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PRODUCTION • PROCESSING • DISTRIBUTION • USE

For forty-eight years—IRON TRADE REVIEW

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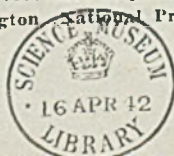
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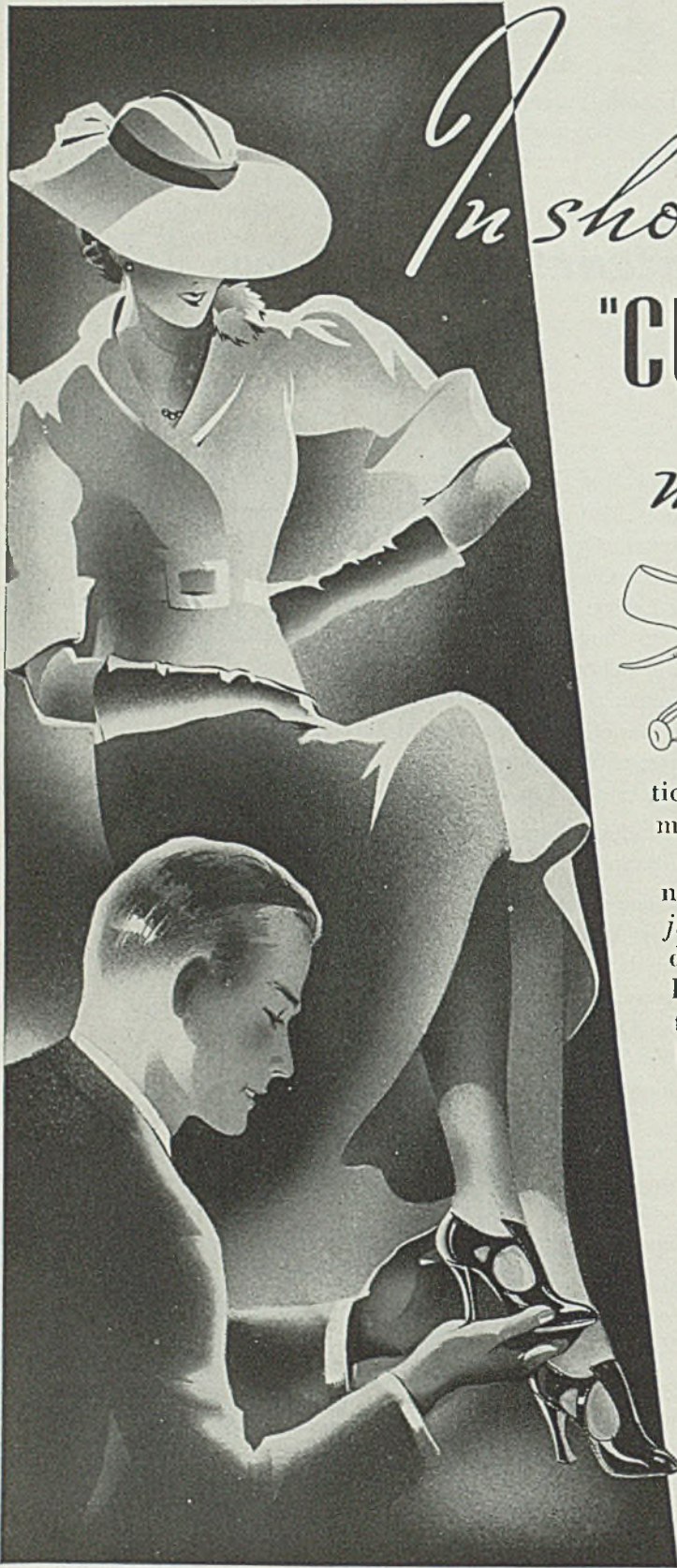
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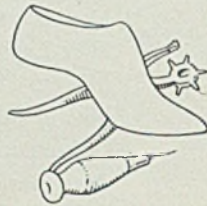




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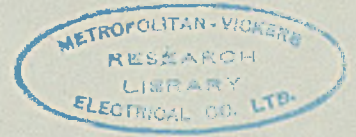
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As the Editor Views the News

PUBLIC opinion, character of local governments, time, money and patience are factors which weigh heavily in the campaign of the three independent steel producers for industrial peace. Judging from the tactics already disclosed, Republic is banking upon a bold technique in which every effort is being made to operate plants so that employes who desire to remain at work may do so. Youngstown Sheet & Tube and Inland are relying upon a passive attitude, making no effort up to the present to reopen their plants. In all three cases the element of time is working in favor of the employers.

• • •

The shut-down of Youngstown and Inland is resulting in a rapidly increasing desire on the part of many employes to get back to work. This pent-up feeling is gradually penetrating into

Two Passive, One Aggressive

the attitude of the public in the affected communities and may become an important factor in the outcome of the present contest. Republic's aggressive policy has elicited a diversity of response, ranging from enthusiastic approval to uncertainty as to its effectiveness. Public reaction to the unfortunate encounter of mob and police in South Chicago was definitely against the agitators in the crowd. The action of the police was praised.

• • •

In one particular, the situation in steel differs sharply from that which existed several months ago when the automobile industry was engaged in a similar contest. At that time the federal

Public Will Decide Issue

and state governments were exceedingly active in trying to bring the two principals together. President Roosevelt was known to have been a participant in the proceedings. Thus far in the steel case, Washington has not figured prominently in the activities. Is this because the Wagner bill, now cleared by the recent Supreme Court decision, is supposed to be adequate to deal with the current

dispute? Or is it because the President feels that he has given Mr. Lewis all the assistance to which he is entitled? If the White House continues to keep hands off, the outcome will rest largely with the decision in the court of public opinion.

• • •

From day-to-day observation one seldom grasps the full appreciation of the extent of progress in the development of machinery or equipment. But if one

Design Is Not Static

surveys the advances from the broad perspective of several decades, the improvements in design sometimes are striking. This is true in the case of drop forging hammers. An authority who has traced the changes in design and construction of hammers from 1907 to 1937 (p. 46) finds marked improvements in almost every detail. Some were due to better materials and manufacturing practice. Others were evolved to meet changing and more exacting requirements in the production of drop forgings. The study of steady progress in three decades indicates that design is never static. Today's ideas may be outmoded a few years hence.

• • •

When Dr. Krivobok addressed the American Iron and Steel institute on "Stainless Steels," he made a timely plea to engineers, chemists and executives

Using Stainless Appropriately

(p. 50) to extend to metallurgists the "necessary co-operation in first understanding the problem" attending a specific application of stainless steel "and then to give us time in which intelligently to work out the problem." This is a reasonable and highly important request because the success or failure of stainless when introduced for a particular application depends almost entirely upon its adaptability to the peculiar conditions of that application. Carelessness in specifying these conditions is responsible for much unnecessary grief. If users and fabricators of stainless will heed Dr. Krivobok's advice, mistakes in application will be reduced and the service of stainless steels will be enhanced.



E. L. Shaner



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Republic 'to Fight It Out If It Takes All Summer'; Government 'Observing'

BOTH sides in the steelworks strike, affecting three major producers, apparently were as far apart late last week as when the Steel Workers Organizing committee called the walkout May 26.

No effort at conciliation has been made by the federal government, although three conciliators from the department of labor are watching developments, and making daily reports to Secretary Perkins. James F. Dewey is at Pittsburgh; Robert Tilkington at Chicago, and John O'Connor has a "roving commission." Governor Davey, of Ohio, has interviewed representatives of the union committee and the Republic Steel Corp., but so far merely to learn their views.

"I am not going to settle this strike until Tom (T. M. Girdler, Republic chairman) signs an agreement," said Philip Murray, SWOC chairman.

"We stand ready to bargain collectively with the CIO at any time, and have been ready, but we will not sign a contract," reiterated C. M. White, Republic's vice president in charge of operations. "We will fight it out if it takes all summer—or longer."

Youngstown Sheet & Tube Co. and Inland Steel Co. which shut down when the strike was called indicated that they would resume operations whenever their employes wished to return and could return without disturbance.

Operations Hold Steady

Meanwhile, the strike has not caused any hardship among steel consumers. Steelworks operations last week held at approximately 75 per cent. A slight increase at Pittsburgh was offset by adjustments at Chicago and Cleveland. The total annual ingot capacity represented by the three steel companies is 11,513,000 gross tons, or 16.8 per cent of that of the entire industry.

Twenty blast furnaces operated

by the three have been banked as a result of the strike, nine by Sheet & Tube, nine by Republic, and two by Inland. The net loss in active furnaces in May, however, was only 17, and daily average pig iron production, as well as total for the month, was slightly above the figures for April.

Some Men Return To Work

Republic reported late in the week that it was gaining men at all of its plants which were operating. At Warren, O., 44 men came back, some of whom had to break through picket lines. Injunctions were sought by Republic against pickets who have been interfering with the entry and exit of railroad cars at Warren and Niles. Its Youngstown plant remained down.

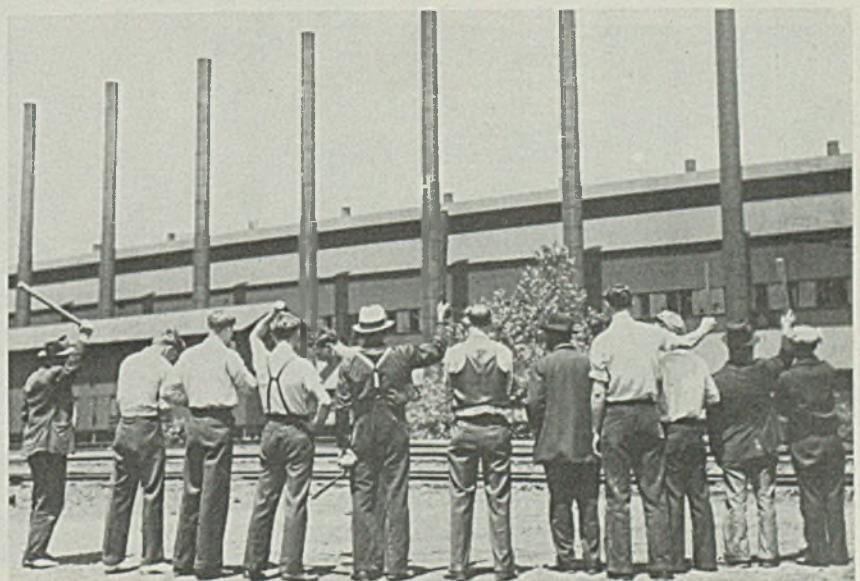
Protests also were lodged with

the postal authorities at Washington against the interception and refusal of postal employes to deliver mail in Republic's Niles, O., plant. It was reported that no mail was delivered at Niles unless first passed by a man identified with the CIO.

Quietness in the strike situation at Chicago last week was in marked contrast to the turbulence of the first few days of the shutdowns. The toll of those disturbances was seven lives and score of injuries, the latter sufficiently serious to send 90 victims to hospitals.

