-ruited sheets (17-gage base)	Cold-finished	Cold-rolled strip
Boston New Yo•k Jersey City Philadelphia Baltumore Washington Norfolk, Va. Bethlehem, Pa.• Claymont, Del.• Coatesville, Pa.• Buffalo (city) Buffalo (city) Buffalo (country) Pittsburgh (country) Cleveland (city) Cleveland (country). Detroit Omaha (city, del.). Omaha (country)	$\begin{array}{c} 4.356^{\circ}\\ 4.135^{\circ}\\ 4.155^{\circ}\\ 4.155^{\circ}\\ 4.155^{\circ}\\ 4.155^{\circ}\\ 4.232^{\circ}\\ 4.377^{\circ}\\ \dots\\ 3.50^{\circ}\\ 3.50^{\circ}$	$\begin{array}{c} 4.203^{1}\\ 4.018^{1}\\ 3.937^{1}\\ 4.05^{1}\\ 4.22^{1}\\ 4.303^{1}\\ 3.70^{1}\\ 3.55^{1}\\ 3.55^{1}\\ 3.55^{1}\\ 3.55^{1}\\ 3.55^{1}\\ 3.55^{1}\\ 3.55^{1}\\ 3.55^{1}\\ 3.55^{1}\\ 3.58^{1}\\ 3.952^{1}\\ 4.27^{1}\\ 4.27^{1}\\ 3.988^{1}\\ \end{array}$	$\begin{array}{c} 4.203^{i}\\ 4.049^{i}\\ 4.049^{i}\\ 3.875^{i}\\ 8.865^{i}\\ 4.067^{i}\\ 4.262^{i}\\ 3.70^{i}\\ 3.70^{i}\\ 3.70^{i}\\ 3.55^{i}\\ 3.65^{i}\\ 3.55^{i}\\ 3.65^{i}\\ 3.55^{i}\\ 3.65^{i}\\ 3.55^{i}\\ 3.$	6.039 ¹ 5.875 ¹ 5.564 ¹ 5.543 ¹ 5.632 ¹ 5.777 ¹ 5.551 5.15 ¹ 5.15 ¹ 5.15 ¹ 5.15 ¹ 5 ¹	$\begin{array}{c} 4.050^{\circ}\\ 3.856^{\circ}\\ 8.856^{\circ}\\ 3.774^{1}\\ 3.64^{1}\\ 3.64^{1}\\ 4.037^{1}\\ 4.037^{1}\\ 3.842^{1}\\ 4.037^{1}\\ 3.575^{1}\\ 3.475^{1}\\ 3.575^{1}\\ 3.575^{1}\\ 3.475^{1}\\ 3.575^{1}\\ 3.475^{1}\\ 3.575^{1}\\ 3.475^{1}\\ 3.575^{1}\\ 3.475^{1}\\ 3.915^{1}\\ 3.945^{1}\\ 3.945^{1}\\ 3.945^{1}\\ 3.671^{1}\\ \end{array}$	5.548 ¹ 4.375 ¹ 4.664 ¹ 4.293 ¹ 4.4293 ¹ 4.4293 ¹ 4.427 ¹ 4.927 ¹ 4.927 ¹ 4.927 ¹ 4.927 ¹ 4.927 ¹ 4.927 ¹ 4.927 ¹ 4.927 ¹ 4.927 ¹ 4.925 ¹ 4.955 ¹ 3.85 ¹ 3.85 ¹ 4.950 ¹ 4.52 ¹ 4.920 ¹ 4.920 ¹	$\begin{array}{c} 4.418^{1}\\ 4.275^{1}\\ 4.554^{1}\\ 4.554^{1}\\ 4.332^{1}\\ 4.332^{1}\\ 4.477^{1}\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	5.725 ¹⁴ 5.501 ¹³ 5.465 ¹⁷ 5.862 ¹⁷ 5.862 ¹⁷ 5.862 ¹⁷ 5.20 ¹⁵ 5.10 ¹⁸ 5.327 ¹³ 5.327 ¹³ 5.347 ¹³ 5.347 ¹³ 5.491 ¹⁵ 6.00 ¹⁶ 5.90 ¹⁵ 5.296 ¹⁵	5.05114 4.83814 4.83914 5.18925 5.11825 5.11825 5.00724 4.55224 4.62516 4.52516 4.52524 4.55524 4.5556	$\begin{array}{c} 4.656^{21}\\ 4.584^{21}\\ 4.605^{21}\\ 4.543^{21}\\ 4.543^{21}\\ 4.543^{21}\\ 4.577^{21}\\ 4.677^{21}\\ 4.10^{21}\\ 4.10^{21}\\ 4.20^{21}\\ 4.10^{21}\\ 4.25^{12}\\ 4.945^{21}\\ 4.602^{24}\\ \end{array}$	4.965 5.075 5.075 5.064 4.96 4.60 4.60 4.60 4.70 4.00 4.95
Youngstown ^o Middletown, O. ^o Chicago (city) Milwaukee Indianapolis St. Paul St. Louis St. Louis Memphis, Tenn. Birmingham New Orleans (city) Houston, Tex. Los Angeles San Francisco Portland, Oreg. Tacoma, Wash. Seattle	3.75^{1} 3.908^{1} 3.83^{1} 4.092^{2} 3.75^{1} 4.296^{1} 3.75^{1} 4.00^{2} 4.60^{4} 4.60^{6}	$\begin{array}{c} 3.80^{1} \\ 3.958^{1} \\ 3.88^{3} \\ 4.142^{2} \\ 3.968^{3} \\ 4.346^{3} \\ 3.80^{1} \\ 4.408^{3} \\ 4.50^{1} \\ 4.50^{1} \\ 4.50^{1} \\ 4.70^{2} \\ 4.70^{6} \\ 4.70^{6} \end{array}$	3.80^{1} 3.58^{1} 3.58^{1} 4.142^{2} 3.968^{3} 4.346^{1} 3.80^{1} 4.408^{1} 4.50^{1} 5.20^{4} 4.15^{7} 5.00^{8} 5.00^{8}	5.40° 5.558° 5.48° 5.742° 5.568° 6.071° 6.153° 6.329° 5.75° 7.45° 5.85° 6.75° 6.75°	3.475^{2} 3.475^{1} 3.633^{1} 3.743^{1} 3.643^{1} 4.221^{1} 3.675^{1} 4.283^{1} 3.988^{3} 5.225^{4} 4.125^{7} 4.875^{37} 4.877^{7}	$\begin{array}{c} 3.851\\ 3.95^{-1}\\ 4.108^{-1}\\ 4.292^{-3}\\ 4.118^{-1}\\ 4.292^{-3}\\ 4.118^{-1}\\ 4.596^{-1}\\ 4.055^{-1}\\ 4.655^{-1}\\ 4.658^{-1}\\ 5.85^{-1}\\ 5.85^{-1}\\ 5.80^{-6}\\ 5.80^{-6}\\ 5.80^{-6}\\ \end{array}$	$\begin{array}{c} 3.750^1\\ 3.850^1\\ 4.008^1\\ 4.018^1\\ 4.192^3\\ 4.018^1\\ 4.496^5\\ 4.05^1\\ 4.563^6\\ 5.200^4\\ 4.50^1\\ 5.000^{37}\\ 4.60^6\end{array}$	$\begin{array}{c} 4.85^{12}\\ 5.10^{16}\\ 5.10^{16}\\ 15.558^{15}\\ 5.368^{16}\\ 5.622^{15}\\ 5.622^{15}\\ 5.746^{16}\\ 5.20^{15}\\ 5.763^{24}\\ 6.35^{16}\\ 6.40^{16}\\ 6.40^{16}\\ \end{array}$	$\begin{array}{c} 4.425^{24}\\ 4.583^{24}\\ 4.793^{24}\\ 4.793^{24}\\ 4.793^{24}\\ 4.593^{24}\\ 5.304^{24}\\ 5.819^{10}\\ 7.425^{5}\\ 6.875^{15}\\ 6.825^{15}\\ 6.55^{15}\\ 6.55^{15}\\ 6.55^{15}\\ \end{array}$	4.20 ²¹ 4.358 ²¹ 4.43 ²¹ 4.52 ²¹ 4.52 ²² 4.52 ²² 4.52 ²² 4.52 ²¹ 4.99 ⁿ 5.079 ²ⁿ 4.10 ²¹ 6.033 ²ⁿ 5.783 ²ⁿ 5.983 ¹³ 5.983 ¹³ 5.983 ¹³ 5.983 ²¹	4.90 5.058 5.060 5.398 5.222 5.465 5.868 7.588

Basing point cities with quotations representing mill prices, plus warehouse spread; topen market price.

BASE QUANTITIES 400 to 1999 pounds; 400 to 14,999 pounds; 630 to 9999 pounds; 400 to 39,999 pounds; 640 to 8999 pounds; 640 to 9999 pounds; 400 to 39,999 pounds; 640 to 39,999 pounds; 140 to 39,999 pounds; 1400 to 1499 pounds; 140 to 39,999 pounds; 141 to 30,999 pounds; 141 to 30,9

to 1499 pounds; ¹⁶—one bundle to 1499 pounds; ¹⁷—one to nine bundles; ¹⁵—one to six bundles; ¹⁹—100 to 749 pounds; ²⁰—300 to 1999 pounds; ²¹—1500 to 39,999 pounds; ²²—1500 to 1999 pounds; ²³—1000 to 39,999 pounds; ¹³—400 to 1499 pounds; ²³—1000 to 1999 pounds; ²⁴—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; ²⁷—300 to 4999 pounds.

ORES	Indian and African	Khodesian -
Lake Superior Iron Ore Gross ton, 514% (Natural) Lower Lake Ports	48% 2.8:1 \$39.75 48% 3:1 41.00 48% no ratio 31.00	45% no ratio \$28.30 48% no ratio 31.00 48% 3:1 lump 41.00
	C. A. M. Margaret	Domestic (seller's nearest rail)
Old range bessemer \$5.45 Mesabi nonhessemer 5.05 High phosphorus 5.05 Mesabi bessemer 5.20	44% no ratio	48% 3:1 \$43.50 less \$7 freight allowance.
Old range nonbessemer 5.30	50% no ratio 32.80	Manganese Ore
Eastern Local Ore	Brazilian-nominal	Sales prices of Office of Metals Re- serve, cents per gross ton unit, dry,
Cents, units, del. E. Pa. Foundry and basic 56- 63% contract 13.00	44% 2.5:1 lump \$33.65 48% 3:1 lump 43.50	Paltimore. Norfolk. Mobile and New Orleans, 85c; Fontana, Calif., Provo,
Foreign Ore		
Cents per unit, cif Atlantic ports Manganiferous ore, 45- 55% Fc., 6-10% Mn Nom.	NATIONAL EMERGEN	NCY STEELS (Hot Rolled)
N. African low phos. Nom. Swedich basis 60 to 68% 13.00	(Extras for allow content)	
Spanish, No. African ba-	(sanda for anog bontone)	The state of the state of the
sic, 50 to 60% Nom.	Chenii	cal Composition Limits, Per Cent-

Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and penaltics and other provisions. Frice at basing points which are also gonese ore is fob cars, shipside, at dock most favorable to the buyer. Sumers at 15c to 17c per unit less than Metal Reserve prices.

Molybdenum

Sulphide conc., Ib., Mo. cont., \$0.75 mines

Basic open-hearth Electric furnaces

per Billets per Billets 100 lb per GT 100 lb per GI

\$0.812 \$16.230 \$1.353 \$27.050

.812 16.230 1.353

17.312

.703 14.066

Bars

.866

Bars

1.407

1.244

Billets

27.050

28.132

24.886

33.542 33.542

Manganiferous ore, 45- 55% Fe., 6-10% Ma., Nom. N. African low phos. Nom. Swedish basic, 60 to 68% 13.00 Scanich No. African bas	NATIO (Extras for a	ONAL
sic, 50 to 60% Nom.		
Brazil iron ore, 68-69% fob Rio de Janeiro 7.50-8.00	Desig- nation	Cathon
Tungsten Ore	NE 9415	.1318
Chinese Wolframite, per	NE 9425	.2328
short ton unit, duty	NE 9442	.4045
paid \$24.00	NE 9722	.2025
 Chrome Ore	NE 9912	.1015
Gross ton tob cars, New York,	NE 9920	.1823

Chrome OreNE 9722.20-.25.50-.80.20-.35.10-.25.40-.70.15-.25.70314.0661.24424.800Gross ton fob cars, New York,
Philadelphia, Baltimore, Charles-
ton, S. C., Portland, Oreg., or Ta-
come, Wash.
(S S paying for discharge; dry
basis, subject to penalties if guar-
antees are not met.)NE 9722.20-.25.50-.80.20-.35.40-.601.00-1.30.20-.301.29825.9681.67733.542

Cr

.30-.50

.30-.50

.30-.50

.10-.25

Si

.20-.35

.20-.35

.20-.35

Mn

.80-1.20

1.00-1.30

.50-.80

.80-1.10 .20-.35

Ni

.30-.60

.30-.60

.30-.60

,40-.70

Mo

08-.15

.08-.15

.08-.15

.15-.25

/TEEL

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PIG IRON

Maximum prices per gross ton fixed by OPA schedule No. 10, last amended July 27, 1946; \$2 increase may be charged on adjustable pricing contracts made between May 29 and July 27. Delivered prices do not include 3 per cent federal tax, effective Dec. 1, 1942.