Inland Steel and Sheet & Tube plants were idle except for the limited operation of two blast furnaces by the former and one by the latter. By agreement with the union these units have been kept going to consume coke being produced by ovens which have been held in service in

One Ball, Many Bats, at Pickets' Game



JUST to prove that they had some other thought than to crack skulls, a picket in this group at a Youngstown district plant exhibited one base ball—but nearly everyone had a bat. Wide World photo

order to maintain a gas supply for the district utility.

Republic continued to operate at South Chicago, with five of its eight open-hearth furnaces running. Workers are being housed and fed within the plant. Food has been transported past the gates without disturbance, though Pennsylvania railroad police stated that one empty freight train entering the plant had been stopped for search by strikers who threatened to blow up trains found carrying food.

CIO leaders broadcast the report that Republic was burning tar paper in idle furnaces to give the impression steel was being made, but this statement was squelched when newspaper reporters were admitted to the plant to observe and photograph actual operations.

Rioters Not Workers

Investigation of the fatal riot outside the Republic plant May 30 revealed that one of the seven killed was a WPA worker and an active communist. Chicago police also reported that 12 others who participated were known communists, some of them arrested previously for radicalism. Identification of 65 prisoners taken by police after the riot showed that less than one-fourth had been employed by Republic. The company stated that only 14 of all those who were injured had been in its employ.

Forty of those arrested were arraigned on charges of conspiracy to commit an illegal act, with the hearing set for June 23. Charges have been filed against the remainder still confined in hospitals.

In the meantime city officials con-

tinued investigations into activities of the agitators responsible for planning the mass meeting and subsequent march to the Republic plant. Arrested rioters claimed that the agitators had assured them the police had no right to protect the company's property and that it was legally permissible for the pickets to invade the plant and close it.

Republic's operating position, and its policies regarding the CIO, were clearly explained last week at a press conference attended by T. M. Girdler, chairman; R. J. Wysor, president; C. M. White, vice president in charge of operations; and J. A. Voss, director of industrial relations.

Mr. White stated that 21,081 were working out of a force which normally would be 50,701. This excludes certain groups of employees not directly affected by the strike and who go to make up Republic's 56,000 total.

Buffalo continues on full schedule; Chicago is operating almost at capacity, and the United plant, Canton, O., is operating at the same rate which existed just prior to the strike, that is, practically full.

Shipping 7000 to 8000 Tons

"We are making no attempt to operate the sheet mills or Berger plant in Canton, because these are hard to protect and could not be provided with food, nor the men insured protection in coming and going," said Mr. White.

At Warren, O., the plant force had increased by 226 to a little over 2000 since the strike was called. The only difficulty at Warren and

Niles, O., has been getting in food, according to Mr. White.

Four to five tons of food daily is being transported into the Warren plant, because, as Mr. White explained, "the city authorities cannot give us protection and we don't want to risk violence."

"Our greatest worry at Warren," he said, "is to keep the men in the plant from breaking loose and attacking the men in the picket line outside. The greatest danger of mob violence is that a shot from the picket lines will hit one of the planes bringing in food."

Then he described the episode of one man trying to reach the plant who was seized by pickets, stripped of his clothing, face smeared with grease. "Our superintendents practically had to use force to keep our men in."

"At the Canton South plant 339 men were employed, but that has been shut down, since we could not supply provisions and guards for a small plant like that."

The Newton Steel plant at Monroe, Mich., also is down. "The men there would be working right now, but for interference."

The Corrigan, McKinney plant at Cleveland is idle. "We had perfect co-operation from the Cleveland police," said Mr. White, "but we felt that we could not operate without tremendous bloodshed in Cleveland—and the same goes for the Poland avenue plant in Youngstown, due to the general location and problem of protecting the men."

Summing it up, he stated that Republic has been shipping 7000 to 8000 tons a day, about half as much as just before the strike.

Closed Shop Is Aim

Mr. Voss said that in the presence of Gov. Henry Horner, Illinois, Van A. Bittner, SWOC organizer in the Chicago district, admitted that the closed shop is the ultimate aim of the unionization drive.

Mr. Girdler referred to published interviews with John L. Lewis and Homer Martin, president of the automobile workers, in which they were similarly quoted.

Mr. Girdler's statements with respect to the company's general labor policy simply reiterated what the company had previously said publicly and in pamphlets to its employees.

"We have told everybody that we are prepared to obey the law and to bargain collectively with the CIO, but we have refused to sign a contract," he declared. "The only contract that has been offered to us is the Carnegie-Illinois-CIO contract and that we will not sign."

Someone asked: "How about efficiency under a closed shop?"

"An executive of a fair-size steel

Republic Officials at Press Conference



Cleveland News Photo

LEFT to right: T. M. Girdler, chairman; R. J. Wysor, president; J. A. Voss, director of industrial relations; and C. M. White, vice president in charge of operations. Fifteen newspaper men plied them with questions for more than an hour when they explained Republic's operating position and labor policy

company which has signed the Carnegie-Illinois agreement, told me that the efficiency of his workers was off 33 per cent, and there is a constant stream of men with complaints.

"We have not hired a strike breaker and we have not hired an armed guard who hasn't been in our employ for a long time. There isn't an employe working in our plants except of his own free will. All can go home and come back at any time—if they can get back."

No Contracts With Miners

The question was asked: "Are you paying bonuses or overtime for the work being done in the mills under strike conditions?"

"We always pay a bonus," Mr. Girdler said, "for production over a certain amount, and are paying time and a half for overtime over 40 hours, as our regular schedule provides."

A discussion about contracts with the United Mine Workers brought out the fact that Republic has no signed contract but has authorizations from individuals for deducting union dues.

CARNEGIE-ILLINOIS ASKS DISMISSAL OF COMPLAINT

William Beye, representing Carnegie-Illinois Steel Corp., appeared before the national labor relations board last Friday on behalf of that corporation, stating that it has com-

Record Payroll; Highest Wages

MORE than 12,000 employes were added to the steel industry's payrolls in April, when a record of 589,000 employes was established, according to the American Iron and Steel institute.

Payrolls in April—the first full month following the general wage increase effective March 16—amounted to \$94,322,000, against \$90,863,000 in March, and \$70,105,000, the average monthly payroll in 1929.

Average hourly earnings for the 530,000 wage-earning employes were 85.6 cents, a new record. In March the average was 79.3, and in 1929 the average for the year was 65.4.

Wage earners worked on an average of 41.3 hours per week in April.

plied with the agreement it made to withdraw all support from company unions and not to interfere with employe self-organization.

He said the corporation has posted its agreement at all of its plants for the past 30 days. He asked that the complaint lodged by the Steel Workers Organizing committee and

the Amalgamated Association of Iron, Steel and Tin Workers be dismissed by the board, to which the board replied that a dismissal order will be issued as soon as it has a confirmation of this in writing from its regional directors.

MOTOR CAR DISPUTES AFFECT 15,000 WORKERS

Refusal of union men to work with nonunion employes on the motor line closed two Chrysler plants in Detroit last Friday, affecting 9800 men. A wage rate dispute closed Packard's "120" plant, affecting 2000, after a sitdown in the stamping division.

A proposed sitdown at Fisher Body's Pontiac plant to force United Automobile Workers' members to pay dues was forestalled by the management closing the plant, affecting 3300. The plant manager attributed the closing to "numerous complaints of excessive heat." The UAW suspended initial fees to spur signing of Ford workers.

International Harvester To Build Motor Plant

International Harvester Co., Chicago, will build a manufacturing plant at Indianapolis, in which will be concentrated production of motors for its line of trucks. It will be located on a 75-acre tract five miles from the city and will cost \$4,000,000, with capacity for 700 motors per day.

It will include a one-story main building for motor manufacture, a foundry and heating plant, with power substation. The manufacturing buildings will cover 340,000 square feet of floor space and the foundry 260,000 square feet. Steel frame construction will be used. Two assembly lines each 500 feet long will occupy the main building. Overhead conveyors will be used for a large part of plant transportation. The foundry will have capacity for 300 tons of gray iron castings daily.

Colorado Fuel & Iron Buys Coast Wire Plants

Colorado Fuel & Iron Corp., Denver, has decided to exercise an option for the purchase of California Wire Cloth Co., which has plants at Oakland and South San Francisco, Calif. A subsidiary company will be formed to operate the plants, which will be expanded. Purchase will be by issue of 10,500 shares of stock, already authorized. This move is in the direction of diversifying products and broadening the field served by the Colorado company.

SWOC Chairman Leads Youngstown Pickets



IN FRONT of the main entrance of Republic Steel Corp.'s plant in Campbell, Youngstown suburb, Philip Murray, national chairman of the Steel Workers Organizing committee, set up a loud speaker and harangued a crowd of pickets and onlookers. Some of the pickets were imported from the coal fields and Akron rubber plants. Murray, at speeches in Youngstown and elsewhere, appealed for financial help. Wide World photo

Production

STEELWORKS operations last week averaged 75 per cent, unchanged from the preceding week. Pittsburgh advanced 1 point to 95 per cent, and Detroit was up 5 points to capacity operations, but adjustments were made at Chicago and Cleveland on account of strike conditions.

Cleveland-Lorain—Down 19 points to 46 per cent. National Tube Co. at Lorain operated 11 furnaces the first half of the week and 10 the remainder, while Otis Steel Co. scheduled seven the first four days. All Republic furnaces were down.

Cincinnati—Up 6 points to 96 per cent, leaving only one open hearth in reserve.

Youngstown—Down 1 point to 29 per cent. Carnegie-Illinois Steel Corp. is operating 14 open hearths, a bessemer unit here and others at Sharon. Sharon Steel Corp. is scheduling five furnaces. Operating schedules of Republic Steel Corp. and Youngstown Sheet & Tube Co. have been curtailed by the strike.

Buffalo—Declined 3 points to 88 per cent, with little change indicated for this week.

Chicago—Declined to 63 per cent, compared with an average of 75 per cent a week ago when strikes started to cause schedules to recede. Steel-making is at a standstill at plants of Inland Steel Co., Youngstown Sheet & Tube Co., with Republic Steel Corp. operating five of eight open hearths. Twenty-seven of 39 blast furnaces continue active.

Detroit—Gained 5 points to 100 per cent, with schedules calling for one furnace to be taken off this week, reducing the rate to 95. Incidence of the 4-day week on Ford assembly lines has had no effect on the company's steelmaking.

St. Louis—Off 3 points to 91 per cent.

Pittsburgh—Up 1 point to 95 per cent. Forty-nine stacks are operating, compared to 37 one year ago.

Wheeling—Unchanged at 96 per cent, for the second consecutive week.

New England—With less than half of the open hearths in the district operating, ingot production was at 45 per cent, off 10 points. This drop is due entirely to wide-spread repairs.

Central eastern seaboard—Ingot production is easier at around 71 per cent, with the tendency expected to continue slightly downward over the next few weeks.

Birmingham—Ingot operations remained at 83 per cent last week. Little or no change is indicated for this week.