	No. 2			Mal-
	Foundry	Basic	Bessemer	leable
Bethlehem, Pa., base	\$29.50	\$29.00	\$30.50	\$30.00
Newark, N. J., del.	31.20	30.70	32.20	31 70
Brooklyn, N. Y., del.	32.28	00.10	02.20	32 78
Birdsboro, Pa., base	29.50	29.00	30 50	30,00
Birmingham, base	24.88	23.50	24 50	00.00
Baltimore, del.	30.22	20.00	20100	
Boston, del.	29.68			
Chicago, del.	28.72			
Cincinnati, del.	28.94	28.06		
Cleveland, dei.	28.62	27.74		
Newark, N. J.	30.82			
Philadelphia, del.	30.05	29.55		
St. Louis, del.	28.62	29.54		
Buffalo, base	28.50	27.50	29.50	29.00
Boston, del.	30.06	29.56	31.06	30.56
Rochester, del.	30.03		31.03	30.53
Syracuse, del.	30.58		31.58	31.08
Unicago, base	28.50	28.00	29.00	28.50
Milwaukee, del.	29.73	29.23	30.23	29 73
Muskegon, Mich., del.	32.05			32.05
cleveland, base	28.50	28.00	29.00	28.50
Akron, Canton, del.	30.04	29.54	30.54	30.04
Derroit, base	28.50	28.00	29.00	28.50
Dubuth by Mich., del.	30.81	30.31	31.31	30.81
St David .	\$9.00	28.50	29 50	29.00
St. Paul, del.	31.13	30.63	31.63	31.13
Everett Manual Annual	28.50	28.00	29.50	29 00
Boston dal Dase	29.50	29.00	30.50	30.00
Granita Cita att	30.06	29.56	31 06	30.56
St Louis del base	28.50	28.00	29.00	28.50
Hamilton O have	29.00	28.50		29 00
Cincinnati del	28.50	28.00		28.50
Neylla Jaland the	29.68	29 18		29.68
"Pittsburgh dat bl ag	28.50	28.00	29.00	28.50
Provo. Iltab bass	29.27	28.77	29.77	29.27
Sharpsville Pa boas	26.50	26.00		
Sparrows Point boos	28.50	28.00	29.00	28.50
Baltimore del	29.50	29.00		
Steelton, Pa hano	30.60		1 1111	
Swedeland, Pa base	00 50	29.00		
Philadelphia del	29.50	29.00	30.50	30.00
Toledo, Q., base	30.43	29.93	00.00	30.93
Youngstown, Q., hase	28.00	28.00	29.00	28.50
Mansfield, O., del	28.00	28.00	29.00	28.50

* To Neville Island base add: 61c for McKees Rocks, Pa.; 93c Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; \$1.24, Oakmont, Verona; \$1.38, Brackenridge.

Exceptions to above prices: Struthers Iron & Steel Co., Struthers, O., may charge 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig Iron. Republic Steel Corp. may outer \$2 a ton higher for foundry and basic pig Iron on the Birming-ham base. 0.,2 High Silicon, Silvery

6.00-6.50 per cent (base)\$34.00 6.51-7.00 \$35.00 9.01-9.50.40.00 7.01-7.50.36.00 9.51-10.00.41.00 7.51-8.00.37.00 10.01-10.50.42.00 8.01-8.50.38.00 10.51-11.00 43.00 8.51-9.00.39.00 11.01-11.50.44.00 Fob Jackson county, O., per gross ton. Buffalo base \$1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01 to 14.50%, \$50 Jackson co.; each additional 0.50% silicon up to and including 18% add \$1; low 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 Irun

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn. \$33.00 (For higher silicon frons a differ-ential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. and 6.)

Gray Forge

Neville	Island,	Pa.	 .\$28.00
Valley	base		 , 28.00

Low Phosphorus

Basing points: Birdsboro, Pa., Steel-ton, Pa., and Buffalo, N. Y., \$34.00 base; \$35.38, del., Philadelphia, In-termediate phosphorus, Central Furnace, Cleveland, \$31.00.

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

a ton for phospholus content of 0.00 per cent and over. Manganese: An additional charge nut 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 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.

Open Market Prices of Leading Ferroalloy Products per lots \$1.23; less-ton lots \$1.25; east-\$36; ern. Spot up 5c per lb. 0.60. Ferroitianium: 20-25%, 0.10 maxi-mum carbon: per lb contained Ti; \$1.2075 and \$1.3075 central; \$1.229 and \$1.329, western; spot add 5c. Ferreculumblum: 50-50% per 1b contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, \$2.25; less-ton lots \$2.30, Spot prices up 10 cents.

Ferrochrome: Contract, lump, packed; high carbon, eastern zone, c.l. 15.05c, ton lois 15.55c; central zone, add 0.40c and 0.65c; western zone, add 0.5c and 1.85c; high car-bon, high nitroxen, add 5c to all high carbon ferrochrome prices. De-duct 0.55c for bulk carlots. Spot prices up 0.25c.

prices up 0.25c. Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c, add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differen-tial 0.45c. Prices are per pound of contained Cr. fob shipping points. Low carbon, high nilrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%. Ferrochrome, Special Foundry: (Cr

Ferrachrome, Special Foundry: (Cr 62-66%, C about 5-7%): Contract, hump nacked, eastern zone, freight allowed, c.l. 15.60c, ton lots 16,10c, less than ton 16.75c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.85c for smaller lots. Deduct 0.55c for bulk carlots. S. M. Ferrachrome, high carbon (Cr

S. M. Ferrochrome, high carbon (Cr 60-65%, Si, Mn and C 4-6% each): Contract, lump, packed, eastern

Refractories

Per 1000, fob shipping point Net prices Fire Clay Brick Super Duty High Heat Duty Pa., Ill., Md., Mo., Ky. 65.00 65.00 70.00 Intermediate Heat Duty Ohio
 Ohio
 57.00

 Pa., Ill., Md., Mo., Ky.
 59.00

 Ala., Ga.
 51.00

 N. J.
 62.00
 57.00 Low Heat Duty Pa., Md., Ohio 51.00 Malleable Bung Brick All bases 75.00 Ladie Brick (Pa., O., W. Va., Mo.)

Silica Brick

Pennsylvania				,			,			•	65.00
Joliet, E. Chicago		•	٠	•	•	•	•	٠	٠	•	74.00
Birmingham, Ala.	•		•	•	•	•	•	•	٠	٠	80.00

Magnesite

Domes	tic		d	e	30	1-	bı	1	rr	16	×	i		8	1	8	1	31		, Det
Bulk	10	0			зе		7e	,		1, ,			-				•			22.00
Bags	ι.	•	• •	• •	•	• •	• •	•	•	•	•	•	•	• •	•	•	•	•	•	26.00

Basic Brick

Net	ton,	fob	Baltimore	Ply	mouth
	M	eting	, Chester,	Pa.	
Chro	me t	rick			54.00
Chen	a, boi	nded	chrome .		54 00
Mag	nesite	brid	k		76 00
Cher	n, bo	nded	magnesit		65.00

Fluorspar

Metallurgical grade, fob shipping point in Ili., Ky., net ton, carloads, effective CaF² content, 70% or more, \$33; 65% to 70%, \$32; 60% to 65%, \$31; less than 60%, \$30.

zone, freight allowed, c.L. 16.15a, ton lots 16.65c, less ton 17 Mc; cen-tral zone, add 0.40c for c.L. and 0.65c for smaller lots; w-siern zone, add 0.5c for c.l. and 1 she for smaller lots. Prices are per lb of contained chromium; asyst prices 0.25c higher. Deduct 0.65c for bulk contoines carlots.

S.M. Ferrachrome, 10 w earbest (Cr 62-66%, Sl 4-6%, Ma 4-6%) and C 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20 1% ton lots 21.00c, less ton lots 22 0% castern, freight allowed, per prund contained chromium, 20.40c, 20.30c, 20 % and 22.65c, central; 21.00c, 21 4hc 22.65a and 23.85c, western; aput up 0.25c. Ferrochrome Briquete: Containing exactly 2 lb. Cr. packed eastern zone, cl. 9.50c, ton lots 9 40c. leas than ton 10.10c, central son, add 0.3c for cl. and 0.5c for smaller lots western zone, add 0.70c for cl and 2c for smaller lots. Dwinct 0.30c for bulk carlots. Prices per lb of briquets; spot prices 0.25c higher. Chromium Metal: 97% min chromium, max. 0.50% carboa, eastern zone, per lb contain-d chromium bulk, c.l., 79.50c, 2000 ib to c.l. 80c; central 81c and 62 fire; weat-ern 82.25c and 84.75c; tob ship-ping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Ca 88-90%, Fe 1% max., Si 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls. N. T. basis, freight allowed to destination, ex-cept to points taking rate in success of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; east: Contract ton lots or more \$1.35, less, \$1.60, pound of metal; \$1.36 and \$1.61

Spiezeleisen: 19-21% carlot per gross ton, Palmerton, Pa., \$36; Pittsburgh, \$40.50; Chleago, \$40.60.

Ferromanganese, Ferromanzanese, standard: 78-82% C.I. gross ton, duty paid, \$135 fob cars. Baitimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. Is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. Is producer); \$140 fob cars, (where Gloss-Sheffield Steel & Iron Co. Is producer); \$140 fob cars, Pittaturgh (where Carnegie-Illinois Steel Corp. Is producer); ad \$6 for packed c.I., \$10 for ton, \$13.50 for least on; \$1.70 for each 1%, or frac-tion contained manganese over 82% or under 78%. standard: 78-82%

Ferromanganese, low carbon: East-Ferromanganese, low carbon: East-ern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20.80c; medium, 15.75c. Prices are per pound contained Mn. bulk car-lot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Con-tract, carlots, bulk 0.0605c, packed 0.063c, tons 0.0655c, less 0.068c, eastern, freisht allowed; 0.0635c, 0.0655c, 0.0655c, 0.0735c and 0.078c, central; 0.0655c, 0.0655c, 0.06355c and 0.0685c, western; spot up 0.25c. western; spot up 0.25c.

Perrotungsten: Spot 10,000 lb or more, per lb contained W, \$1.90; contract, \$1.88; freight allowed as far west as St. Louis.

mum carbon; per ib contained Ti; ton lots \$1.35; less-ton lots \$1.40 eastern. Spot up 5c per lb.

Ferrotlianium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight al-lowed to destination east of Missis-sippi river and north of Baltimore and St. Louis, 6.8% C \$142.50; 3-5% C \$157.50.

Ferrovanadium: V 35-55%, con-tract basis, per ib contained V, fob producers plant with usual freight allowances; open-hearth grade \$2.70; special grade grade \$2.90. grade \$2.80; highly-special

Ferromolybdenum: 55-75% 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 with Rockdale, Tenn.; contract price \$58.50, spot \$62.25.

Ferrosilicon; Contract, lump, packed; Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.65c, ton lots 13.10c, smaller lots 13.50c; 80-90% c.l. 10.35c, ton lots 10.85c, smaller lots 11.35c; 75% c.l. 9.40c, ton lots 9.95c, smaller lots 10.45c; 50% c.l. 7.90c, ton lots 8.50c, smaller lots 9.10c. Prices are fob shipping point, freight allowed, per lb of contained Sl. Spot prices 0.25c hizher on 80-90%, 0.30c on 75%, 0.45c on 50%. Deduct 0.85c for bulk carlots.

Ferro-Borun: (B 17.50% min., Si allowed, per lb contained TI; ton 0.50% max.) per lb of alloy con-

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 l0c and 19.60c western; area up 25c spot up 0.25c. Calcium - Silicon:

(Ca 30-35%, 9 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.

Silicon Metal: Min. 97% Si and Silicon Metal: Min. 97% SI and max. 1% Fe, eastern zone, bulk, c.l., 12 90e; 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.

Siliconumanese, containing exactly 2 lb. Mn and about ½ lb. Si, eastern zone, bulk, c.l. 5.80c, ton lots 6.35c; central zone, add 0.25c for c.l and 1c for ton lots; western, add 0.55c for c.l. and 0.20c for ton lots. Ferreadileon, weighing about 5 lb, and containing exactly 2 lb. Si, or about 2½ lb, and containing exactly 1 lb. Si, packed, eastern zone, c 1. 3.90c, ton lots 4.15c, less ton lots 4.45c central zone, add 0.15c for c.l. and

central, \$1.40 and \$1.65, western; spot up 5c, Calcium-Manganese-Silicon; (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb. of alloy. Contract, carlots, per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less for bulk carlots. 17.100 - Calcium-Manganese Mangal, (Min 96% Ma

for blik carlois. Manganese Melal: (Min. 96% Mn, max. 2% Fe), per lb of metal, east-ern zune, bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c.

western, 30.55c and 35.05c. Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight al-lowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

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 \$201, 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 ton, \$2.00, less than ton \$2.10, eastern, freight all to we d: \$1.9125, \$2.0125 and \$2.1125, central; \$1.9445, \$2.0445 and \$2.1445, western; spot same as contract. Manganese-Boron: (Mn 75% approx., contract.

Borosli: 3 to 4% B, 40 to 45% Si, \$6.25 lb contained B, fob Philo, C., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

Carbortam: B 0.90 to 1.15% net ton packed 11.25c, ton lots 11.75c, less to carload, & per lb fob Suspension 12.25c, eastern, freight allowed; Bridge, N. Y., freight allowed same as high-carbon ferrotitanium. central; 13.25c and 13.75c, 14.50c

as mgn-caroon terrotriandin. Silicaz Allivy: (SI 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy 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, yestern; spot up 0.25c,

western; spot up 0.25c. Silvaz Alloy: (SI 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Tl 9-11% and B 0.55-0.75%), per lb of alloy. Con-tract, carlots 55.00c, 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.

spot up 0.25c. SMZ Alloy: (SI 60-55%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) per lb of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up 0.25c.

CMNZ Alloy 4: (Cr 45-49%, Mn 4-6%, Sl 18-21%, Zr 1.25-1.75% and C 3.00-4 50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 0.25c.

(¹¹⁸Z Alloy 5: (Cr 50-56%, Mn 4-6%, Sl 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c,

17.75

17.75

27.00

and 15.00c, western; spot up 0.25c. and 15.000, Western, spor up 0.28c. Zirconium Alloy: 12-15%, per lb of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per g r o s s ton 5102.50; packed \$107.50; ton lots \$103; less-ton lots \$112.50. Spot up \$5 per ton.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up 4c.

16.00c. Spot up 4c. Aialfer: (Approx. 20% AI, 40% SI, 40% Fe) contract basis fob Niagara Falls, N. Y., iump per lb 5.88c; ton lois 6.38c; less 6.88c Spot up 4c. Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, less-ton lots 9.75c per lb alloy; freich' not exceeding St. Louis rate allowed.

Tungaten Metal Powder: Spot, less than 97%, \$2.50-\$2.60; frei allowed as far west as St. Louis. freight

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Howards: Vanadum Pentoxide, t e ch n i c a l grade: Fused, approx. 89-92% $V_{c}O_{n}$ and 5.84% NA₂O; or air dried, 83-85% $V_{s}O_{n}$ and 5.15% NA₂O, \$1.10 per lb contained V.O₆, fob plant, freight allowed on quantities of 25 lb and over to St. Louis.

OPEN MARKET PRICES. IRON AND STEEL SCRAP

Prices are dollars per gross ton, delivered at consumer's plant except where noted. For complete OPA price schedule refer to MPR-4 **OPEN HEARTH AND BLAST FURNACE GRADES**

							Machine	Mixed		S
	-Heavy M	felting-	No. 1 Pusheling	No.1	Bundles	No 3	Shop	Borings,	Short Shovel	Cast Iron
New York	15.83	15 33	15.33	140. 1	15.33	13.33	10.33	10.33	19.83	Dorings
Philadelphia	18.75	18.75	18,75	18.75	18.75	16,75	13.75	13.75	15.75	14.75
*Boston	14 06	14.06	14.06	14.06	14.06	A	9.06	9.06	11.06	
Cleveland	19.50	19.50	19.50	19.50	19.50		14.50	14.50	16 50	13.50-14.00
Pittsburgh _	20.00	20,00		20.00	20.00		15.00	15.00	17.00	16.00
Mansfeld	20,00			20.00			15.00		17.00	10.00
Chicago	18.75	18.75	18.75	18.75	18.75	16.75	13.75	13.75	15.75	14.75
Buffalo	19.25	19.25	19.25	19 25	19.25		14.25	14.25	16.25	15.25
Detroit	17.32		17.32	17.32			12.32	Carlier.	14 32	13.32
St. Louis	17.50	10 50		10 50	10 50		10.50	10 50 11 00	12.50	11 50 10 00
Birmingham	19 50	19.50	17 00	19.50	19.50	15.00	10.50-11.00	10.50-11.00	12.50-13.00	11.50-12.00
San Francisco	17.00	17.00	17.00	17 00	17.00	9.00	7.00		12.00	13.00
Seattle	14.50	14.50					1.00			
Los Angeles	14.00	13.00		12.00	12.00		5.50	5.50		
			ELECTRIC FU	BNACE FO	UNDRY AND S	SPECIAL CR	ADES			
				Electric		I DONEL OIL	Cut St	ructural	No. 1 Chemica	1
	Bar Crops		Punchings and	Furnace	Heavy	Alloy Free	and Pla	ate Scrap	Cast Iron	Tin Can
-	and Plate	Cast Steel	Plate Scrap	Bundles	Turnings	Turnings	1 ft and under	2 It and unde	r Borings	Bundles
Philadelphia	21.25	21.25	21.25	19.75	18.25		21.25		°16.51	
INew York .	2.1.1.2.	****	17.83	16.33			17.83	17.33	14.33	
Cleveland	22.00		22.00	20.50			1.12.00	1111	13.31	
Pittsburgh	22.50		22.50				1.6-1.685			
Chicago	1944	1000	21,25							
St. Louis		20.00								
Birmingham .	15.50	15 50				7.00	19.00	18.50		14 50
Sau Flancisco	10.50	10.00		12.44		7.00	18,00	17.50		14.00
			STEEL	L GRADES O	OF RAILROAD	ORIGIN				
	No. 1 Heavy	10 11			Ra	ils				4
	R R Steel	Railroad	Autos	Desalling	Handom	Cut 3-It	Cut 18-in.	Railroad	Uncut	Angles,
Pittehurgh	21 00	22 00	28.00	Reforing	21 50	and under	and under	Specialties	Tires	Spilce Data
Valley	21.00	22.00	20.00	1.011	21.50	20.00		24.50		
Chicago	19.75	22.00		22.25	20.25	22.25	23.50	22.75		22.25
St. Louis	1111	22.00	24.50	21.00	19.00	21.50			21.00	21.00
Cincinnati	2012		04.00	00 70	20.50-21.00					00.50
San Eranoison			24.00	20.50	18.50	1111			00 50	20.50
Seattle	14.50		24.00	1. 2000	10.00			. + + + + + +	20.50	
	Nr. 1	m	**	CAST II	ION GRADES					
	No. 1 Cupala Cast	Charging	Heavy Brookable Cost	Stown Blats	Unstripped	Mallashia	11 1 . 61 .	Clean	No. I	Burnt Cast
1New York	25 00	PUL Cast	20 00	23.00	90.00	Mancable 94.00	Brake Shoes	Auto Cast	wheels	P Durin Calor
*Philadelphia	25.00	21.00	20.00	20.00	20.00	24.00	17.75	27 00	22.00	
Boston	25.00		20.00	23.00	-0.00			27.00		
Buffalo	25.00	21.00	20.00	23.00	20.00	24.00	17.75	27.00	22.00	17.75
Cleveland .	25.00		20.00		1.4.4.4					
-ratsburgh .	25.00		20.00	23.00						
Chicago	25.00					24 00				
						ALC: ULL				

" Fob shipping point; I fob tracks; I dealers buying prices.

21.00

20.00

20.00

20.00

23.00

23.00

23.00

20.00

25.00 25.00 25.00

25 00

25.00

Detroit St. Louis Cincinnati

Birmingham •Seattle

22.00

22.00

17.75
NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 14.37 $\frac{1}{2}$ c, del. Conn.; less carlots 14.50c, refinery. Dealers may add $\frac{3}{4}$ c for 5000 lb to carload; 1c, 1000-4999 lb; 1 $\frac{1}{2}$ c, 500-999 lb; 2c, 0-499 lb Casting, 14.12 $\frac{1}{4}$ c, refinery. 20,000 lb or more; 14.37 $\frac{1}{2}$ c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 15.50c; 88-10-2 (No. 215) 18.75c; 80-10-10 (No. 305) 18.25c; No. 1 yellow (No. 405) 12 50c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis; high grade 9.25c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb, 0.4c; under 2000 lb 0.50c.

Lead: Common 8.10c, chemical 8.20c, corroding, 8.20c, E. St. Louis for carlots; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha dis'ricts; add 15 points for Cleveland - Akron - Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston - Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., plgs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ¼c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 13.25c; No. 12 foundry alloy (No. 2 grade) 13.25c; steel deoxidizing grades, notch oars, granulated or shot: Grade 1 (95-974%) 14.50c; grade 2 (92-95%) 13.25c; grade 3 (90-92%) 12.25c; grade 4 (85-90%) 11.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; 14c 5000-10,000 lb; ¾c 1000-5000 lb; 14c less than 1000 lb. Prices include treight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (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.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500, Grade A, 99 8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 51.871/c; Grade C, 99.65-99.79% incl. 51.621/c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% 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; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 999-224 lb; and 2c for 223 lb and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, fob refinery 35.00c lb; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c.

Mercury: Open market, spot, New York, \$96-\$99 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, \$14.75 per ib contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, slicks, and all other "regular" straight or flat forms \$1.25 lb, del.; anodes, balls, discs and all other special or patented shapes, \$1.30.

Cobalt: 97-99%, \$1.50 lb, for 550 lb (bbl.); \$1.52 lb for 100 lb (case); \$1.57 lb under 100 lb.

Gold: U. S. Treasury, \$35 per ounce.

Indium: 99.9%, \$2.25 per troy ounce.

Silver: Open market, N. Y. 89.00c per ounce.

Platinum: \$91.50 per ounce.

Palladium: \$24 per troy ounce.

Iridium: \$125 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 14.37%,c, Conn., for copper, Freight prepaid on 100 lb or more.)

Sheet: Copper 25.81c; yellow brass 23.67c; commercial bronze, 95% 26.14c, 90% 25.81c; red brass. 85% 24.98c, 80% 24.66c; best quality 24.38c; phosphor bronze, grade A 4% or 5%, 43.45c; Everdur, Duronze or equiv., hot rolled, 30.88c; naval brass 28.53c; manganese bronze 31.99c; muntz metal 26.78c; nickel silver 5% 32.38c.

Reds: Copper, hot rolled 22.16c, cold drawn 23.16c; yellow brass 18.53c; commercial bronze, 95% 25.83c, 90% 25.50c; red brass, 85% 24.67c; 80% 24.35c; best quality 24.07c; phosphor bronze, grade A 4% or 5% 43.70c; Everdur, Duronze or equiv, cold drawn, 29.82c; muntz metal 22.34c; nickel silver 5% 34.44c.

Seamless Tubleg: Copper 25.85c; yellow brass 26.43c; commercial bronze 90% 28.22c; red brass 85% 27.64c, 80% 27.32c; best quality brass 26.79c; phosphor bronze, grade A 5% 44.70c.

Copper Wire: Bare, soft, fob eastern mills, carlots 19.89c, less carlots 20.39c; weatherproof, fob eastern mills carlot 22.07c, less carlots 22.57c; magnet, delivered, carlots, 23.30c, 15,000 lb or more 23.55c, less carlots 24.05c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet wid'hs as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32 90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
02.04	3"-94"	25 600	29.20c

Lead Products: Prices to jobbers; full sheets 11.25c; cut sheets 11.50c; pipe 9.90c, New York, 10 00c Philadelphia, Baltimore, Rochester and Buffalo, 10.50c Chicago, Cleveland, Worcester and Boston.

Zinc Products: Sheet fob mill, 13.15c, 36,000 lb and over deduct 7%. Ribbon and strip 12.25c, 3000-lb lots deduct 1%, 6000 lb 2%, 9000 lb 3%, 18,000 lb 4%, carloads and over 7%. Boller plate (not over $12^{\prime\prime}$) 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lb 12.50c; 100-500 lb 13.00c; under 100 lb 14.00c. Hull plate (over $12^{\prime\prime}$) add 1c to boller plate prices.

PLATING MATERIALS

Chromie Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lb to 1 ton 17.75c; under 400 lb 18.25c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval over 15 in., 25.125c; curved, 20.375c; rourd oval straight, 19.375c; electro-deposited, 18.875c.

Copper Carbonate: 52-54% metallic Cu. 250 lb barrels 20.50c.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls 34.00c, fob, Niagara Falls.

Sodium Cyanide: 96%, 200-lb drums 15.00c; 10,000-lb lots 13.00c fob Niagara Falls.

Nickel Anodes: 500-2999 lb lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

Nickei Chioride: 100-lb kegs or 275-lb bbls 18.00c lb, del.

Tin Anodes: 1000 lb and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb bbls 39.00c, fob Grasselli, N. J.; 100-lb kegs 39.50c.

Sodium Stannate: 100 or 300-lb drums 36.50c, del.; ton lots 35.50c.

Zinc Cyanide: 100-lb kegs or bbls 33.00c fob Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lb fob shipping point. Add %c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean	Rod	Clean
	Heavy	Ends T	urnings
Copper	12.000	12.000	11.250
Commercial bronze	0.010	5.020	
95%	11.250	11.000	10.500
90%	11.125	10.875	10.375
Red Brass			
85%	10.875	10.625	10.125
80%	10.875	10.625	10.125
Rest guality (71-79%).	10.500	10.250	9.750
Munta molal	9 250	9.000	8.500
Multic metal	10.500	10.250	
NICKEI SILVEL, J.O.	12 750	12 500	11 500
Phos Dr., A, D, 570	0.500	0.250	8 750
Naval brass	9.500	0.050	9 750
Manganese bronze	9,500	9.200	0.100

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are fob shipping point; add ½c for shipment of 60,000 lb of one group and ½c for 20,000 lb of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper and copper borings 11.50c; No. 2 copper wire and mixed heavy copper, copper tuyeres 10.50c.