District Steel Rate

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended		Same week	
	June 5	Change	1936	1935
Pittsburgh . . .	95	+ 1	62	32
Chicago	63	-12	70	43
Eastern Pa. . . .	71	- 1½	43	29½
Youngstown . . .	29	- 1	77	48
Wheeling	96	None	68	48
Cleveland	46	-19	82	54
Buffalo	88	- 3	84	37
Birmingham . . .	83	None	69	52½
New England . . .	45	-10	70	60
Detroit	100	+ 5	88	94
Cincinnati	96	+ 6	80	†
St. Louis	91	- 3	†	†
Average	75	None	67	41

†Not reported.

highest of any month. April sales, \$9,663,009, were the second highest month. Smaller cash totals but larger numbers of installations are expected for the summer months, Mr. Henderson said.

Properties, Behavior Of Tin To Be Studied

A three-year research program on the fundamental properties and behavior of tin has been established in the metals research laboratory at the Carnegie Institute of Technology by the Bristol-Myers Co., manufacturing chemists, Hillside, N. J.

Three men will devote their entire time to the work and will receive assistance from other members of the staff. Dr. Gerhard Derge of the laboratory staff will head the group.

The work will be devoted to the science of tin rather than to its practical applications. It will probably include studies on extrusion velocities, the generation of protective layers on tin, the rate of hardening and softening, the types and amounts of impurities in high-purity tin and their effects on the properties of the metal.

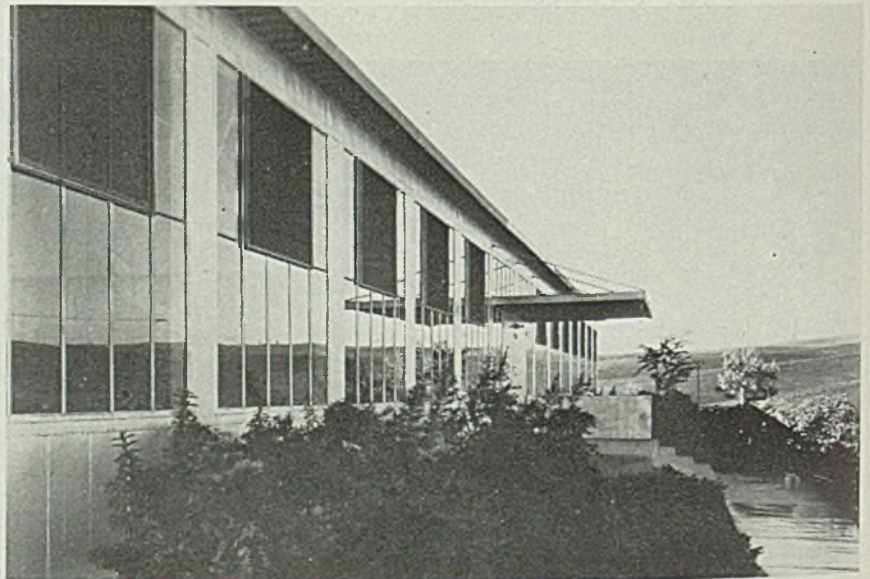
Simplified practice recommendation for steel reinforcing bars again has been reaffirmed without change, bureau of standards has announced.

Air Conditioning Sales Reach All-Time Peak

Installed cost of equipment sold by the Air Conditioning Manufacturers' association members in the first four months of 1937 totaled \$41,311,301, an increase of 180 per cent over the corresponding period in 1936, according to William B. Henderson, executive vice president. This was 82.7 per cent of total sales in 1936, largest year in the industry's history.

March sales were \$17,137,869,

All Steel Construction in California Military School



COPPER-BEARING steel in Robertson cellular units forms this building of the California Military Academy in Baldwin Hills, Los Angeles. The principle of indoor-outdoor class rooms is followed, sliding metal and glass doors allowing class activities to be extended into the outdoors. The building shown above required 16 tons of 16-gage steel, with metal lath and cement for partitions. Several schools in California have been built of steel, this probably being the largest structure of this kind. A spray coat of aluminum on the exterior will reflect heat, keeping the interior cool

May Iron Output Gains as Strikes Bank 20 Furnaces

FORCED banking of 20 blast furnaces by three major steel companies whose plants were beset by CIO strikes late in May failed to arrest the upward swing in coke pig iron production which began last July. Both total output and average daily output in May registered small gains. However, the labor disturbances did not occur until the last week in the month.

Active blast furnaces on May 31 totaled 169, a loss of 17 from the total of 186 making iron on April 30. In addition to the 20 furnaces banked because of strikes, four more went down from normal causes. All

MONTHLY IRON PRODUCTION

	Gross Tons		
	1937	1936	1935
Jan.	3,219,741	2,029,304	1,478,443
Feb.	3,020,006	1,838,932	1,614,905
March ...	3,470,470	2,046,121	1,770,990
April ...	3,400,636	2,409,474	1,671,556
May ...	3,544,162	2,659,643	1,735,577
Tot. 5 mo.	16,655,015	10,983,474	8,271,471
June	2,596,528	1,558,463	
July	2,595,791	1,520,340	
Aug.	2,711,726	1,759,782	
Sept.	2,728,257	1,770,259	
Oct.	2,991,794	1,978,379	
Nov.	2,949,942	2,066,293	
Dec.	3,125,192	2,115,496	
Total	30,682,704	21,040,483	

of these units remained idle as the month ended. To offset this loss, seven furnaces resumed in May.

Average daily production in May was at the rate of 114,328 gross tons per day, which, compared with the rate of 113,354 tons per day in April, was an improvement of 974 tons, or 0.8 per cent. This was the highest daily output since October, 1929, with 115,747 tons per day. The rate for May, one year ago, was 85,795 tons per day.

Total production in May was 3,544,162 gross tons, this being a gain of 143,526 tons, or 4.2 per cent, over the 3,400,636-ton total of the previous month. A major portion of this increase, however, is explained by the fact that May was a one-day longer month than April. The May output was the largest on record since October, 1929, with 3,588,146 tons; it compared with 2,659,643 tons in May, 1936.

Production for the first five months of 1937 aggregated 16,655,015 gross tons. Against the 10,983,474 tons made in the corresponding

period of 1936, this was a gain of 5,671,541 tons, or 51.5 per cent. The five-month total for 1935 was only 8,271,471 tons.

Relating production to capacity, operations in May were at the rate

AVERAGE DAILY PRODUCTION

	Gross Tons			
	1937	1936	1935	1934
Jan.	103,863	65,461	47,692	39,537
Feb.	107,857	63,411	57,675	45,385
March ...	111,951	66,004	57,120	52,438
April ...	113,354	80,316	55,719	57,873
May ...	114,328	85,795	55,986	66,370
June	86,551	51,949	64,563	
July	83,735	49,043	39,630	
Aug.	87,475	56,767	34,199	
Sept.	90,942	59,009	29,969	
Oct.	96,509	63,818	30,689	
Nov.	98,331	68,876	31,930	
Dec.	100,813	68,242	33,161	
Ave.	110,298	83,832	57,694	43,774

of 84.2 per cent, as compared with 83.7 per cent in April, 82.5 per cent in March, and 63.1 per cent in May, one year ago.

The 169 operating blast furnaces on May 31 compared with 186 in April, 182 in March, 176 in February and 169 in January. In May, 1936, active furnaces numbered 145. Of the 24 stacks blown out or banked in May, 19 were nonmerchant or steelworks units and five were merchant. Four of the stacks resuming were of steelworks classification and three were merchant units.

Of the 20 furnaces forced to bank

MAY IRON PRODUCTION

	No. in blast last day of		Total tonnage	
	May	Apr.	Mer- chant	Nonmer- chant
Ohio	26	43	124,993	671,649
Penna.	65	64	149,416*	1,027,625
Alabama ...	15	14	90,926*	119,662
Illinois ...	14	15	83,501	246,969
New York ...	13	12	84,346	153,747
Colorado ...	3	3		
Indiana ...	13	16	15,919*	560,431
Maryland ...	5	5		
Virginia ...	1	1		
Kentucky ...	2	2		
Mass.	1	0		
Tenn.	1	1		
Utah	1	1	30,044*	184,934
West Va. ...	3	3		
Michigan ...	4	4		
Minnesota ...	2	2		
Missouri ...	0	0		
Total	169	186	579,145*	2,965,017*

*Includes ferro and spiegeleisen.

as a result of strikes, nine are owned by Republic Steel Corp., nine by Youngstown Sheet & Tube Co. and two by Inland Steel Co. Fifteen of the furnaces are located in Ohio, three are in Indiana and two are in Illinois.

Stacks resuming in May were: In Pennsylvania: Steelton A, Bethlehem Steel Co.; Carrie No. 6, Carnegie-Illinois Steel Corp. In Alabama: Alabama City, Republic Steel Corp.; Woodward No. 3, Woodward Iron Co. In Illinois: South Works New, No. 5, Carnegie-Illinois Steel Corp. In New York: Troy, Troy Furnace Co. In Massachusetts: Everett, Mystic Iron Works.

Furnaces blowing out or banking were: In Ohio: Globe, Globe Iron Co.; two Brier Hill, three Campbell and Hubbard No. 1, Youngstown Sheet & Tube Co.; Martins Ferry, Wheeling Steel Corp.; Massillon, four River and four Youngstown, Republic Steel Corp. In Pennsylvania: Bethlehem F, Bethlehem Steel Co. In Alabama: One Pioneer, Republic Steel Corp. In Illinois: Two Iroquois, Youngstown Sheet & Tube

RATE OF OPERATION

(Relation of Production to Capacity)

	1937 ¹	1936 ²	1935 ³	1934 ⁴
Jan.	76.6	48.2	34.2	28.3
Feb.	79.5	46.6	41.4	32.5
March ...	82.5	48.5	41.0	37.5
April ...	83.7	59.1	40.0	41.4
May ...	84.2	63.1	40.2	47.5
June	63.6	37.2	46.3	
July	61.5	35.2	28.4	
Aug.	64.3	40.7	24.5	
Sept.	66.9	42.5	21.5	
Oct.	71.0	45.8	22.1	
Nov.	72.3	49.5	22.8	
Dec.	74.2	49.0	23.7	

¹Based on capacity of 49,512,737 gross tons, Dec. 31, 1936; ²capacity of 49,777,893 tons, Dec. 31, 1935; ³capacity of 50,845,741 tons, Dec. 31, 1934; ⁴capacity of 50,975,561 tons, Dec. 31, 1933. Capacities by American Iron and Steel Institute.

Co. In Indiana: One Indiana Harbor, Youngstown Sheet & Tube Co.; Madeline, Inland Steel Co.

Carnegie-Illinois Steel Corp. is dismantling its dormant Carrie No. 5 blast furnace at Rankin, Pa. This furnace was built in 1902-03, was last relined in 1926 and has been idle for several years. With demolition of this unit, the total number of potential furnaces in the United States is reduced from 241 to 240.

Negotiations are reported in progress between German steel interests and the government of Brazil for a trade agreement which will give Germany control of certain iron ore mines in Brazil. Shortage of ore is said to be handicapping rearmament plans of the Reich and supplies from Spain and Sweden have been much reduced, making access to other sources imperative.

Steel Exports Set New High Records

EXPORTS of finished and semi-finished steel and scrap in April and in the first four months of 1937 established new records in several instances. Shipments of semifinished and finished iron and steel in April reached a new high, with 243,800 gross tons, valued at \$15,854,933. This not only exceeded any month in 1929 but also surpassed the monthly totals for the previous eight years of comparable record, according to the metals and minerals division of the department of commerce.

The total compares with 208,335 tons, valued at \$13,784,606, in March and 105,081 tons in April, 1936. While not definitely determined, the April tonnage is believed to have compared favorably with, if not to have exceeded, any monthly post-war figure. The April value, however, is slightly lower than the valuation of \$17,105,330 for exports in April, 1929.

Pig Iron Largest Export Item

Pig iron exports in April amounted to 38,179 gross tons, the largest item on the export list. This compares with 23,384 tons in March and 215 tons in April, 1936. For four months pig iron exports were 83,059 tons, an unprecedented total, most going to Japan. This compares with 712 tons exported in the similar period of 1936. In the six-year period, 1931-1936, an aggregate of only 25,312 tons was exported and in the four-year period, 1927-1930, total pig iron exports were 195,702 tons.

Scrap exports in April reached an all-time peak at 427,886 gross tons, valued at \$8,340,759, compared with March exports of 362,249 tons, valued at \$6,735,381, the previous high point. Aggregate shipments in the first four months of 1937 were 1,014,255 tons valued at \$18,825,273, compared with 663,416 tons valued at \$7,773,791 in the corresponding period of 1936.

Cumulative exports, excluding scrap, in the initial four months were 720,754 tons, valued at \$48,802,952, compared with 353,348 tons in the comparable period of 1936 and 930,626 tons in the first four months of 1929.

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Articles	Gross Tons		
	April 1937	March 1937	Jan. thru Apr. '37
Pig iron	38,177	14,435	83,059
Ferromanganese and spiegeleisen	1,076	59	1,226
Other ferroalloys	60	133	621
*Ingots, blooms, etc.			
Not cont. alloy	5,216	3,557	17,371

Articles	April 1937	March 1937	Jan. thru Apr. '37
Alloy, incl. stainless	279	525	911
Bars, iron	114	294	577
Bars, concrete	2,181	819	4,703
*Other steel bars:			
Not cont. alloy	9,885	8,868	28,962
Stainless steel	7	11	73
Alloy, not stainless	616	523	2,046
Wire rods	6,508	3,057	14,524
Boiler plate	519	324	1,169
*Other plate, not fab.:			
Not cont. alloy	25,785	26,589	70,763
Stainless steel	6	6	11
Alloy, not stainless	1,104	96	1,311
Skelp	11,181	5,964	21,453
Sheets, galv. iron	437	509	2,056
Sheets, galv. steel	7,261	5,441	21,932
*Sheets, black steel:			
Not cont. alloy	29,220	18,303	73,942
Stainless steel	47	47	186
Alloy, not stainless	60	18	141
Sheets, black iron	1,238	833	3,045
*Strip steel, cold-rolled:			
Not cont. alloy	2,311	2,689	9,862
Stainless steel	50	19	140
Alloy, not stainless	46	44	236
*Strip steel, hot-rolled:			
Not cont. alloy	4,300	5,699	19,991
Stainless steel	31	37	95
Alloy, not stainless	11	80	241
Tin plate, taggers' tin	30,289	23,484	98,037
Terne plate	378	831	2,277
Tanks, except lined	2,543	4,781	8,834
Shapes, not fab.	12,179	16,169	39,404
Shapes, fabricated	2,070	3,941	10,785
Plates, fabricated	4,121	335	7,948
Metal lath	221	135	628
Frames and sashes	47	50	255
Sheet piling	127	667	1,875
Rails, 60 lb.	3,995	15,581	24,116
Rails, under 60 lb.	843	576	3,568
†Rails, relaying	5,502	2,386	10,101
Rail fastenings	1,436	1,146	3,367
Switches, frogs, etc.	297	146	659
Railroad spikes	225	135	792
R. R. bolts, nuts, etc.	38	70	245
Boiler tubes, seamless	894	1,155	3,687
Do. welded	10	61	175
Pipe:			
Sms. casing, oil line	6,276	9,035	25,048
Do. welded	441	1,390	3,417
Do. Sms. black, except casing	1,046	1,355	4,936
Pipe fittings:			
Mall. iron screwed	411	423	1,424
Cast iron screwed	312	272	1,017
Pipe and fittings for:			
Cast iron pressure	2,248	1,744	8,660
Cast iron soil	690	844	2,641
Pipe—Welded:			
Black steel	1,802	1,742	6,443
Black wrought iron	90	104	578
Galv. steel	1,318	966	6,078
Galv. wrought iron	244	214	771
Pipe and fittings:			
Rivtd. iron or steel	47	45	170
Wire:			
Plain iron or steel	2,369	3,907	11,088
Galvanized	1,672	2,272	7,086
Barbed	3,000	3,480	12,394
Woven wire fencing	400	305	1,270
*Woven wire screen:			
Insect	49	27	129
Other	136	92	453
†Wire rope	480	648	1,820
†Wire strand	32	56	192
†Card clothing	21	2	27
Other wire mfrs.	845	702	2,610
Wire nails	2,096	2,653	7,268
Horseshoe nails	65	76	305
Tacks	21	26	103
Other nails, staples	204	411	1,111
Bolts, etc.	1,005	1,002	3,600
Castings:			
*Gray iron, semisteel	464	566	2,146
Malleable iron	544	627	1,886
*Steel, not alloy	183	161	668
Alloy, incl. stainless	190	128	561
Car wheels, tires, axles	1,597	1,884	5,173
Horseshoes, calks	46	28	130
*Forgings, n. e. s. †			
Not alloy	552	430	1,877
Alloy, incl. stainless	29	90	274
Total I. & S. prod.	243,860	208,335	720,754
Scrap iron and steel	421,383	355,979	989,443
Scrap, tin plate	1,869	1,181	5,097
†Tin plate, circles, strips, cobbles	958	1,415	4,668
Waste-waste tin plate	3,676	3,674	15,047
Total scrap	427,886	362,249	1,014,255
GRAND TOTAL	671,746	570,584	1,735,009
Iron ore	78,609	66	81,403

*No comparable breakdown for previous year. †New class—no comparable figures available for previous year. ‡Previously carried under one heading. "Wire Rope."

Japan Buys 680,000 Tons Iron, Steel in 4 Months

Japan has placed some large orders for pig iron and steel products in the United States, a commercial attaché at Tokyo has reported to the department of commerce. In the first four months this year this country sold Japan more pig iron than the total of pig iron exports in the six preceding years. The orders in the four months amounted to 680,000 tons of iron and steel, consisting of 420,000 tons of pig iron, 140,000 tons of semifinished steel and 120,000 tons of finished steel products. Because of Japan's urgent need of imported steel products, the duties have been removed from nearly all the categories the United States ships there.

April Machinery Exports Best Since May, 1930

Exports of industrial machinery from the United States in April showed a gain of 43 per cent over April, 1936, and attained the highest monthly value since May, 1930. Total value of such exports was \$22,717,849.

Power generating machinery totaled \$1,427,898, more than double those of April last year. Construction and conveying machinery showed a total value of 133 per cent above the same month a year ago. Mining, well and pumping machinery made a gain of 91 per cent.

Power-driven metal-working machinery exports were valued at \$5,119,671, only slightly higher than the value for April, 1936, which was \$4,600,454. Lathes, screw machines, milling, grinding and gear cutting machines gained over a year ago but this was offset by smaller exports of rolling mill and forging machinery, sheet and plate metal working machines.

Billboards Offer Media For Safety Campaigns

Safety messages comprise the bulk of material used on bulletin boards of industrial companies, a survey by the Metropolitan Life Insurance Co. reveals. Fifty-three per cent of material posted relates to safety, 17 per cent to instructions, 13 per cent to group insurance, 8 per cent to health, 7 per cent to social activities and 1 per cent each to inspirational messages and employ advertising.

Billboards are widely used both to make announcements to employes and as mediums for continuous campaigns of safety, waste reduction and similar topics, the report indicates.

Sintered Carbides In Modern Plant

FIRTH-STERLING STEEL CO.'S new building in McKeesport, Pa., for production of sintered carbides was formally opened last Wednesday.

Air-conditioned and sound proofed, the two-story structure is modernistic in design, and such materials as glass brick, plate glass, stainless steel and aluminum have been used in its construction. Great efforts have been made toward the elimination of wasteful handling of materials and time losses.

Terrazzo floors, glass walls and linoleum ceilings are used in many parts of the building so that the surfaces may be washed, to eliminate the possibility of dust or other foreign matters which might cause defects in the finished tools. A dust filtering ventilation system has been provided as a further precaution.

One room, which houses the ball mills where powdered materials are crushed and mixed, has been sound-proofed to bring about an 85 per cent reduction in the noise resulting from the operation.

The formal opening marked the tenth anniversary of the company's first experience with sintered carbides, which are used largely for tools, dies, and other machining applications.

Sintered carbides are made from extremely fine metallic powders of tungsten, carbon and cobalt mixed together, pressed in a mold to form

a blank or tip, then heated in a hydrogen furnace to a temperature where the metal with the lower melting point softens while the others retain their solidity. The plastic metal then coalesces with the solid particles and on cooling the mass becomes a solid hard metal piece of a predetermined shape.

The new building was designed and built by Rust Engineering Co., Pittsburgh. The main section is 220 feet long and 70 feet wide. An office wing extends from the center and contains a lobby and display room. Glass brick is used for stair wells and interior partitions, and offices are sound-proofed by using air-separated double glass wall as partitions.

Toolroom on First Floor

A tool and die shop occupies the first floor of the main building. The second floor contains the sintering furnace room and finishing room, which is provided with elaborate devices to keep out dust; two laboratories and a ball mill room.

The plant is reported to be the largest in the world devoted to the exclusive manufacture of tungsten carbides and carbide tools. Practically all of the machinery and equipment is new.

Upon entering the building through a garden, visitors find in the lobby display cases containing a variety of finished tools and dies as well as specimens of Ferberite ore (iron tungstate), which is mined on the company's properties in Colorado. The tungsten is put through a chemical process of refinement in the company's laboratory in McKeesport.

Included in the equipment is a 400-

ton two-way press for large production pieces. Special furnaces have been designed and built for the sintering process to insure a hydrogen atmosphere.