(Group 2) Soft red brass and borings, aluminum bronze 10.75c; copper-nickel solids and borings 11.00c; lined car boxes, cocks and faucets 9.50c; beil metal 17.25c; babbitt-line brass bushings 14.75c.

(Group 3) Admiralty condenser tubes, brass pipe 8 75c; muntz metal condenser tubes 8.25c; old rolled brass 8.25c; manganese bronze solids; (lead 0%-0.40%) 8.00c; (lead 0.41%-1%) 7.00c; manganese bronze borings, 7.25c.

Aluminum Serap: Price fob point of shipment, truckloads of 5000 pounds or over: Segregated solids, 2S, 3S, 5c lb, 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50c, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb borings and turnings one cent less than segregated.

Lead Scrap: Prices fob point of shipment. For soft and hard lead, including cable lead, deduct 0.75c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.75c, fob point of shipment, add ½c for 10,000 lb or more New die cast scrap 4.95c, radiator grilles 4.95c, add ½c for 20,000 lb or more. Unsweated zinc dross, die cast slab 5.80c, any quantity.

Nickel, Monel Scrap: Prices fob point of shipment; add ½c for 2000 ib or more of nickel or cupro-nickel shipped at one time and 20,000 ib 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 ib 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.

Monet: No. 1 castings, turnings 15.00c; new clipping 20.00c; solder sheet 18.00c.

Sheets, Strip . . .

Heavy yearend carryover is inevitable as fourth guarter preference tonnage is showing increase

Sheet & Strip Prices, Page 182

New York — Every indication points to heavy carryover in sheets at the end of this year, even greater than many anticipated a short time ago. Some producers who had set up quotas for fourth quarter only later to be confront-ed by possibility of having to reduce them, because of the volume of rated tonnage being received, have more re-cently decided to do nothing about reducing quotas but rather let the tonnage that they can't handle fall into next year.

They explain that they still don't know how much rated tonnage they will have to supply over fourth quarter and that any effort now to reduce quotas so as to make the end of the year come out more evenly would be unsatisfactory and, in fact, would be a waste of time and effort. In a few cases producers did not set up quotas at all, figuring that their current arrearages, combined with what rated tonnage they would receive, would take up entire fourth quarter production. These producers, consequently, may come cut at the end of the year with their order books in reasonable balance. However, they will be the exception.

Certain sheet producers estimate that they will be at least two months behind at the end of the year and possibly more, especially on hot and cold-rolled sheets and galvanized. In the case of the latter, producers are especially fearful that their carryovers will be heavy, because of shortage of zinc, which already has very definitely affected output at some mills.

On stainless steel sheets the outlook is more promising. Some producers, knowing about where they stand on fourth quarter orders, have opened books for first quarter. They are now accepting orders not only from their manufacturing customers but from job-bers as well, promising the latter the same tounage as set up for the current quarter.

Philadelphia - Sheet producers continue to have difficulty meeting even the greater portion of demand. Due to rated tonnage for the housing program they have little to spare in galvanized for other requirements, a situation also complicated by shortage of zinc. The carryover in hot and cold-rolled sheets at the end of third quarter was somewhat less than at the end of the preceding quarter, but nevertheless was still heavy and in some specialities require-ments for electrical sheets remain far in excess of capacity. Expansion in electrical sheet facilities, due originally to be increased in September, have been held back because of inability to obtain equipment, with the result that it probably will be well into first quarter before there will be any material relief in this respect. The situation in stainless steel sheets is probably easiest of all, at least to the extent that some producers have been able to gage their position accurately enough to open books for first quarter. However, there is considerable stainless moving, with increase in de-mand for beer kees a feature here.

Pittsburgh - Sellers are not expected

to be free from priorities and directives until the end of first quarter. In fact, it is possible that preference rating soon may be extended to cover steel shipments to the West Coast and for railroad freight car construction, while rated ton-nage for export and military needs likely will be increased. Producers claim that although rated tonnage is relatively small in contrast to total output the fact that lead dates frequently are ignored and orders from other than regular customers must be accepted has caused much schedule dislocation and reduced output. Carryover into fourth quarter is unusually heavy but most producers scheduled relatively few orders for fourth quarter with the intention to clear up deferred orders if possible. Power strike here has not affected steel mills as they have their own power sources.

Chicago - Sheet and strip makers are taking some encouragement from the fact that new orders are falling significantly below the ratio of shipments to capacity. This may or may not be of lasting importance, but if it continues it may portend that production is gaining on demand. Nevertheless, it would be many months before carryovers could be reduced and shipments become cur-Cancellations are virtually abrent. sent.

Boston-Fabricators of flat-rolled steel are uncertain as to the first-half supply and relatively little new tonnage is being accepted for that period on a firm basis. Mills are making disappointing progress toward reducing prospects of heavy carryovers on most grades. They are hampered by additional rated volume for fourth quarter. Until the extent of the carryover is more definitely established, first and second quarter schedules cannot be estimated. Meanwhile, consumers generally with inventorics appear to recognize the mills' position more clearly, accepting the inevitable as to continuance of limited supplies over the next few months. Narrow cold-rolled strip production is disappointing and operations at con-sumer plants are adversely affected in more cases. Potential production of new fabricated strip products is notably re-tarded, especially if the prospective consumer is a new user of strip in low carsumer is a new user of strip in low car-bon grades. One of the few contracts against Springfield Arseral inquiries, which have often brought no bids, has been placed. This was on a bid Sept. 12 on several hundred tons by T. J. Rafferty & Co., Worcester warehouse.

Cleveland-Increase of 3½ cents per 100 pounds in delivered prices of finished steel, including sheet and strip, at Toledo, O., Detroit, eastern Michi-gan, Gulf and Pacific coast basing points will restore the normal balance between these arbitrary mill basing point values and other basing point prices. The increases were authorized to permit mills to charge the same pro-portion of the July 1 freight increase to the consumer at the named points as they already are permitted to charge at regular basing points. Although OPA said that under the former maladjust-ment producers would "find it to their advantage to refrain from shipping iron and steel products into these territories, scllers state that shipments to these districts have not been curtailed due to the unsatisfactory price situation.

CC ratings for delivery of iron and

steel products became valid on the first of this month, restoring the system which was in effect prior to Jan. 21. If a manufacturer can show urgent need for steel and can fulfill certain requirements, he can obtain preferential treat-ment. In addition, self-certified orders placed on mills for September delivery but which were carried over to October must now be treated as CC orders for the current month. Sellers of flat-rolled products report that rated orders account for as much as 25 per cent of bookings for October on some products. Priorities are especially heavy for coldrolled, galvanized, and enameling sheets. This is expected to become an increasingly serious problem with mills in arranging schedules. So far CC ratings have been authorized chiefly under the veterans' housing program but rail-roads are expected to be granted prefercntial treatment soon, which will further complicate the mills' problem of making an equitable distribution of their output.

Cincinnati _ - Schedules of district sheet mills are still being upset by inroads by rated orders. Hence there is an uncertainty as to how nonrated consumers will fare during four h quarter. Although first quarter books have not been opened, it appears certain the supply will be no easier. A recheck dis-closed carryover from third quarter not as heavy as in earlier estimates. Production continues high.

St. Louis — Sheet production is on the increase al'hough hampered by a shortage of bricklayers needed for maintenance on some open hearths, soaking pits and slab furnaces. Continuing refusal of new orders is enabling mills to pick up ground on backlogs. Bocks are filled now through arst half and will not be reopened until January or February. September output was 60 per cent of capacity and October and November are slated for 80 and 100 per cent, respec-tively. Two of the three new open hearths Granite City Steel Co. leased from DPC are on, and the third is to start operation in October. Mills hope to be on top of their orders by the end of June. Pressure for sheets continues to increase. Sheets lighter than 18 gage

are in especially great demand. Birmingham — Shects are tightest of all specifications in steel in this district. Not only is demand phenomenal from regular sources for such staple items as roofing, but processing sheets are a cause of more than ordinary concern with apparently no end to demand. Mills are working at capacity with a little switching of ingots evident here and there, but no end to the current squeeze is immediately apparent.

Semifinished Steel . . .

Semifinished Prices, Page 182

Cleveland - Prices of semifinished steel, including ingots, blooms, billets, slabs, and sheet hars, have been increased, effective Oct. 9, 50 cents per gress ton at Toledo, U., Derroit, easiern Michigan, Gulf and Pacific Coast basing This action was taken by OPA points. to permit sellers to charge the same proportion of the July 1 freight increase to the consumer at the named points as they are already permitted to charge under the basing point system where the con-sumer bears all freight increases from the basing point to delivery point.

Steel Bars

First quarter books open for alloy and cold-drawn bars but delayed on hot carbon material

Bar Prices, Page 182

Pittsburgh - Bar mill production held at practical capacity last week in spite of complete shutdown of public transportation because of the electric util-ity strike. Sellers are not expected to open books officially for arst quarter until more accurate estimates of yearend carryover can be made. Most producers find third quarter carryover is two to three months. Anscheduled relatively few orders for fourth quarter shipment. However, production in third quarter was not up to expectations, with the result that most producers believe the yearend carryover will absorb all January output. Considerable tonnage for export is in the offing for fourth quarter, in addition to that al-ready scheduled for European coun-tries. If approved, this directive ton-nage will lutther dislocate production schedules for demontion schedules for domestic account.

New York - While hot carbon bar producers are under heavy pressure from buyers for commitments on first quarter buyers for commitments on first quarter tonnage, they, in general, still have not formally opened books. They explain that they are far behind on commitments and still are not able to gage accurately what they are going to be able to pro-duce over the remainder of this year. However, some business is being taken, and it would not be surprising if some of larger sellers will take general action socn. Already books have been opened for årst quarter on alloy bars and coldfor arst quarter on alloy bars and cold-drawn carbon bars. The greatest scarcity continues in small sizes of hot carbon bars, anything, in fact, under 1½ inches. Railroad equipment builders are driving hard for tonnage for new construction and repairs, tonnage required for this year.

St. Louis - Production of merchant bars remains high but is losing ground to demand. Bar mills are having in-creasing trouble getting piz iron, coke and scrap, although no shutdowns are in ight yet. Because all but essential new orders are being rejected, some progress on the backlog is being made. Bar deliveries on the average are six to seven months late. All new business is on a null convenience basis. Attempts are being made to reduce export tonnage and a substantial order from France for railroad and dock reconstruction work was turned down recently.

Seattle -- Demand for bars continues at a peak but mills are refusing much at a peak out mills are refusing inden business, striving to reduce current back-logs. Books for 1947 will not be opened initial later. One plant here recently re-fused 2000 tons, 1200 of which were from warcheuses. It will probably be well into next year before present comwell into next year before present com-mitments are delivered. A large tonnage is required for reclamation projects but this is affected by the freezing order. In many instances contents are unable to many instances contractors are unable to bid because they cannot obtain materials. Mill production is affected by labor turnover and inefficiency.

Philadelphia - Producers of hot car-

bon bars continue far behind on commitments for smaller sizes and when they open books to the general trade for arst quarter it is likely they will be fully sold out for the period. Some producers, in fact, probably will be sold out for well beyond that. As some producers already have formally opened books beyond Dec. 31 on cold-drawn carbon bars and hot and cold alloys, commitments for first quarter are expanding. With agri-cultural equipment manufacturers no longer favored by preferences, relatively little rated tonnage is being booked for this industry.

Cleveland — Deliveries of bars are being made this month on "CC" ratings for the first time since Jan. 21 when the system was suspended. These orders account for only a small propor-tion of total bookings and have not caused any major revisions in schedules. The increase of 31/2 cents per 100 pounds in delivered prices, effective Oct. 9, at Toledo, O., eastern Michigan, Gulf and Paciae coast basing points will not result in any increase in shipments to those such as in the second s gust, although producers have not for-mally accepted them or attempted to make delivery promises with large sizes in fairly free supply. Some consumers have switched to alloy specifications in order to get prompter delivery but others have hesitated to do so because of the substantially higher costs.



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October 7, 1946

189

WARKET NEWS

Steel Plates

Output far below needs as scrap shortage limits steel; light gages most delayed, well into next year

Plate Prices, Page 183

New York — With plate producers still unable to operate at capacity, for any one of several reasons, principally because of shortage of scrap, consumers report increasing difficulty in getting shipmen's. In some cases they report that suppliers are weeks behind on current promises and see no early signs of improvement. Light plate is espe-cially scarce, as it has been through-out the greater part of this year.