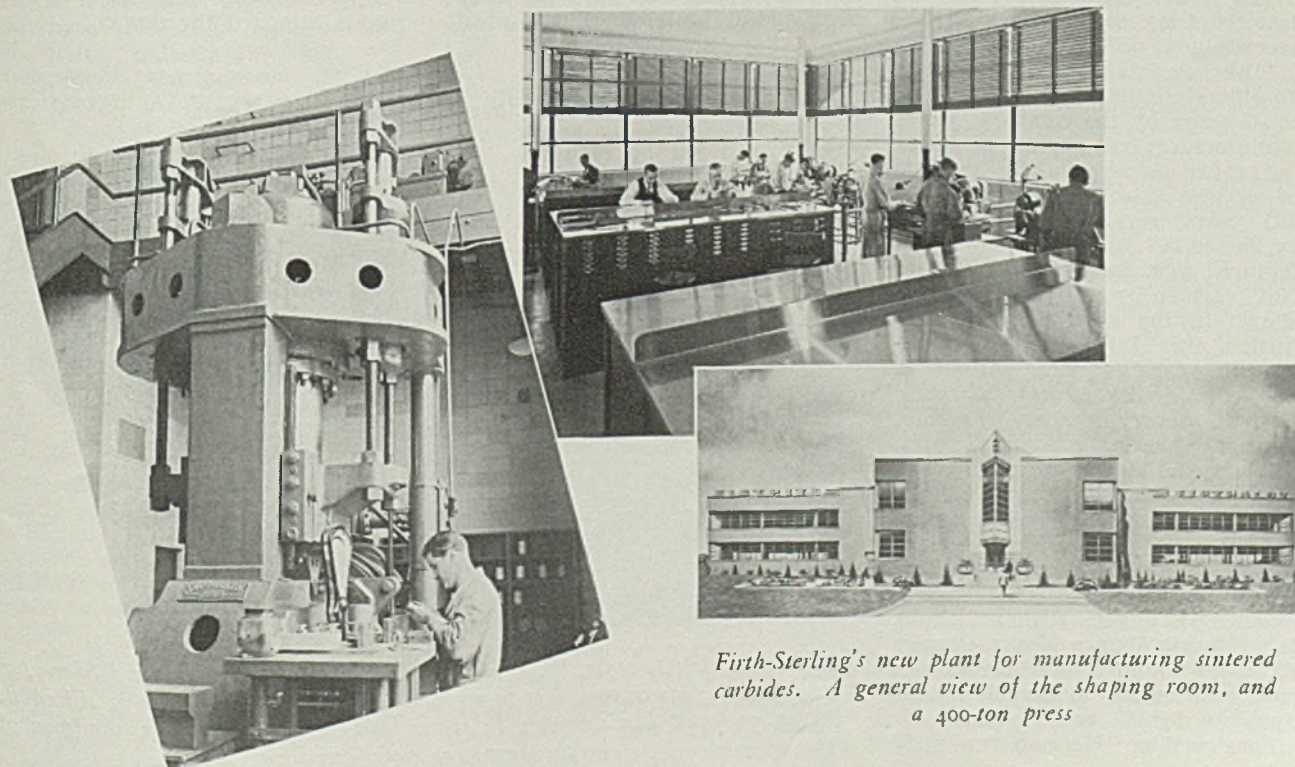
Industrial Conference Board Elects Officers

Elon H. Hooker, president, Hooker Electrochemical Co., New York, was elected chairman of the National Industrial Conference board at its twenty-first annual meeting recently in New York. John Henry Hammond, of Hines, Rearick, Dorr & Hammond, New York, was elected honorary chairman.

Dr. Virgil Jordan continues as president and chief executive.

Members of the board's executive committee elected for the ensuing year include: Phillip E. Bliss, president, Warner & Swasey Co., Cleveland; William C. Dickerman, president, American Locomotive Co., New York; David M. Goodrich, chairman, B. F. Goodrich Co., Akron, O.; R. J. Hamilton, president, American Radiator Co., New York; Auguste G. Pratt, president, Babcock & Wilcox Co., New York; A. W. Robertson, chairman, Westinghouse Electric & Mfg. Co., New York.

Councillors include: Eugene G. Grace, president, Bethlehem Steel Corp.; Cornelius F. Kelley, president, Anaconda Copper Mining Co.; L. F. Loree, president, Delaware & Hudson railroad; Andrew W. Mellon, Pittsburgh; George M. Verity, chairman, American Rolling Mill Co.; and Owen D. Young, chairman, General Electric Co.



Firth-Sterling's new plant for manufacturing sintered carbides. A general view of the shaping room, and a 400-ton press

Men of Industry

E B. EVLETH has been appointed vice president and general manager, Brown Instrument Co., division of Minneapolis-Honeywell Regulator Co., Philadelphia, manufacturer of industrial recording and control instruments. He succeeds William J. Hajek, retired. Mr. Evleth was formerly resident vice president for Minneapolis-Honeywell at Chicago.

C. L. Saunders, former regional sales manager, has been promoted to succeed Mr. Evleth as vice president in charge of the Midwest region.

Frank R. Frost, president, Superior Steel Corp., Pittsburgh, sailed from New York June 2 on a six-weeks' business trip to Europe.

Frederick D. Banning has been named to the Cleveland staff of Designers for Industry Inc., Terminal tower, as chief engineer in charge of the engineering development department. George E. Henry has

been appointed sales promotion manager for the company, with headquarters in the International building, New York.

H. E. Friedlein, associated with the Cincinnati office of Crucible Steel Co. of America for 25 years, has been named manager, succeeding Robert C. Webster, retired.

F. W. McIntyre Jr. has joined the sales organization of Reed-Prentice Corp., Worcester, Mass., making his headquarters in Worcester and traveling in the New England territory.

J. J. Summersby, heretofore assistant vice president, Worthington Pump & Machinery Corp., Harrison, N. J., has been named general sales manager. He has been identified with the corporation since 1920.

Edward W. Ristau has been made vice president, Skilsaw Inc., Chicago, manufacturer of electric hand saws, buffers, grinders, polishers and sand-

ers. He will continue directing sales, advertising and promotion.

E. G. Howell has terminated his active business connection with Erman-Howell & Co. Inc., Chicago, iron and steel scrap dealer. At a recent annual meeting of directors, Walter Erman was re-elected president and treasurer and J. C. Godhelp was elected vice president.

R. Notvest has been appointed exclusive sales representative for Champion Rivet Co., Cleveland, on welding electrodes for the St. Louis and southern Illinois territories. He will retain his present headquarters at 457 South Arlington street, Indianapolis.

Louis Allis, president, Louis Allis Co., Milwaukee, manufacturer of electric motors, has been elected to receive the degree of doctor of electrical engineering at the commencement exercises of Pennsylvania Military college, Chester, Pa., June 8. He was graduated from the school in 1888.

R. W. Griffiths, works manager, Briggs & Stratton Corp., Milwaukee, maker of automobile switches, locks and other hardware, has been

12 Lamson & Sessions Workers Have Continuous Service Record of 650 Years

TWELVE employes who have worked continuously for more than 50 years for the Lamson & Sessions Co., Cleveland, were presented gold medals at a testimonial dinner at the Hotel Cleveland, Cleveland, last Saturday night. Their service records total 650 years.

Silver medals were presented to 70 others continuously employed 25 to 49 years by the company, which manufactures bolt and nut products.

The five oldest employes in point of service have an aggregate of 295 years' service. This exceeds by 28 the 267 years of five workers featured in a recent "Believe It or Not" cartoon by Ripley. These five shown in the accompanying illustration, are: Louis Brown, machinist, 67 years' service; Alfred B. Bower, sales department, 59 years; Bernard Sherry, packer, 57 years; George Dennerle, foreman, 56 years; William J. Stevenson, watchman, 56 years. John G. Jennings, board chairman, is sixth in the illustration with 54 years' service. The combined service record of these six is 349 years.

David Kruggel, Richard Crain, John Haurin, James Mayer, Charles E. Nieman and Frank C. Nieman have been employed steadily by the company for 50 or 51 years.

Pensioned are Herman Braun, 57

years' service, John Ptacek, 53 years, John Patterson, 53 years, Charles Friedel, 50 years, John Minarek, 50 years and John Charvet, 50 years.

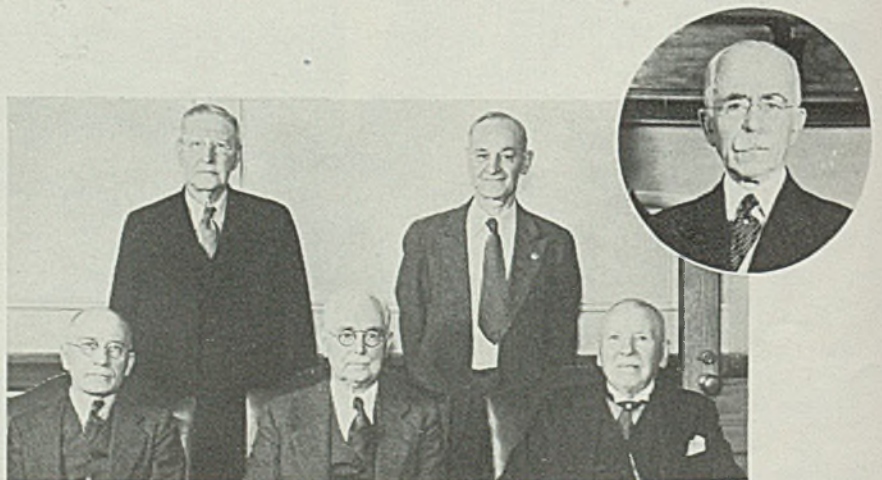
Tribute was also paid to George S. Case, president, 33 years' service, and I. L. Jennings, vice presi-

dent, who has served 30 years.

Louis Brown who heads the seniority list won the Ohio state title for longest service in one company some years ago.

Approximately 300 employes and guests attended the dinner.

These Six Have Record of 349 Years



Upper row, left to right, W. J. Stevenson, 56 years' service; Bernard Sherry, 57 years' service; lower row, left to right, George Dennerle, 56 years; Alfred B. Bower, 59 years; Louis Brown, 67 years; inset, John G. Jennings, chairman of the board, 54 years' service

lected vice president in charge of manufacturing. Edward V. Oehler, general sales manager, has been elected vice president in charge of sales.

J. R. Luby has been appointed metallurgist in charge of electrical sheet production, Empire Sheet & Tin Plate Co., Mansfield, O. For ten years Mr. Luby was associated with Follansbee Bros. Co. as electrical sheet engineer and for the past two years as chief metallurgist.

Richard T. Myer, graduate of Purdue university, has been selected to receive a research fellowship to run three years and pay \$1200 annually, established in the department of metallurgy at the Carnegie Institute of Technology by the International Nickel Co. Inc., New York.

Harold A. Todd, secretary and treasurer, Wisconsin Motor Corp., Milwaukee, maker of heavy duty gasoline and fuel oil engines, has been elected president to succeed Hugo W. Schnetzky, resigned. P. N. Hauser and C. O. Thomas, vice presidents, First Wisconsin National bank, have been elected vice president and secretary-treasurer, respectively, of the motor firm.

George S. Whyte, president, Macwhyte Co., Kenosha, Wis., since it was established at Coal City, Ill., in 1901 to manufacture wire rope and cable, has been elected to the new office of chairman of the board and is succeeded by his son, Jessel S. Whyte. Robert B. Whyte, brother to the retiring president, has been elected vice president in general charge of factory operations.

Thomas A. Johnston, formerly head of Carnegie-Illinois Steel Corp.'s sheet and tin mill laboratory, has been named metallurgist at the Farrell-Mercer works. An employe of United States Steel Corp. subsidiaries since 1904, his first job was as a shear boy in the Farrell tin mills.

J. D. Fenstermacher has been made manager of sales, steel casting and railroad sales division, Columbia Steel Co., San Francisco, subsidiary of United States Steel Corp. E. S. Duval and F. R. Steckel have been named manager of sales, and assistant manager of sales, respectively, of alloy and stainless steel products.

E. J. Gove has been placed in charge of the recently opened office in Youngstown, O., of Cutler-Hammer Inc., Milwaukee. He has been



E. J. Gove

located in Youngstown for a number of years.

John Wilbur has been appointed to the Cleveland office of Electro Metallurgical Sales Corp., New York. Following graduation from Yale in 1933, Mr. Wilbur was first associated with the Niagara Falls works of Electro Metallurgical Co., and the past year and a half has been with the New York office of Electro Metallurgical Sales. Both organizations are units of Union Carbide & Carbon Corp.

Dr. Harvey N. Davis, president, Stevens Institute of Technology, Hoboken, N. J., has been nominated for president of the American Society of Mechanical Engineers for 1938 to succeed James H. Herron, president, James H. Herron Co., Cleveland. Dr. Davis served the society as vice president several years ago.

F. O. Hoagland, master mechanic, Pratt & Whitney division, Niles-Bement-Pond Co., Hartford, Conn., was nominated to serve as vice president for one year. Vice presidents named for 2-year terms include: B. M. Brigman, dean, Speed scientific school, University of Louisville, Louisville, Ky.; Harte Cooke, mechanical engineer, McIntosh & Seymour Corp., Auburn, N. Y.; W. H. McBryde, consulting engineer, San Francisco; and L. W. Wallace, director, equipment research, Association of American Railroads, Chicago.

Nominees to serve as managers for three years are: Carl Bausch, vice president, Bausch & Lomb Optical Co., Rochester, N. Y.; S. B. Earle, dean, school of engineering, Clemson Agricultural and Mechanical college, Clemson College, S. C.; and F. H. Prouty, partner, Prouty Bros. Engineering Co., Denver.

These selections were made at a meeting of the nominating committee at the society's semiannual meet-

ing in Detroit, May 17-21. Election will be by letter ballot closing Sept. 28, with nomination virtually assuring election.

Died:

PERCY EARL HUNTER, 64, president, Hunter Steel Co. and inventor of the Hunter Steel safety railing used on bridges and boulevards, May 25 in Pittsburgh. He was also president, Pittsburgh Annealing Box Co. and Ohio Valley Steel Co. Hunter Steel Co. had formerly been the Independent Bridge Co., of which he was president.

Hubert C. Tener, for many years secretary of Westinghouse Air Brake Co., May 24 in Pittsburgh.

John C. Bird, 64, mechanical engineer, Union Steam Pump Co., Battle Creek, Mich., in that city May 20.

John W. Gelling, 52, assistant superintendent of the American Can Co. plant at North Chicago, Ill., in that city, May 23.

Edward A. Malmgren, 52, of Duluth, a mechanical engineer and for 19 years in the employ of Oliver Iron Mining Co., subsidiary of United States Steel Corp., in that city, May 21.

Frank H. Willard, 74, president and general manager, Graton & Knight Mfg. Co., Worcester, Mass., in that city, May 25. He was the first president of the American Leather Belt- ing association.

Joseph M. Bodenberger, 61, secretary and director of purchases, Baker Mfg. Co., Evansville, Wis., manufacturing gasoline engines and farm machinery, in that city, May 19.

Frank Thomson, 54, office manager at Cleveland for American Steel & Wire Co., in that city, May 31. He had been associated with the company 26 years, for the past eight years at Cleveland and before that at Chicago.

J. J. Bever, 75, for over 30 years foundry manager for Otis Steel Co., Cleveland, before his retirement in 1930, at his home in Lakewood, O., May 31. He was a member, American Foundrymen's association, American Society of Mechanical Engineers, American Iron and Steel institute, Cleveland Engineering society and various other organizations.

Meetings

TO HONOR CLEVELAND HEADS OF TECHNICAL SOCIETIES

EIGHT Cleveland men prominent in national engineering and technical societies are to be honored by the Cleveland Engineering Society at its annual meeting, June 5. They are: P. C. Allen, vice president, Oglebay, Norton & Co., president, American Institute of Mining and Metallurgical Engineers; James H. Herron, president, James H. Herron Co., president, American Society of Mechanical Engineers; A. M. MacCutcheon, vice president, Reliance Electric & Engineering Co., president, American Institute of Electrical Engineers; A. E. Gibson, president, Wellman Engineering Co., president, American Welding Society; C. Clarke Wales, chief engineer, Otis Steel Co., vice president, Association of Iron and Steel Engineers; H. B. Dates, professor of electrical engineering, Case School of Applied Science, president, Illuminating Engineers' Society; B. J. Schwendt, assistant signal engineer, New York Central railroad, chairman, signal section, Association of American Railroads; and A. D. Taylor, president, American Association of Landscape Architects.

Dr. W. E. Wickenden, president, Case School of Applied Science, will preside at the meeting.

The Cleveland Engineering Society has moved its headquarters from the Hanna building to more spacious accommodations in Guild Hall in the Builders Exchange building.

STEEL ENGINEERS ARRANGE VISIT TO HOMESTEAD MILL

Association of Iron and Steel Engineers has arranged an inspection trip to the new 100-inch semicontinuous plate mill of Carnegie-Illinois Steel Corp., Homestead, Pa., for the afternoon of June 23. About 500 members and guests are expected to attend. The association will conduct an informal dinner meeting at the William Penn hotel, Pittsburgh, in the evening, the program to take the form of a symposium on flood control and rehabilitation.

ARRANGE PROGRAM FOR DEVELOPMENT CONGRESS

Program for the sixth International Congress for Steel Development to be held in Dusseldorf and Paris, June 21-25, includes papers on "Protection of Steel Frame Buildings Against Fire" and "Influence of Ductility on Steel Construction" and annual reports of the steel industries of member countries. The American industry will be repre-

sented at the congress by the American Institute of Steel Construction Inc.

The first two days of the congress will be spent in Dusseldorf, during which time two visits will be made to the Dusseldorf exposition. The last three days sessions are to be in Paris where delegates will visit the World Fair of Paris on two occasions.

ELECTRICAL ENGINEERS TO CONVENE IN MILWAUKEE

Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt., and past president, American Society of Mechanical Engineers, will be principal speaker at one session of the summer convention of the American Institute of Electrical Engineers in Milwaukee, June 21-24. His subject will be "The Engineer in a Changing World."

A number of Milwaukee plants will be visited during the convention, these including the Harnischfeger Corp., Cutler-Hammer Inc., Allis-Chalmers Mfg. Co., A. O. Smith Corp., Globe Union Mfg. Co. and Allen-Bradley Co.

K. L. Hansen, engineer, Harnischfeger Corp., is general chairman of the convention committee.

Financial

ALLIS-CHALMERS DOUBLES FIRST QUARTER EARNINGS

Net income of \$1,504,897 for the first quarter is reported by Allis-Chalmers Mfg. Co., Milwaukee. This equals 85 cents a share on 1,770,853 shares, and is almost double the \$754,127 reported in the same quarter last year.

DIVIDENDS DECLARED

American Rolling Mill Co., Middletown, O., declared a dividend of 50 cents on the common stock payable July 15 to record of June 15. In the previous quarter a dividend of 30 cents was paid.

Directors of Wheeling Steel Corp., Wheeling, W. Va., declared a dividend of \$1.50 on preferred, payable July 1 to holders of record June 12.

McKeesport Tin Plate Corp., McKeesport, Pa., declared a dividend of 50 cents, payable July 1 to holders of record June 10. Prior to the exchange of two shares of new stock for each share of old, the company paid a dividend of \$1 a share on April 1.

Directors of General Electric Co., Schenectady, N. Y., declared a dividend of 40 cents a share, payable July 26 to stockholders of record June 25.

Vanadium Alloys Steel Co., La-

trobe, Pa., declared an extra dividend of \$2.25 a share, payable June 25 to stock of record June 10. For the fiscal year to date four quarterly dividends of 60 cents a share have been declared, the last to be disbursed June 2.

Plan Research To Combat Occupational Diseases

Medical and engineering research to combat industrial diseases due to dusts and fumes is planned by the Air Hygiene Foundation, a non-profit scientific organization with headquarters at Mellon Institute, Pittsburgh.

Broader support from industry for this research will be asked. Approximately 170 firms, representing mining, metals, foundries, glass, refractories, ceramics and kindred industries, are now affiliated with the foundation.

The program calls for studies at Saranac laboratory, Harvard School of Public Health, University of Pennsylvania hospital, Singer Memorial hospital, and Mellon Institute, and for work in co-operation with the United States bureau of mines.

Lincoln Arc Welding Contest on Broad Lines

"The idea that opportunities of the James F. Lincoln Arc Welding Foundation's \$200,000 awards are available only to individuals familiar with electric welding and its use, is erroneous," announces Dr. E. E. Dreese, chairman of trustees and of the jury of awards. "Although a definite object of the awards is to urge architects, engineers, designers and production managers to study products which are now partially welded, so that electric welding may be applied more extensively, the primary object is to encourage study of products and structures built by some other method so that electric welding may be used in construction."

Spanish Translations of Technical Data Published

Translation of engineering data into Spanish to aid American machinery builders to sell their products in the expanding Latin American market is planned by the bureau of foreign and domestic commerce, machinery division. The bureau already has published a translation of Centrifugal Fans, Standard Method of Designating Discharge, Rotation and Arrangement for Drive, previously adopted by the National Association of Fan Manufacturers.

Activities of Steel Users and Makers

MESTA MACHINE CO., Pittsburgh, has booked an order for a new blooming mill, a hot strip mill and a cold strip mill, with all necessary equipment, from John Summers & Sons Co., England. The new mills will be installed at Shoten, near Liverpool, and Mesta Machine will have entire supervision of construction.

Central Foundry Co., New York, has removed its general offices from 420 Lexington avenue to 386 Fourth avenue.

Robert W. Hunt Co. has moved its offices and laboratories from 53 Park place, New York, to 59 Murray street.

Ideal Commutator Dresser Co., Sycamore, N. Y., has removed its New York office to larger quarters at 61 East Eleventh street.

P. W. Bowers & Co., iron and steel scrap dealer, has moved from the Chrysler building, New York, to 16 Park avenue at Thirty-fifth street.

Yarnall-Waring Co., Philadelphia, has moved its Cleveland branch

office from 30 Euclid arcade to 1740 East Twelfth street. G. G. Sutton is Cleveland district manager.