Hewever, buyers have less difficulty getting orders placed for next year for plates than for other major products. Various mills, although not all, are ac-cepting orders for first quarter and be-yend. One independent has capacity fully scheduled for first half. Demand from car shops is more active than in considerable time, due not only to in-creasing equipment orders being placed but to urgency for getting out work on

books and for making needed repairs. Boston — Volume of plate orders be-ing placed is limited, with most mills sold through the year, confronted with high but uncertain carryovers and with



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many unentered orders still to be submilted to mills for scheduling. With carryover and orders awaiting space pro-ducers are in second quarter. Until extent of carryovers is known most are practically out of the market. Notably difficult is placement of tank steel, a grade affected by selectivity in accep-tance of orders for some months. As a result backlogs in this grade are con-

centrated heavily, with two producers taking orders to the timit of the r apility. Cleveland — Price increase of 3½c per 100 pounds at Toledo, O., Detroit, east-ern Michigan, Gulf and Pacide Coast ports will become effective Oct. 9 on plates. Sellers point out that this will not result in any increase in the proportion of total output that is being shipped into these territories because price consid-erations have not been a factor in determining allocations of the supply. CC ratings became valid Oct. 1 but have been applied to only a few orders in this district. Sellers have not opened books for 1947 and when they do April

generally will be the earliest position. Philadelphia — Shortage of scrap and pig iron, particularly the former, con-ticues to handicap eastern plate producers. In no case is production at normal and in some cases well below. Last month one producer turned out about 30 per cent of what he ordinarily would, because of difficulty in getting raw ma-This situation has made it diffiterials. cult, if not impossible, for most plate cuit, if not impossible, for most plate preducers to make progress on current commitments and this, combined with future commitments, has built backlogs extending into second quarter, even on the basis of normal production. With orders so far advanced and with West Coast preduction being increased there may be some cancellations or adjustments may be some cancellations or adjustments affecting later schedules but so far there have been few such developments, according to district mills. One plate pro-ducer whose operations have been hit by pig iron and scrap shortage, although not the hardest hit, claims that if he were to get back to normal production he could roll present commitments in seven months, but that if he were forced to continue at the present rate of output rolling of orders on books would require

Scattle — Bids were opened here Oct. Scattle — Bids were opened here Oct. 3 for the Bow Lake pipe line, requiring 36,695 feet of 30 to 72-inch steel water pipe, totaling 5000 tons, with alternate bids on concrete pipe. Oregon Culvert & Pipe Co., Portland, Oreg., is low at \$14,790 to the forest service for 5760 foot of compressed metal culvert pipe. feet of corrugated metal culvert pipe.

Wire . . .

Wire Prices, Page 183

Pittsburgh - Many consumers of wire are altempting to get on mill books for first quarter delivery, with little success. as producers arst must have a clear indication of carryover into next year. On many manufacturers and merchant wire items this tonnage is expected to absorb more than half of first quarter output. Estimated 1947 nail requirements of 835,000 tons will necessitate further increase in production to about 70,000 tons monthly. Present monthly output is estimated at 66,000 tons. In the effort to increase nail production CPA is said to be considering an incentive premium payment plan applicable to all tonnage over the established quota. Boston — Overall prospects for an im-

proved supply of rods has not improved, although some users currently have slightly larger stocks, due to mild, tem-porary improvement in deliveries against old orders. Demand for drawn wire is unabated and slight inroads are being made on backlogs, although integrated mills manage to maintain a high rate of ingot production. Cable works have an improved supply of copper but shortages in other components handicap heavier production. Output centers heavily in high-carbon. Users of low-carbon stocks are in need cf wire. Screw and small fastener producers are pressing for more rods and wire.

Structural Shapes . . .

Structural bookings and shipments show increase in spite of restrictions by CPA on nonhousing

Structural Shape Prices, Page 183

New York - August bookings, according to the American Institute of Steel ing to the American Institute of Steel Construction, amounts to 161,567 tons, compared with a revised total for July of 135,502 tons. The total for the first eight months was 1,264,435 tons, against an average of 956,887 tons for the five prewar years, 1936-1940, an increase of 32.1 per cent. August shipments totaled 145,137 tons, the largest for any month reported this year, and brought the total for the first eight months to 924,953 tons, against an average of 936,890 for the five prewar years. Tonnage available the five prewar years. Tonnage available for fabrication within the remaining four menths this year was reported at 651,461 tons, against 350,517, the average for

the five prewar years. Philadelphia — Heavy structural work continues to lag because of CPA restric-tions. Not only are new inquiries and orders definitely down from a few weeks ago but some orders already placed are being held up at least temporarily. Fur-thermore increased costs, par.icularly in labor, are holding up work exempt under CPA regulations, public work especially. On the other hand some work is going ahead, including 600 tons for four Bell telephone buildings in Philedelphia and vicinity, placed with Betblehem Steel Co., Bethlehem, Pa., and 300 tons for a state bridge at Clifton, N. J., placed with American Bridge Co., Pittsburgh. The latter fabricator is understood to have booked 1900 tons for a power station at Waren, Pa., are enzineers. CPA disbeing held up at least temporarily. Fur-Reading, Pa., are enzineers. CPA dis-trict office for the period Sept. 20-26 ap-proved 30 projects, valued at \$600,327, and denied projects valued at \$1,326,464. Fabricators and shape mills, however, still have substantial backlogs, running well into next year.

Scattle -- CPA restraint on building is felt deeply in this area, resulting in

is felt deeply in this area, resulting in decreased inquiry for steel and other ma-terials, especially in the case of small plants. Much steel already placed is afloat, delayed by the seamen's strike. Some small jobs, under 75 tons, are being accepted but completion is uncertain. Boston — Most fabricated structural steel contracts being placed here are for prejects outside this district. New in-quiry is light and with placement of the few contracts now pending active ton-nage will be substanially reduced, al-though some contracts have been can-

celed and others postponed. These are scattered about the country. E. B. Badger Co., Cambridge, Mass., requires a large tomage for a reducry at Bay-town, Tex. Although inquiry has de-clined and is being reflected in fabricating shops, mills have not experienced any letdown or easing yet. Ciucago — Fabricators are pressing

mills hard for standard structural shapes. They have much work in progress and jobs become held up for lack of sufficient material or sizes to maintain schedules. Inventories cf shapes are low and in their smaller shape mills, demand for the output far exceeding capacity. The situation is further complicated by having insufficient semifinished steel to allocate to the various structural mills. The excessive demand for flat-rolled products, such as sheets, has operated to the detriment of structural steel.

Tubular Goods . . .

Tubular Goods Prices, Page 183

Pittsburgh — Pig iron shortage con-tinues to restrict production of cast iron ripe and this has held up a number of municipal projects, while others have been dropped, at least temporarily. Limited production of tube rounds and skelp prevent full operation among nonintegrated interests and there is little indication of much improvement in supply before the end of the year. Exception-



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D-6

October 7, 1946

ally heavy demand is expected to keep steel pipe inventories of distributors well below normal, although mill pipe production currently is unusually high. Producers are booked solidly through the remainder of the year on small diameter light-wall tubing, with late December available on larger sizes. Unusually heavy tubing demand is noted from automotive and railroad industries. Producers dc not expect much interruption to production from CC rated tonnage this quarter.

Pig Iron . . .

Supply still short, demand heavy, with incentive plan not yet showing effect; coke supply inadequate

Pig Iron Prices, Page 185

New York — Preference tonnage for October will amount to about the same as for September as far as this district is concerned. At least that is the opinton of some leading pig iron sellers. It is still too early to gage the effect of the price incentive program this month on foundry and malleable iron production; however, it should result in some improvement.

One complication, though, is scarcity of coke. This may become even more pronounced because of increasing production of foundry and malleable iron, which requires a greater percentage of coke than basic iron. Mclt in this district in September was down appreciably from the preceding month, due primarily to strikes of truckers and salt water scamen. Brooklyn foundries were particularly handicapped. However, while there are still some laber disorders among the truckers and new strikes have developed along the water front, the general opinion is that these disruptions will be ironed out fairly soon and will not have the bearing on foundry production this month that they did in September.

Pittsburgh — Inadequate electric power, developing from the strike of electric utility employees, has forced many foundries to curtail operations, due to inability to operate certain equipment. Some foundry interests hope to accumulate some pig iron in the interval, as well as coke and cast scrap. The local merchant blast furnace expects little change in volume of rated orders for October, in spite of removal of agricultural implement manufacturers from the preferred category. Critical shortage of scrap has forced nearly all foundries to increase proportion of pig iron in their mixtures, which adds to the general tightness in pig iron.

Cincinnati—Supplies of pig iron to foundries in this district continue on the September level which, in the lack of easy scrap, held down the melt on unrated castings. Dependent on other districts for foundry iron, melters here are unable to predict what effect. if any, the premium price plan will have on allotments

Boston — For the next two months at least no easing in pig iron is in sight,



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30 DUNDAFF STREET, CARBONDALE, PENNA. Sales Offices In Principal Cities with an increasing number of foundries confronted by stoppages, due to lack of iron. Included is one large machine tool builder and one textile mill equipment builder. The latter is also affected by shortages at ten foundries supplying castings under subcontracts. October schedules are being lined up after delays because of extensions of acceptance of rated tonnage until Oct. 5.

Although under pressure, Mystic furnace, which goes into blast Nov. 15, is not accepting arm orders until the volume of rated orders on that producer is established. First production will be spread thinly and ore supply will have to be increased if the stack is to continue in blast more than three months. Shortage of castings is opening the field for weldments and stampings in several industries forced to improvise.

Philadelphia—Pending anal word Oct. 5 as to what they would be called on in preference tonnage to supply in October, district pig iron sellers have started shipments on the basis of last month's distribution. Production of foundry and malleable iron is expected to show some improvement as a result of the price incentive program and while rated consumers will get what they need, output will still fall far short of what nonrated foundrics would like to have.

However, fast becoming a greater obstacle than even pig iron itself is coke. With rated consumers increasing their needs for coke, 200 to 300 per cent in some cases, as compared with a year ago, and even more, district by-product producers are fairly swamped. The situation has been made particularly critical as producers have little or no stocks on which to rely. Efforts of eastern seaboard consumers to obtain beehive coke from western Pennsylvania have been largely unsuccessful so far. Also adding to the scarcity is the expanding production of foundry iron, which requires a greater quantity of coke.

Buffalo—Although pig iron output has reached levels attained during the war, producers are falling far short of filling pressing demands of foundries. The trade was surprised this week by the arrival of a boat with 5000 tons of pig iron from the Detroit section, presumably for a local automotive caster. Producers continue to search for coke and ore supplies to maintain present operating schedule. There is a possibility that one furnace may be shut down soon because of the coke problem.

Chicago — Foundries, loaded with orders for castings, are caught firmly between the shortages of both pig iron and cast scrap. Most are operating handto-mouth on both. More than normal iron has to be used to offset lack of scrap. Of the district's 41 blast furnaces, 37 are operating, but only a fraction of the output goes into merchant iron, most being required for steelmaking. Foundries making items for housing are hoping WAA accepts Inland Steel Co.'s bid for the DPC blast furnace plant, as it would provide between 20,000 and 24,000 tons of merchant iron per month to be applied to the housing program. Some announcement on the sale is expected before Oct. 9 when Inland's lease on the plant expires.

St. Louis — Pig iron production remains at capacity. Operations for some time have been limited to basic iron, hence the effect of the premium production plan has not been felt. Large users have sufficient supplies although there are virtually no ground stocks. Shipments from outside have been hampered somewhat by production delays and car shortages. Any further drop, it is reported, will endanger local supplies seriously.

Birningham — Pig iron scarcities continue to trouble merchant iron melters. Demand seems without end and in unpredictable quantities, especially from foundries and scattered industrial plants. Best estimates are that an additional 50 per cent iron is needed in this terrtory.

Scrap . . .

Little gain in shipments as collectors find profit narrow; consumers search widely for supply

Scrap Prices, Page 186

Pittsburgh - Additional steel producers have obtained approval to buy electric furnace scrap grades for open-hearth use. In an effort to balance consumer scrap inventory CPA is expected soon to issue regulations limiting consumer cast scrap stocks to 30 days supply and 45 days for other grades. It was earlier expected that scrap dealers would have to balance collections with shipments to consumers but this has not materialized and dealers are free to accumulate scrap. Steelmakers continue to rely heavily on dwindling scrap inventories with most scrap orig-inating directly from fabricators, resulting in considerable cross hauling while railroad cars are scarce. Mills claim railroad cars are scarce. Mills claim there is no alternative. Government scrap drive collections are gaining mo-mentum. OPA has agreed to put up for consideration at the next industry advisory committee meeting the request of a group of electric furnace and acid open hearth operators here that billet, bloom and forge crop scrap be restored as a separate listing at a differential of \$5 per ton

Chicago — Although flow of scrap is at a slightly higher level than before OPA announced its price decision, it continues far below demand. Roughly the supply is about equal to current consumption. Demand is at its high level because mills are trying strenuously to improve inventories, now disturbingly low since winter weather is not far away. There appears to be little hope of stocking much material until industrial production generates more tonnage, and this is dependent upon a better flow of ànished steel from mills. Carnegie-Illinois Steel Corp. has received government approval to acquire and use 25,000 tons of electric furnace steel in its Gary open hearths; request to make similar use of 15,000 tons at South Works so far has netted approval for 7500 tons. Inland Steel Co. was granted similar approval for an unstated tonnage. Cast scrap is now as tight as before OPA granted celling price increase; price apparently being unable to improve volume except immediately after the advance.

immediately after the advance. Cincinnati — All melters are pressing for heavier scrap shipments, loudest appeals being for cast. Brokers and dealers have scoured sources of cast scrap but have had only moderate success in bringing out additional tonnage. Others besides foundries are hard put for adequate scrap as middle interests allot sup-

plies as best they can to meet most urgent needs. The market has noted slight, if any, gain recently in production scrap.