Pioneer Engineering & Mfg. Co., Detroit, manufacturer of coolant and lubricant pumps, has named the Burklyn Machinery Co., Syracuse, N. Y., as general distributor in that city.

Pittsburgh Testing Laboratory has moved its Chicago offices and laboratories to 223 West Hubbard street. Murray H. Henry has been appointed manager of the Chicago district.

Acme Aluminum Foundry Co., 6831 South Bell Avenue, Chicago, has acquired 15,000 square feet of additional floor space at 6724 South Chicago avenue for use as an additional aluminum foundry.

Ex-Cell-O Corp., Detroit, has appointed Williams & Wilson Ltd., 544 Inspector street, Montreal, Que., as representative in that district for its complete line of cutting tools, grinding spindles, drill jig bushings and other industrial products.

Dampney Co. of America, manufacturer of protective coatings for metal, Hyde Park, Boston, has opened a new branch office at 425 Citizens and Southern National Bank building, Atlanta, Ga. Ray W.

Carter, for the past six years associated with the New York office of the company, goes to Atlanta as southeastern district representative, and L. W. MacLean, of the Philadelphia office, has been transferred to New York.

Columbia Steel Co. of California has awarded Lewis Foundry & Machine Co., Pittsburgh, a Blaw-Knox Co. subsidiary, a contract for a completely mechanized three-high mill with roller and catcher tables. This is the seventh three-high mill order received by the Lewis company this year.

Metal Stampings Inc., Toledo, O., has recently been formed by William L. Peters, former vice president and general manager, Toledo Stamping & Mfg. Co., to develop a new die and stamping business in the former steel wool plant at Perrysburg.

Mercoid Corp., 4213 Belmont avenue, Chicago, has appointed a number of distributors who will carry in stock and give service on the complete line of automatic controls for heating, air conditioning, refrigeration and industrial applications. Service is also available from all Mercoid factory branches.

Electro-Motive Corp., La Grange, Ill., diesel locomotive manufacturer, has purchased an additional 106 acres of land adjoining its present property. While the company has not made known its plans, it is understood that a substantial extension of its plant is contemplated. Present capacity is 150 to 175 locomotives a year.

Rolling Cafeteria Brings Snacks to Industrial Workers



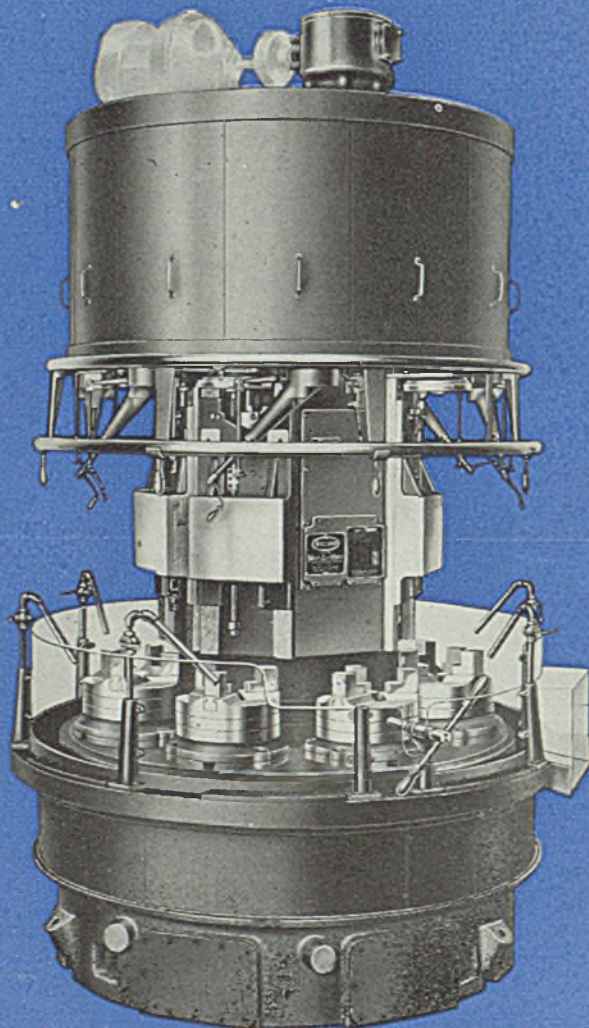
A SNACK at odd periods of the day is recommended for workers when hungry, tired or depressed. So a new "rolling cafeteria" built mainly of steel, and especially designed for industrial service, filled with sandwiches, milk, coffee, ice cream, candy, pie and cake, appears in the aisles of the East Pittsburgh works of the Westinghouse Electric & Mfg. Co. five times a day. J. H. Hartman, Westinghouse restaurant manager who designed the equipment, states that by eating at odd periods, even as much as five times a day, fatigue is avoided and cheerful dispositions maintained. Westinghouse operates three rolling cafeterias under supervision of its medical department

Huge World's Fair Mural To Be Porcelain Enamel

A porcelain enameled mural 70 feet long and 20 feet high surmounting a wainscot 140 feet long and seven feet high will adorn the shelter focal center building at the New York world's fair of 1939. The mural will be designed by J. Scott Williams, Chicago, an artist who has done much work in stained glass and murals. Contract for executing the mural has been awarded Ferro Enamel Corp., Cleveland, which will set up a studio in Long Island City, N. Y.

Fifty or more panels will be highly decorated in enamel, depicting the history and progress of housing on this continent. Technicians of the Ferro Enamel Corp. will do the work under direction of Mr. Williams. Location of the mural places it facing one of the principal entrances of the fair, where it will be conspicuous, one of the first objects seen by visitors.

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Productive
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Those equipment buyers who have accepted this suggestion have Profited thereby

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Operations include Step-drilling, Taper Boring and Reaming, Rough and Finish facing, turning, sweeping, chamfering and turning radius.

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The
Bullard Company
Bridgeport,
Connecticut.



MIRRORS OF MOTORDOM

DETROIT

BLUEPRINTS by the hundreds are being fed out from automotive engineering departments to material and parts suppliers, as new model specifications become more definite; and nearly all these prints bear evidences of a thorough review by engineers and cost experts to shave a penny here and a nickel there from costs. No stone is being left unturned this year to locate parts where costs can be trimmed without sacrificing quality.

Examples have been cited here previously to illustrate this trend. Another is the recent decision by Olds to adopt S.A.E. 1020 steel for all bolts, instead of the former S. A. E. 1035.

This switch was made some time ago by other General Motors units such as Chevrolet and Pontiac. This year Olds is making the move, with a resultant saving in bolt cost of an estimated 20 per cent. S. A. E. 1020 has lower manganese content and, of course, 15 points

BY A. H. ALLEN
Detroit Editor, STEEL

less carbon, which accounts for lowering the tensile strength to about 90,000 pounds per square inch—still ample, however, for the use to which such bolts are put.

Plymouth engineers have been studying possibilities of making a change to cast camshafts and crankshafts, but are not yet convinced of the merits of the cast shafts. It has been proposed to use a nickel-molybdenum duplexed iron which would permit a cost saving over forged steel, would improve vibration damping properties, but would lower ductility and strength.

Ford is about the only passenger car producer using cast shafts, although they are used on some diesels and tractor engines. Ford uses a so-called semisteel, melted in the electric furnace.

Higher prices on the 1938 car models are almost a foregone conclusion. In fact there have been further increases in 1937 prices on certain models, although naturally they have been accompanied by no extensive fanfare. One make of car is at least \$100 more in price today than it was two months ago. So the question resolves itself into how to soften the impact of higher prices on new models and how to make increases as small as possible.

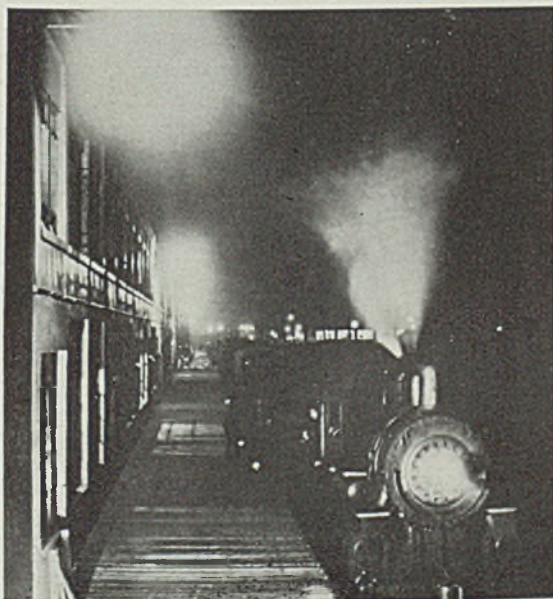
The obvious answer is to give more car for the money. One readily understood definition of "more car" is a model with a longer wheelbase; hence the proposed plan by Ford to lengthen the wheelbase of the 85 model, mentioned here last week. It is understood Packard also is considering the possibility of increasing the wheelbase of its 120 model to 126 inches, and stretching the 115 or 6-cylinder model to 120 inches.

This would be in line with the former Packard policy of building "big" cars. Many will recall that it was with considerable reluctance the Packard management approved the introduction of smaller models several years ago when the 120 was introduced. Mr. Macauley and others associated with him firmly believed in the Packard tradition of large, quality cars, and it was with some hesitancy they embarked into the unexplored medium-price field. But their venture proved highly successful and resulted in bringing the company to the front rank.

Packard Expanding

Rearrangement and expansion of plant facilities at Packard are continuing, and more space shortly will be available for manufacture of the 120 model. A new building has been completed on Palmer avenue, with a bridge across the street into the present 120 plant. The present service department in the 120 plant will be moved out, giving building space covering an entire city block for manufacturing work on this model. A considerable amount of

Sodium Lights Aid Unloaders



YELLOW - GLOWING sodium lights have been installed at 250-foot intervals along the 1260-foot freight unloading platform at the DeSoto plant in Detroit, marking what is believed to be the first use of this type of lighting in automobile plants. The lights have unusually high mist and fog penetrating characteristics and permit engineers and brakemen to see car numbers clearly. Here a trainload of tires and other car parts is backing into the platform at night



MIRRORS OF MOTORDOM

new equipment will be required for the enlarged plant.

THIRTY-FIVE new presses will be installed in Fisher Body's new press room and die shop at the division's No. 1 unit in Flint, Mich. Old press equipment now operated in other portions of the plant will be moved into the new structure to bring total number of presses to 135, capable of handling a complete line of all sizes of stampings from steel tops down.

While plans call for a new die shop in connection with the addition, it is believed most of the die work will continue to be handled in Fisher's No. 23 plant in Detroit, which is only 1½ hours from the Flint division by truck.

The new shop will add 170,000 square feet of working floor space to the present 2,180,000 square feet, and will boost the payroll by about 750 when the structure is completed in October. Thus, Fisher in Flint will furnish a complete line of Buick bodies, convertible coupe and sedan bodies for other GM lines, and a variety of knocked-down parts for east and west coast divisions.