Philadelphia — Little improvement is noted in scrap and in spite of possibility of stiffer controls on inventories, as discussed recently by the CPA steel scrap advisory committee in Washington, the outlook is still poor, as viewed by most trade leaders. Meanwhile, district operations continue restricted by lack of scrap. The Philadelphia Navy Yard recently sold 4000 tons of unprepared scrap, 2000 tons of mild steel going at the ceiling of \$14.01 and 2000 tons of alloy scrap at \$15.75. Some eastern consumers have been permitted by Washington to buy low phos scrap for basic open hearth usc. They assert, however, that as they are insisting on the material being up to specifications they are not getting much relief.

Cleveland—Little relief is apparent in the steel and iron scrap situation, collectors and yards apparently being apathetic in view of their facting that the margin of proat is too small under present regulations to cause effort on their part. As a result shortage continues and melters are cutting into reserves or operating on daily receipts. Lack of scrap is made up by larger proportion of pig iron. Further reducing supply of the latter for other users. Low phos grades continue to be taken tor open hea.ths, un-



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der government permission. Cast scrap is in somewhat better supply but still is fur short of needs.

Boston — Movement of steel and cast scrap continues limited and some dealers are reluctant to release tonnage of the former at current prices. Cast supply is limited and in some cases low phos is going to open hearths. Foundries are melting a high ratio of scrap with the percentage as high as 90 to 100 per cent in some cases, including the valve foundry in the Springâeld district. Shortage of pig iron accounts for this, but the high scrap ratio in melts intensifies the pressure on the limited supply being released.

New York — Scrap shipments still fall far short of requirements, this even applying to cast grades, on which some price relief was granted recently. One fundamental difficulty with cast scrap is that so little is being produced. Meanwhile, upgrading of scrap on a large scale is being reported.

is being reported. Birmingham — Scrap is piling up on local yards. Not a great deal of it, according to reports, is of the most desirable grade, but it is not moving except in negligible amounts. Processing has been hampered by labor shortage and bad weather, although steelmaking has not yet actually suffered a setback on that account.

Warehouse . . .

Warehouse Prices, Page 184

Philadelphia — Having experienced one of the best months of the year in September, Philadelphia jobbers differ in appraisal of the outlook for the remainder of the year. Much depends on ability to obtain steel for mills, and while some believe incoming shipments will decline, now that preferences under Direction 13 have lapsed, others believe shipments in general will be maintained, if not actually increased. The latter admit, however, that this may not be true with regard to some of the more critical items, such as sheets and small carbon bars. They are not certain about light shapes, either.

Pittsburgh — Steel distributors expect substantial reduction in mill shipments this quarter, with expiration of Direction 12, under which steel producers shipped warehouses not less than the same proportion of total tonnage produced in third quarter as in fourth quarter of 1945. Demand for warehouse steel remains well above ability of distributors to satisfy. In spite of slightly improved mill slipments in August and September warehouse inventories are well below normal and unbalanced, particularly in sheets, plates, small bars and most structural items. Distributors cannot use customers' CC ratings as a basis for obtaining steel from mill. However, this type tennage has been relatively light so far.

Boston — Inventories of distributors for fourth quarter are less than in third quarter, although tonnage from mills during the directive period was slightly heavier. Distributors, however, were unable to build up stecks, most steel moving out promptly against new and back orders. Prospects for the final quarter are not bright for mill shipments after lapse of the directive, some producers baving advised that less steel will be forthcom-



ing to warehouses. Coverage for 1947 is limited, due to reluctance of most mills to take on firm orders for that period on many products.

Iron Ore . . .

Iron Ore Prices, Page 184

Iron ore movement from the Lake Superior region dropped in September to 9,636,353 gross tons, a a decline of 906,746 tons from September, 1945, or 8,60 per cent. For the season to Oct. 1 this year movement totaled 43,259,634 tons, a decrease of 18,412,137 tons, or 29.86 per cent. Unless weather conditions the remainder of the navigation season are favorable to vessel operations on the lakes stocks of ore for the winter are likely to be somewhat short of meeting demand at the present rate of operations.

Details of September movement are as follows:

	Sept. 1946	Sept. 1945
Escanaba	529.021	548,007
Marquette	377.940	579,425
Ashland	469 981	583,687
Superior	3 229,992	3,493,586
Duluth	2.698.369	2,818,839
Two Harbors	2,113,546	2,447,962
Total, U. S. Ports	9,418 849	10,471,506
Michipicoten	64 249	43,744
Port Arthur	153,255	27,849
Total Canada	217.504	71,593
Grand Total	9,636,353	10,543,099
Decrease 906,746 tons	s, 8.60 per c	cent.

Movement from the several ports to Oct. 1 is as follows:

	To Oct. 1, 1946	To Oct. 1, 1945
Escanaba	2,167,382	3,723,090
Marquette	1,729,191	3,025,722
Ashland	2,615,422	3,520,004
Superior	13,731.577	19,988,403
Duluth	11,858,880	16,426 092
Two Harbors	10,224,935	14,568,007
Total U. S. Ports	42.327.387	61.251.318
Michipicoten	349.951	344.316
Port Arthur	482,296	76,137
Total Canada	832.947	420 453
Grand Total	43,259,634	61,671,771

Decrease 18,412,137 tons, 29.86 per cent.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 183

New York — Bolt and nut manufacturers are estimated to have backlogs ranging from four to six months, and are constantly turning down business because of inability to operate at capacity. Makers declare they not only have difficulty getting steel, but also have trouble in obtaining manpower.

Principal demand is for industrial assembly work, as differentiated from railroad requirements. Jobber demands are second in importance, with stocks at most distributing plants low and unbalanced. Railroad requirements perhaps fall third, and here there is special pressure on bolt and nut makers, as builders of car equipment are fully cognizant of the letters that have gone out from Washington requesting suppliers to direct particular attention to their needs.

The greatest difficulty in obtaining steel lies in small sizes. Hot carbon bar producers report that their 8 and 10inch mills are heavily overloaded; thus they are far behind on promises and are wary about accepting new commitments. As a matter of fact, hot carbon bar producers generally have not formally opened books for next year and are accepting little new business even informally.

Higher Simanal Prices Posted for Fourth Quarter

Ohio Ferro-Alloys Corp., Canton, O., has posted increased prices for fourth quarter for silicon-manganese-aluminum ferroalloy, or simanal. Following are prices per pound of alloy, fob works, with freight allowed to destination, except to those points taking a freight rate in excess of the St. Louis rate; to such points the equivalent of the St. Louis rate will be allowed: Carload, hulk, 8.50c for lump, 2-inch and 1-inch material; 8.75c for ¼ and ½-inch size; 9.25c for 8 and 20 mesh. Prices for packed material (50 gallon barrels) are: Carload 9.00c for lump, 2-inch and 1inch material; 9.25c for ¼ and ½-inch; 9.50c for 8 and 20 mesh; ton lots, 9.25c for lump 2-inch and 1-inch; 9.75c for ¼ and ½-inch; 10.00c for 8 and 20 mesh; less than ton lots, 9.75c for 1ump, 2-inch and 1-inch; 10.25c for ¼-inch and ½inch; 16.50c for 8 and 20 mesh. An extra charge of ½-cent is made for 30-gallon harrels.

Mines Bureau Reports on Drop in Scrap Supplies

Supply of iron and steel scrap and pig iron became increasingly short during June, according to the latest figures released by the Bureau of Mines. Reported stocks of scrap in dealers' yards decreased from 512,000 gross tons on May 31 to 425,000 tons at the end of June. Moreover, 67 per cent of the stocks were unprepared scrap on June 30 compared with 59 per cent at the end of May, indicating an additional deterioration in the scrap situation. Stocks of No. 2 heavy melting steel dropped from 101,000 tons on May 31 to 39,000 tons on June 30.

Shipments to consumers by dealers decreased 16 per cent from May and total receipts by consumers decreased slighty despite a 12 per cent increase in total use of purchased scrap during June. Stocks of scrap at consumers' plants wcre estimated at 3,670,000 tons on June 30 compared with 3,911,000 tons at the end cf May.

STRUCTURAL SHAPES ...

STRUCTURAL STEEL PLACED

- 900 tons, heavy naval equipment for Pocatello, Idaho, depot, to Schmitt Steel Co., Portland, Oreg.
- 500 tons plus, material for steel warehouse, Grand Coulee, to American Bridge Co., Pittsburgh.
- 357 tons, sheet piling, boiler house, Milwaukee, for Joseph Schlitz Brewing Co., to Carnegie-Illinois Steel Corp., Chicago; Edward E. Gillen Co., Milwaukee, contractor.

300 tons, spring steel storage building, Chicago

Heights, Ill., for American Locomotive Co., to Wendnagel & Co., Chicago; Sumner S. Sollitt & Co., Chicago, contractor.

- 200 tons, plant expansion and alterations, Ottawa, Ill., for Bakelite Corp., to American Bridge Co., Pittsburgh; F. J. McGraw Co., New York, contractor.
- 125 tons, bus garage, International Railway Co., Buffalo, to Bethlehem Steel Co., Lackawanna, N. Y.; George W. Walker & Sons Inc., Buffalo, general contractor.

STRUCTURAL STEEL PENDING

- 4935 tons, steel girder superstructure with swing span and machinery, South Capitol street bridge, Anacostia river, District of Columbia; bids Oct. 31, to district commissioners.
- 155 tons, also 55 tons reinforcing, bridge Boise county. Idaho; bids soon to Public Roads Administration, Portland, Oreg.
- Unstated, \$750,000 hangar for United Air Lines, Scattle; plans in preparation by Austin Co., Scattle.
- Unstated, state highway bridge Willamette river, near Eugene, Oreg., estimated at \$527,000; bids soon.

REINFORCING BARS...

REINFORCING BARS PLACED

2000 tons, rolling mill, Bettendorf, Iowa, for Aluminum Co. of America, to Carnegie-Illinois Steel Corp., Chicago; Walsh Construction Co., Davenpo.t, Iowa, contractor.

REINFORCING BARS PENDING

- 100 tons, warehouse and plant, Chicago, for New Century Co.; bids Oct. 1.
- 100 tons, addition, Spring Valley, Ill., for St. Margaret's hospital; bids Oct. 4.
- 100 tons, also 50 tons shapes, public roads

project in Oregon; E. W. Elliott, Seattle, low, \$133,788.

PLATES . . .

PLATES PLACED

700 tons, reconstruction of blast furnace No. 4, Gary, Ind., for Carnegie-Illinois Steel Corp., to John Mohr & Sons, Chicago.

PLATES PENDING

5,000 tons, 36,695 feet, 30 to 72-in. water line, Bow Lake project, Scattle; bids Oct. 3; alternate concrete pipe.

PIPE . . .

CAST JRON PIPE PENDING

Unstated, \$21,000 project, 27th. Ave N. E., Seattle; funds allocated; bids soon.

RAILS, CARS . . .

RAILROAD CARS PLACED

- Atlanta & West Point, 50 fifty-ton box cars, to Pullman-Standard Car Mfg. Co., Chicago; work will be done at the Binningham, Ala.,
- shops. Detroit, Toledo and Shore Line, 50 seventyton covered hoppers, to Greenville Steel Car Co., Greenville, Pa.
- The Georgia, 50 fifty-ton box cars, to Pullman-Standard Car Mfg. Co., Chicago; construe-' tion at the Birmingham, Ala., shops.
- Gulf, Mobile & Ohio, 420 fifty-ton box cars and 80 fifty-ton automobile cars, to American Car & Foundry Co., New York.
- Southern Pacific, 1000 forty-ton box cars, to Pullman-Standard Mfg. Co., Chicago.
- Western Pacific, 250 forty-ton box cars, to Mt. Vernon Car Mfg. Co., division of Pressed Steel Car Co., Mt. Vernon, Ill.



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October 7, 1946

RAILROAD CARS PENDING

- New York City Board of Transportation, 100 to 400 subway cars; American Car & Foundry Co., New York, low bidder; also 100 to 200 trolley coaches, bids Oct. 7, previously bid in May.
- Railway Express Agency, 500 refrigerator express cars; new specifications being issued in place of those recently figured.

LOCOMOTIVES PLACED

- Scaboard Airline, thirteen 3000-horsepower diesel-electric locomotives, to Baldwin Locomotive Works, Eddystone, Pa.
- Texas & Pacific. seven 1000-horsepower dieselelectric switch engines, to Electro-Motive Division of General Motors Corp., La Grange, Ill.
- Chicago, Indianapolis & Louisville, one 1500horsepower diesel electric switcher, to American Locomotive Works, New York and another to Fairbanks Morse & Co., Chicago.

Iron and Steel Engineers Envision Prosperity Ahead

(Concluded from Page 83)

cost of producing pig iron should not be seriously affected, Mr. Davis contended.

As evidence of the accuracy of this statement, it is well known that Bethlehem Steel Co. and the Youngstown Sheet & Tube Co., through their operating agent, Pickands Mather & Co., have acquired large areas of taconite on the Mesabi range and have a laboratory and test plant operating near Hibbing, Minn., concentrating large samples which they are mining from the properties they have acquired. This work has been in progress for the past 5 years and these companies feel the expenditures they are making are justified. Oglebay Norton & Co. are doing the same type of work in co-operation with the American Rolling Mill Co. and the Wheeling Steel Corp.

Whether or not the next few years will bring the erection of large taconite plants on the Mesabi remain to be seen, but some of the steel companies feel that such a development is distantly possible. If this development comes, Mr. Davis explained, we will have an almost inexhaustible supply of high-grade iron ore available within the borders of our country. The Mesabi range, in his opinion, will actually become a manufacturing district rather than a straight mining district because this taconite industry must be looked upon as one that actually manufactures high-grade ore from worthless rock.

In conclusion Mr. Davis said these are interesting times in the iron ore industry and decisions of great importance are being made, but it appears certain that the future ore supply of our northern steel industry will come either from abroad or from the Lake Superior taconites.



CONSTRUCTION AND ENTERPRISE

ARKANSAS

El. DORADO, ARK.—Lion Oil Co. is building three ammonia oxidation units at its plant here for production of nitric acid, to cost about \$750,000.

CALIFORNIA

- BURBANK, CALIF.—Calvin & Clement, 407 South Grammercy St., Los Angeles, has building permit for a machine shop at 1100 West Magnolia Blvd., 35 x 80 feet, to cost about \$13,500.
- LOS ANGELES.—Apex Steel Corp. Ltd., 6111 South Eastern Avc., will build a plant 118 x 260 feet and office building 70 x 125 feet. to cost about \$100,000. A. C. Martin, 333 South Beaudry St., is architect.
- LOS ANGELES—Steamaster Automatic Boiler Co., 5819 Compton Ave., has let contract to Economy Steel Co., 9901 South Alameda Ave., for a 68 x 260-foot traveling craneway, to cost about \$55,000.
- MONROVIA, CALIF.—Pan American Trailer Co., 974 South Fair Oaks St., will build a 60 x 750-foot plant at 1700 Shamrock St., to cost about \$90,000. G. F. Smith, 3806 Beverly Blvd., Los Angeles, is architect.
- POMONA, CALIF.—Pomona Machine Works. 163 South Commercial St., has permit for construction of a machine shop 40 x 80 feet. to cost about \$14,400.
- SOUTH GATE, CALIF. Familian Pipe & Supply Co., 9430 Rayo Ave., has building permit for plant addition to cost about \$13,000.
- SOUTH GATE, CALIF. Aircraft X-Ray Laboratory, 1600 East Seventh St., Los Angeles, has building permit for X-ray laboratory here at 11031 Garfield Ave., to cost about \$22,000.

CONNECTICUT

- NEW BRITAIN, CONN.—New Britain Machine Co., 140 Chestnut St., has let contract to Hasson & Downes, 55 West Main St., for a one-story plant addition, to cost about \$140,000
- WATERBURY, CONN.—Scoville Mfg. Co., 99 Mill St., has let contract to Stone & Webster Engineering Corp., 49 Federal St., Boston, for a foundry building to cost about \$650,-000. H. L. Thompson, 99 Mill St., is architect.
- WEST HAVEN, CONN.-Churchward & Co. Inc., 37 Water St., will build one and twostory welding plant additions, to cost about \$75,000.

ILLINOIS

TUSCOLA, ILL.—Panhandle Eastern Pipe Line Co. has let contract .or 26 miles of 26-inch crude oil pipe line in this vicinity to Midwestern Construction Co. Sunray, Tex., to cost an estimated \$1,100.000.

IOWA

1DA CROVE, IOWA—Ida County Rural Electric Co-Operative, Ida Grove, is building 44 miles of electric transmission lines, estimated to cost about \$60.000.

MASSACHUSETTS

- BOSTON, MASS.—Commonwealth of Massachusetts, 20 Somerset St., has let contract to V Barletta Co., 10 Whipple Ave., Roslindale, Mass., for a sewage treatment plant on Nut island, to cost \$1,179.736.
- PITTSFIELD, MASS.—Department of public works has let contract to N. Benenuti & Sons, 16 Elm St., New London, Mass., for a refuse incinerator, to cost about \$180,000

MICHIGAN

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National Bank Bldg., has been incorporated with \$100,000 capital to manufacture plumbing fixtures and supplies, by Robert M. Zell. 1237 Temple Ave.

- DETROIT—Cardinal Products Corp., 1862 Penobscot Bldg., has been incorporated with \$50,000 capital to manufacture metal products, by H. D. Brotman, 18075 Kentucky Ave.
- DETROIT—Reason Tool Co., 2862 East Grand Ave., has been incorporated with \$20,000 capital to manufacture tools, dies and fixtures, by Clair D. Reason, same address.
- DETROIT—Supreme Gas Burner Mfg. Co., 517 Dime Bidg., has been incorporated with \$20,-000 capital to manufacture gas burners and tools, by Virgil R. Jones, 1443 Hampton Rd., Grosse Pointe Woods, Mich.
- DETROIT—Velvalite Industries Inc., 14471 Livernois Ave., has been incorporated with \$50,000 capital to manufacture electrical switches, by Paul Drake, 10201 Roxbury Ave.
- DETROIT—Flexible Products Co., 8881 Central Ave., has been incorporated with \$150,-000 capital to manufacture flexible hushings and couplings, by Arthur C. Pacific, 9282 West Outer Drive.
- JACKSON, MICH.—Burdon Corp., 117 Clinton Ave., has been incorporated with \$50,000 capital to manufacture metal products and conduct a machine shop, by James H. Dawson, 801 South Webster St.
- LINCOLN PARK, MICH.—Coughlan Products Corp., 1469 Electric Ave., has been incorporated with 1000 shares no par value to manufacture tools, toys and household appliances, by John A. Coughlan, 1841 Elizabeth Ave.. Dearborn, Mich.
- LINCOLN PARK, MICH.—Brooks Machine Products Co., 1584 Marion Ave., has been incorporated with \$50,000 capital to manufacture screw machine products, by Verne Brooks, same address.

MINNESOTA

- ALEXANDRIA, MINN.-H. S. Campbell, city clerk, has let contract to Nordland & Ahlberg, Starbuck, Minn., for a sewage treatment plant to cost about \$150,000.
- MINNEAPOLIS-Standard Iron & Wire Works, 1900 NE Third St., has let contract to G. F. Cock Construction Co., 2609 Modelet Ave., for a 100 x 200-foot plant building to cost about \$120,000.

MISSOURI

ST. LOUIS—Texas Co., has obtained permission from the board of public service for erection of a 6,160,000-gallon bulk oil storage plant on the river front, to cost about \$1,-500,000. Eight large steel storage tanks are included, with a pumping system from tanks to barge docks.

NEW JERSEY

GARWOOD, N. J.—National Gypsum Co., 420 Lexington Ave., New York, has let contract to Andrew Christenson & Son, 1140 East Jersey St., Elizabeth, N. J., for a plant addition to cost about \$60,000.

OHIO

- CLEVELAND Superior Die Castings Co., 17325 Euclid Ave., has let contract to Sam W. Emerson Co., 1836 Euclid Ave., for a 70 x 300-foot plant building to cost about \$200,000.
- CLEVELAND—Louis R. Elrad, 6706 Detroit Ave., has plans under way for production of small three-wheeled auto, designed especially as delivery car.
- CLEVELAND—Cleveland Forged Products Co. has been incorporated with 600 shares no par value by Rufus S. Day Jr., 1503 Midland Bldg., to operate a forging business.
- CLEVELAND—Cleveland Co-Operative Stove Co., 2323 East 67th St., James Mitchell, president, is building a new core production plant, to cost about \$350,000, with equipment.
- CLEVELAND-Hydraulic Equipment Co., 11

East 222nd St., is building a one and twostory plant addition to increase manufacturing space, in which new equipment will be installed. Hall Kirkham is president. Company manufactures oil hydraulic systems.

- CLEVELAND—Basic Aluminum Castings Co. has been incorporated by Harold S. Beebe, 8802 Harkness Rd., to manufacture and machine metal products.
- CLEVELAND-M. B. M. Foundry Inc., 4730 Warner Rd., Garfield Heights, O., has been organized by James Goldie and associates to manufacture high-test gray iron castings.
- CLEVELAND—Hornsby Riggs Co. has been incorporated by William H. Brown, 17591 Broadway Ave., and associates, to manufacture tools.
- CLEVELAND—Chesapeake & Ohio Railroad, R. J. Bowman, president, Terminal Tower, has authorized expenditure of \$834,000 for additional machinery in its car shops at Russell, Ky., for fabricating steel for car repairs.
- CLEVELAND—Republic Brass Co., 1617 East 45th St., Richard A. Blywise, president, will build a 150 x 150-foot building to cost about \$75,000.
- LODI, O.— Lodi Foundry Co., recently incorporated to manufacture aluminum castings, will occupy a new building 40 x 120 feet on Ohio St., for which new equipment is being purchased. (Noted Sept. 30.)
- LORAIN, O.—Thew Shovel Co., East 28th and Fulton Sts., will build a plant addition to cost about \$175,000.
- NILES, O.—American Brake Shoe Co. is building a plant for manufacture of locomotive and car parts. Contract has been let to James Stewart & Sons Co.. New York. Cost is estimated at about \$200.000.
- WILLOUGHBY, O.—Willoughby Machine & Tool Co., 15 Second St., has CPA approval for a new plant costing about \$50,000, at Church and Elm Sts. Company manufactures thermomatic heating units.
- YOUNGSTOWN, O.—Temperature Controllers Inc. has been incorporated with 1000 shares no par value, by Arthur J. Sweeney, 148 Alburn Dr., to manufacture air conditioning and ventilating equipment.
- YOUNGSTOWN, O.—East Ohio Gas Co., 1405 East Sixth St., Cleveland, J. F. Robinson, president, announces a \$10 million natural gas line, with a pressure reducing station near Austintown, O.
- YOUNGSTOWN, O.—Harris Fabricating Co. has been incorporated with \$10,000 capital by Frank Harris, 818 Lyden Ave., to manufacture steel water and fuel tanks and lawn rollers.

OREGON

- MILTON, OREG.-City has rejected bids as teo high for a municinal sewage treatment plant and new bids will be asked.
- PORTLAND, OREG. Pacific Telephone & Telegraph Co. has plans by Whitehouse, Church, Newberry & Rochr, Portland, for two exchange buildings in East Portland. to cost about \$1,300,000, including \$650.000 for equipment.

PENNSYLVANIA

- ERIE, PA.—Standard Stoker Co., 1701 Gaskell Ave., will build two additions, 48 x 98 feet and 33 x 59 feet, to cost about \$44,000.
- PHILADELPHIA—Sharpless Corp., Westmoreland and 23rd Sts., has let contract to Barclay White Co., 22 North 36th St., for a 70 x 180-foot plant building, to cost about \$90,000. I. S. Towsley, 112 South Sixteenth St., is engineer.
- PITTSBURGH—Pittsburgh Plate Glass Co., 632 Duquesne Way, Harry B. Higgins, president, will build a plant 200 x 500 feet adjacent to its main works, for manufacture of its double-glazed insulating window unit, at cost of about \$750,000. Austin Co., Cleveland, is architect and general contractor.
- TFAFFORD PA. Westinghouse Theorem Corp., Union Bank Bldg., Pittsburgh, has let separate contracts for a 105 x 175-100t plant

addition to cost about \$80,000.



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200-Ton Alliance 100' Span 150-ton Whiting 30' Span 89-Ton "American" 40'6" Span Span 75-Ton Alliance 37' Span 75-Ton Alliance 78' Span 50-Ton Shaw 69'10'' Span 40-Ton Alliance 82' Span 35-Ton Northern 22' Span 30-Ton Morgan 71' Span 30-Ton Morgan 30' Span 30-Ton Morgan 30' Span 30-Ton Niles 53'9" Span 30-Ton Reading 56' Span 25-Ton Bedford 50' Span 25-Ton Cleveland 106' Span 25-Ton P&H 70' Span 25-Ton Whiting 106' Span 25-Ton Whiting 82' Span 20-Ton Alliance 77' Span 20-Ton Cleveland 65' Span 20-Ton Northern 60' Span 20-Ton P&H 51'4" Span 20-Ton P&H 51'6'' Span 20-Ton Shaw 76'4" Span 20-Ton Shapard Niles 49'6" Span 25-Ton Whiting 106' Span Span 15-Ton Alliance 50' Span 15-Ton Alliance 35' Span 15-Ton Cleveland 55'6''

Span

15-Ton Cleveland 35' Span 15-Ton Morgan 77' Span 15-Ton Niles 32' Span 15-Ton Shaw 82' Span 15-Ton Shaw 82' Span 15-Ton Shaw 77' Span 15-Ton Toledo 82' Span 15-Ton Whiting 74'8 ½" Span Span 12-Ton Morgan 56' Span 10-Ton Alliance 58'9' Span 10-Ton "American" 27' Span Span 10-Ton Case 31'9" Span Span 10-Ton Case 31'9" Span 10-Ton Cleveland 38' Span 10-Ton Cleveland 50' Span 10-Ton Morgan 39'5" Span 10-Ton Morgan 71' Span 10-Ton P&H 451' Span 10-Ton P&H 451' Span 10-Ton P&H 47'4" Span 10-Ton P&H 47'4" Span 10-Ton P&H 40' Span 10-Ton P&H 60' Span 10-Ton P&H 67'6" Span 14-Ton Shepard 36' Span 14-Ton Shepard 36' Span 50' Span

Ton Shaw 23' Span 5-Ton "American" 10 Span

- 5-Ton Champion 37'8" Span
- 5-Ton Euclid 5-Ton Milwaukee 39'8"
- Span 5-Ton Milwaukee 66'9"

Span 5-Ton Milwaukse 70' Span 5-Ton Northern 49'6" Span 5-Ton P&H 45' Span 5-Ton Shaw-Box 26' Span 5-Ton Shepard 40' Span 5-Ton Toledo 96' Span 5-Ton Whiting 80' Span 3-Ton P&H 46'4" Span 3-Ton P&H 48⁷4" Span 3-Ton Shaw 33' Span 3-Ton Whiting 57'3" Span 2-Ton Detroit 28' Span 2-Ton P&H 46'4" Span 2-Ton P&H 46'4" Span 2-Ton Shep. Niles 14' Span 14'.Ton Cleveland 25' Span 14'.Ton P&H 22'8" Span 14'.Ton Curtis 24' Span 14'.Ton "American" 17' Span

Take advantage of the ECONOMY service by telephoning to us collect, which will enable us to discuss your requirements and present our suggestions.

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1-Progressive Welder Co. #126-DS-26A Portable welding gun.

1-75 KVA Transformer, 550/60 1 set Controls and Timer for above.

1-A-1-R Onsrud Single Radial Arm Router, 84" reach. Complete with standard equipment.

1-4 KW Frequency Changer with controls for above.

Both used about 1 year and in excellent condition.

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400 TONS 4" ROUNDS 7' to 16' SAE 1030

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Allov Material Forging Quality

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The machines are rated 50 KW and op-erate on the exclusive Sciaky Electromag-netic "Stored Energy" principle with pat-ented "Variable Pressure Cycle." Capacity on aluminum and other light alloys: .016" plus .016" up to and including .080" plus .080", Speed on two thicknesses of .040" is 80 spots per minute. Throat depth is 36". The quantity is limited. You are urged to act at once. Write, phone or wire for details.

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WILL

to read and use the "Equipment—Mate-rials" pages of STEEL. Follow this section every week for unusual buys and use it to tell other readers of the equipment or materials you have for sale. Rates are For information write STEEL, moderate. Penton Bldg., Cleveland 13, O.

PAY

YOU

EQUIPMENT ... MATERIALS

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We have available for prompt shipment from warehouse stock and offer, subject to prior sale, the following new material: Orders for all or any part will be handled promptly.

Stock No. Qty.	Size	Length	Weight	Analysis	Stock N	lo. Qty.	Size	Length	Weight	Analysis
ANGLES					FLAT	IRON (C	continued)			
A-13 36	9" x 4" x 9/16"	40'0"	33,235	SAE 1020	F-14		4" x 3/4"		1,120	11
HARD STEEL	FLAT (Of Forgin	ig, Threading	, Machini	ing Quality)	F-17		1-1/4" x 1"		6,500	11
HSF-1	1-1/4" x 3/8"	R/L	3,150	NE 8620	F-18		1-3/8" × 1"		1 000	н
HSF-2	1-5/8" x 5/8"	R/L	7,925		F-20		3-1/4" x 3/4"		3,100	
HSF-4	1-1/4 x 5/8 1-5/8" x 3/4"	R/L P/t	700		F-21		4-1/2" x 3/4"		750	
JAIL BARS	1-5/0 25/4	N/L	540		F-92		3" x 3/16" 1-3/9" x 3/4"		9 9 70	41
JB-1	7/8"	P /I	6 665	NE 9630	F-24		5" x 3/8"	85	1,320	*1
JB-2	1	R/L	7,885	141 3030	F-25		2" x 5/8"		350	10
JB-3	1-1/8"	R/L	2,400		F-20		1-1/2 x 3/4 4" x 3/4"	11	1,033	11
OCTAGON					F-28		2-1/2" x 5/8"		1,000	
0-1	7/8"	R/L	3,600	SAE 1020		_				
0-3	3/4"	R/L R/I	2,850	NE 9961	ROUN	DEDGE	FLAT STEEL		010	
O-4	13/16"	R/L	8,450		REF-1		2-7/8 x 3/4 9-2/4" = 5/9"	R/L	410	SAETUYU
ROUND ALLO	DY STEEL (Of	Forging, Th	reading,	Machining	RFF-3		2-1/4 x 5/8"		63	
Quality)					REF-4		1-1/2' x 3/4"		65	
RA-1	7/8"	R/L	370	NE 8620	REF-5	100 million 1	1-1/2" x 1/2"		35	
RA-3	3/4"		230		REF-7		2" x 5/8"		70	89
RA-4	1-1/4"	+1	500		REF-8		1-3/8" x 3/4"		48	**
RA-5	1-3/8"	H	370		REF-9		2-1/2" x 1/2"		44	61 61
RA-7	1-1/8"		2,225		REF-11		1-1/8 x 3/0		60	
RA-8	1-1/8"		925	.0.	REF-12		1-1/4" x 3/4"		67	н
RA-9 PA 10	1-1/4"	H	1,225		REF-13		3-1/4" x 1/2"		150	
RA-11	1"		4,390		REF-14		9-1/9" x 1"		55	
RA-12	15/16"		6.930		REF-16		2-1/2" × 5/8"		300	11
RA-13	7/8"		900		REF-17		1-3/4" x 3/4"		1,400	
HEXAGON				ANY TATA	REF-18 RFF-19		2-3/4 × 3/4 1-3/4" × 3/4"		325	
H-1	1-1/8"	R/L	280	NE 9161	REF-20		1-3/4" x 5/8"		425	H
COAL SCREEN	BARS				REF-21		2" x 7/8"		4.0	
CSB-1	No. 3	R/L	480		REF-23		1-3/4" x 7/8"		1,575	
SQUARES					REF-25		1-3/4" x 3/4"	**	830	11
S-2	7/8"	R/L	4,000	SAE 1020	REF-26	· · · · ·	1-1/2" x 3/4"	12/15 P/I	2,730	
FORGING BIL	LETS			1 1 1 1 1 1 1 1 1	REF-27		2-1/2" x 5/8"	ĸŗĿ	280	
FB-1 300	2-1/2" x 2-1/2"	3-3/4"	1,976	SAE 1020	REF-29		2-1/2" x 3/8"		230	48
ROUNDS				7.5 4	REF-30		1-7/8" x 5/8"		475	22
R-1 P.o	1"	R/L	5,200	SAE 1020	REF-32		1-1/8" x 3/8"		80	
FLAT IDON	5/8			10 mm	REF-33		2-3/4" x 7/16"	10'8"	420	11
E.1	4 4 1011 0 1 111				REF-34		2-3/4" x 7/16"	120	5,720	
F-2	1-1/8 x 3/4 1-1/9" - 5/9"	R/L	570	SAE 1020	REF-35		1-7/8" x 5/8"	12' & 15'	3,330	
F-3	1-1/4" x 1/9"	#1	1,907							
F-4	1-1/8" x 5/8"		57	н	PIPE					
F-6	1/8" x 5/8" 1-1/8" x 3/8"	**	45	11	P-1	1	10" dia, Ex. Hvy.	1/2" wall	11'4-1/2"	Black
F-7	7/8" x 3/4"	65	2,040	81	P-3	1	10" dia, Std. 9	/32" wall	6'5''	
F-9	4" x 3/8"		2,000	81	P-4	1	10" dia. Ex. Hvy.	7/16" wall 1	0 0''	
F-10	5" x 5/16"		350		P-5	1	14" dia. Ex. Hvy.	1/2' wall 2	90"	
			300	1. 1. 1. 1.	1.0		14 UIA, LA. 1999.	1/2 wall 2		
	CDD	0.4		DO			DIC			
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General Sales Office, North Side Plant

NASHVILLE 2, TENN.



1033 HERMAN STREET

EQUIPMENT ... MATERIALS

WILL TRADE

We have one large shear manu-

factured by Bertsch & Company,

description as follows: Opening

between housings 55", depth of throat 16", open end, practically

We need a machine with a capa-

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STEEL, Penton Bldg., Cleveland 12, O.

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Largest Buyers

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WANTED

new. Shears 48" x 1" plate.

city of 10 x 1/2 or 10 x 3/8.

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Description

Lindberg Rectangular Box style Cyclone Furnace. Type 481072 E. H. Serial # 459. Top temperature 1250°. Heating Chamber size 48" wide x 10' long x 72" high. Controls complete. In service two years. Excellent condition.

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NEW CUPRO-NICKEL TUBES 100.000 lbs 19" OD x 18 ga, Wall 80%" and 48" Lengths,

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559 - 575 TON PRESS BRAKE

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Wanted — SHEARINGS Any Amount-All Sizes, Galvanized, Cold and Hot Rolled Aluminum-Stainless and Cooper 6 Minimum Width to 36 Minimum Length. Uniform Quantilies, Gauges from 16 to 30 Inclusive.

Inclusive. Write or Wire Los Angeles Sheet Metal Mtg. Co. 901-903E. 9th St. Ics Angeles 21, Calil. TRinity 4713

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STRIP STEEL URGENTLY NEEDED By Leading Manufacturer

WILL TRADE

1-1/2 x 1-1/2 x 1/8 ANGLES

12, 13, 14 GAUGE STEEL SHEETS

ROCK HILL BODY CO.

ROCK HILL, S. C.

FOR SALE HULETT COAL UNLOADER CAR DUMPER

Manufactured by Wellman Engineering Co. In 1910. In ocerating condition and suitable for recrection elsewhere. Can be inspected at Cleveland, Obio.

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30,000 lbs. .040 x $3^{24}2^{27}$ SAE 1010 #4 Temper Cold Rolled Steel. Must be in coils. Can accept widths up to 12" wide.

• 30,000 lbs. $.040 \times 3^{25} 4^{\prime\prime}$ Type 302-18-8 Soft Temper #2 Finish Stainless Steel. Must be in coils. Can accept widths up to 12" wide.

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Telephone: Philadelphia TRinity 7-9000

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POWER SQUARE SHEAR

14" x 10' capacity—18" Gap. Motor Driven—220-3-60 complete with Hold Down—Side, Front, and Back Gages. Must be in good condition.

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On small alloy steel castings. Steady Job. Write stating age and experience.

D & M MACHINE WORKS Torrance, Calif.

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Young man, experienced in structural steel fabrication, to be capable of making estimates, design mill type buildings, and to handle sales work at such time as market conditions require. Good opportunity for right man in rapidly growing structural fabricating plant located in the South. Advise experience and salary desired. Address Box 704, SIEEL, Penton Bidg., Cleveland 13, Ohio.

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Man, experienced in structural steel fabrication to act as superintendent of medium size f.bricating shop Located in the South. Experi nce at handling fifty or more workers essential. Advise experience and sulary desired. Advises Box *iul.*, STEEL, renton Bldg., Cleveland 13, Ohio.

WANTED: AN EXPERIENCED MAN FOR Plant Superintendent for 42 year old, well established company in sheet metal fabricating and medium size stamping business. Must have ability based on experience in sheet metal layout, forming and stamping metals, welding. Modern production methods and tooling. Company is located in Buffalo, N.Y., and employs approximately 100 employees. Modern plant and equipment. Excellent oppo turit to increase one's camin's based on proven ability. State salary, full experience and age. W ite Box 713, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: ASSISTANT SHOP MANAGER FOR a plant doing general repair work of heavy construction equipment and building new equipment, must be a competent machinist and familiar with modern welding techniques and shop piactices. Age 35 to 45. Applicants should give education and experience in detail, and state present and expected salary. Location near New York City. Address Rox 710, STEEL, Penton Bldg. Cleveland 13, O.

WANTED: ASSISTANT PLANT MANAGER, age 35 to 45, with Mechanical and Electrical Engineering background to assist in the operation of a plant producing steel sheet and strip products. Applicants should give education and experience in detail, and state present and expected salary. Location Eastern Ohio. Address Box 708, STEEL, Penton Bldg., Cleveland 13, Ohio.

FACTORY SUPERINTENDENT — FOR NON ferrous wire plant in New Jersey—300 employees one experienced in handling men—mechanical ly trained and cost minded—under 50 years o' es. Salary and homus. Reply, giving full er perience—reples treated in confidence. Exper ence in casting, rolling and drawing would be helpful Address Box 700, STEEL, Penton Bldg Cleveland 13, O.

WANTED: SALESMAN BY IMPORTANT manufacturer of tubing, both scamless and welded, carbon, alloy and stainless steels. Must have mechanical or metallurgical engineering college degree, or suitable allow steel field sales evocrience. Give full particulars with application. Address Pev 683, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: FUEL, ENGINEER FOR A STEEL plant located in Eastern Pennsylvania. Must have practical experience in combustion and furnace control instruments. State age, education, ex prince and salary expected. Address Box 714, STEEL, Fenton Bldg., Cleveland 13, O.

DRAFTSMEN — DESIGNERS. LAYOUTS, Checkers and Detailers experienced on heavy machiners both rechanical and structural experience, Apply or write to The Engineering Department, Morgan Engineering Company, Alliance, Ohio.

October 7, 1946

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PERSONNEL DIRECTOR — BROAD AND varied experience all phases of labor relations. employment welfare and safety supervision. Address Box 706, STEEL, Penton Bldg., Cleveland 13, O.

ENGINEER. AGE 37, TECHNICALLY TRAINED. 11 years of Engineering Experience, 15 years of broad contacts with aircraft. Capable in research, design, liaison. Good references. C. E. Kahlke, Jr., 34 Grant St., Jamestown, N. Y.

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