Chevrolet in Lead

Chevrolet is stealing the limelight from other GM divisions at the present time, retail demand continuing strong and production lines geared to meet it. From inquiries now being issued on parts for new models, it appears Chevrolet is determined to set a peak pace of 7000 units daily next year and is setting up its supply sources on this basis. Chevrolet has now passed Ford in the weekly production race and probably will hold this lead for some weeks.

Chrysler appears to be having some difficulty in determining just where to locate its new transmission plant, which originally was scheduled to go into the Buffalo area. Latest report is that the location now being proposed is "somewhere in Ohio." Pending decision on the location, equipment buying for the plant is going ahead full speed.

Car production fell off sharply last week, with the Memorial Day holiday finding all plants closed. Total for the week ending June 5

Automobile Production

Passenger Cars and Trucks—United States and Canada
By Department of Commerce

	1935	1936	1937
Jan.....	300,335	377,244	399,634
Feb.....	350,346	300,810	383,698
March....	447,894	438,943	518,977
April.....	477,059	527,625	553,415
4 Mos....	1,575,624	1,644,622	1,855,724
May.....	381,809	408,518	†542,300
June.....	372,085	469,368	.....
July.....	35,297	451,206	.....
Aug.....	245,075	275,934	.....
Sept.....	92,728	139,820	.....
Oct.....	280,316	230,049	.....
Nov.....	408,550	405,799	.....
Dec.....	418,317	519,121	.....
Year	4,119,811	4,616,437	.....

Calculated by *Cram's Reports*
Week ended:

May 8	140,188
May 15	140,396
May 22	*131,306
May 29	*131,421
June 5	110,619

	Week ending June 5	May 29
General Motors	43,412	*53,789
Ford	29,240	*29,400
Chrysler	23,000	28,900
All Others	14,967	*19,332

*Revised. †Estimated.

is estimated at 110,619, a drop of 10,802 units. This week should see the figure creeping up slightly again as full-week production is resumed, although Ford has instituted a 4-day week for the balance of the month at least, which will bring production there down to about 28,000 weekly.

May production of automobiles approximated 542,300, slightly under the official department of commerce total of 553,415 for April, which again this year gives all indications of being the peak production month. Taking into account the fact there were 22 working days in April, compared with 20 in May, however, indicates daily rate of auto assemblies during the month just concluded was above that of April.

ECHOES are still being heard of the UAW charge on the Ford River Rouge plant here. Organizers Frankenstein and Reuther, with a band of some 50, visited the plant

for the expressed purpose of distributing handbills, but for the real purpose of starting some trouble for the benefit of a group of witnesses they had in tow. The latter included a few ministers and some representatives of the LaFollette senate investigation committee. Deliberately invading Ford property, the organizers were handled in no gentle fashion by Ford employes and service men.

A crowd of blue-bereted women kept screaming and egging the fight on, scratching and biting the Ford men until the latter were forced to pile the women into nearby street cars and force the doors shut.

Statements from Harry Bennett of the Ford service department charge the whole affair was provoked deliberately by the UAW to draw public sympathy their way. But the plan did not jell, for by and large, public sympathy strung along with the Ford employes.

However, the UAW immediately filed protests far and wide, and dispatched an airplane over the Rouge plant to invite workers to a mass meeting scheduled for Saturday. A department of commerce plane trailed the union plane to see that it kept above the minimum 1300 feet altitude required by law when flying over cities.

Voluntarily Sign Loyalty Pledge

Meanwhile it was announced at the Ford plant that 60,000 of the 90,000 workers there had signed voluntarily a loyalty pledge to the company. President Martin of the UAW left for Washington to talk over the next step with Boss Lewis.

Efforts to settle the tieup at the Richmond, Calif., Ford plant where about half the force walked out at the instigation of the UAW appeared to be futile, with the Ford management reported on the verge of closing the plant down permanently.

More trouble hit General Motors at its Saginaw divisions last week when six nonunion workers in the service parts department were thrown out by UAW members Wednesday, resulting in the plant being closed by the management. Within an hour or so pickets appeared around the Chevrolet gray iron foundry for some reason and workers were denied admittance. Promptly the plant was closed, throwing 5500 more out of work.

Prospects were for early adjustment of the difficulty following departure of union organizers for the scene. A one-hour walkout of 150 men in the Packard stamping division was settled quickly Wednesday morning and work resumed without disturbing production.

Attitude of one union employe at a Chrysler plant is reflected in a

(Please turn to Page 122)



SPRINGS:
COILED - FLAT
WIRE SHAPES
SMALL STAMPINGS
SPRING COTTERS
EXPANSION PLUGS
WASHERS:
SMOOTH - FLAT

M. D. HUBBARD, PRES.

P. M. HUBBARD

J. A. HUBBARD, SECY.

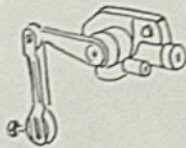
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Automotive Equipment

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- Brake Bands
- Brake Rods
- Brake Shoes
- Carburetors
- Clutch
- Curtains
- Generators
- Grease Cups
- Head Lights
- Hood Hooks
- Horns
- Ignitions
- Mufflers
- Odometers
- Oil Cups
- Shock Absorbers
- Speedometers
- Stabilators
- Starters
- Stop Lights
- Tail Lights
- Timers
- Tire Connections
- Transmissions
- Valves
- Windows



Aviation

- Aeronautical Equipment
- Antennae Reels
- Brakes
- Carburetors
- Clutch
- Fuel Pumps
- Ignitions
- Oleo Strut Shock Absorbers
- Parachutes
- Push Rods
- Starting Equipment
- Super Chargers
- Tail Skids
- Valves
- Variable Speed Propellers



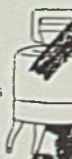
Diesel Equipment

- as developed
- and in
- process of
- development



Electrical Appliances

- Brushes
- Cords
- Curling Irons
- Curling Iron Holders
- Electric Light Sockets
- Electric Light Switches
- Electric Light Switch Washers
- Heaters
- Irons
- Motors
- Pneumatic Tools
- Pneumatic Tool Clips
- Telephones
- Toasters
- Vacuum Cleaners
- Vibrators
- Washing Machines



Furniture

- Cabinet Files
- Chairs
- Desks
- Display Cases
- Drawers
- File Cabinets
- Locks
- Motion Pictures
- Office Chairs
- Office Tables
- Office Trunks



Machinery, Miscellaneous

- Bread Machinery
- Can Opening Machines
- Drills
- Drill Presses
- Floor Surfacing Machines
- Knitting Machinery
- Moving Picture Machines
- Shoe Machinery

Miscellaneous

- Berths
- Bicycles
- Bicycle Bells
- Bicycle Brakes
- Bicycle Pants Guards
- Bracelets
- Cameras
- Cars
- Car Windows
- Cigarette Cases
- Clocks
- Door Checks
- Elevators



- Exercisers
- Fare Registers
- Fire Extinguishers (Small Parts)
- Fire Extinguishers
- Gas Cocks
- Gas Engines
- Gas Heater Washers
- Gas Meters
- Gong Bells
- Governors
- Guns
- Hair Curlers
- Headbands
- Heat Regulators
- Hinges
- Impellers
- Journal Boxes
- Levers
- Locks
- Motion Pictures
- Office Chairs
- Office Tables
- Office Trunks
- Precision Instruments
- Pruning Shears
- Pumps
- Pump Valves
- Punches
- Sashes
- Scales
- Sewing Machines
- Shade Rollers
- Shears
- Spray Guns
- Steam Pumps
- Stethoscopes
- Surgical Instruments
- Suspenders
- Taximeters
- Ticket Punches
- Toys
- Trolleys
- Trolley Catchers
- Trusses
- Truss Attachments
- Vibrators
- Window
- Window Screens
- Window Screen Lifts
- Window Shades
- Wrenches
- Wrench Washers



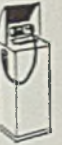
Musical Instruments

- Automatic Pianos
- Bellows
- Cornets
- Horns
- Organs
- Phonographs
- Pianos
- Player Pianos
- Saxophones
- Traps



Office Appliances

- Adding Machines
- Addressing Machines
- Auto Calls
- Cabinets and Files
- Cash Registers
- Check Protectors
- Computometers
- Dictaphones
- Drawing Instruments
- Envelope Sealers
- Loose Leaf Books
- Mailing Machines
- Numbering Machines
- Stamp Affixers
- Staplers
- Time Clocks
- Time Locks
- Time Recorders
- Typewriters



Radio

- Battery Clip Parts
- Binding Posts
- Jacks
- Plugs
- Springs
- Spring Washers
- Stampings



Textile Machinery

- Bobbin Rings
- Card Repeaters
- Dobbies
- Head Motions
- Looms
- Lubrication
- Picker Sticks
- Reversing Mechanisms
- Shuttles



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WINDOWS OF WASHINGTON

WASHINGTON

HEARINGS were begun last week before a joint committee of the senate and house considering the new labor bills. Effort is to be made to try to conclude the hearings this week.

On the other hand, Senator Pat McCarran, Nevada, a supporter of the bill, and the United States chamber of commerce are both suggesting that plenty of time should be taken by congress in debating on this legislation. There has even been a suggestion in some quarters that the legislation should go over until the next session of congress.

In addition to these suggestions the A. F. of L. has taken a cool attitude toward the legislation as it was introduced on both houses. Senator McCarran in discussing the bills called attention to the fact that they are so important that "members of congress ought to take them home for study and bring them back next session." It must be said, however, that this is not a majority opinion by any means and the President at a recent press conference specifically stated that he wanted the legislation at the present session. Just as in the public works revolt of last week in the house, the President is likely to get his way.

Revives NRA Aims

In a statement on the subject of this legislation the Chamber of Commerce of the United States said that "these proposals (referring to the new bills) raise in new form some of the questions involved by the now outlawed NRA and not since the codes have ended have there been brought forward such sweeping designs to regulate employment conditions throughout all industry.

"There are a number of blanks to be filled in," the chamber continues, "including basic wage and hour standards and the extent to which small plants shall be exempted."

The chamber states that "discus-

BY L. M. LAMM
Washington Editor, STEEL

sion of the measure will center less upon the purposes at which it is aimed—the establishment of wage and hour standards—than upon the methods proposed for their achievement.

"Business as a whole is constantly demonstrating by practical accomplishments its willingness and capacity to improve labor standards. Industry, today, as a whole is united in support of a policy of paying the highest practicable wages and in support of the shortening of hours as far as productivity will permit."

PLAN FLEXIBLE BASIC WEEK FOR LABOR BILL

Senator Black, chairman of the committee on education and labor, to which the new labor bill was referred, and father of that bill, stated last week that "it is intended that congress in the passage of this bill shall determine a basic work week." It will be recalled that he is and always has been, an earnest advocate of the 30-hour work week.

"Recognizing the fact that unemployment varies in magnitude and numbers from time to time," he said, "the bill will provide for a flexibility in maximum hours and minimum wages, to meet fluctuating conditions and necessities. It is intended that the bill shall provide maximum hours, however, beyond which industrial activities shall not employ workers, and minimum hours below which the labor board cannot fix the working period. The bill carefully recognizes the right of employer and employe to bargain collectively and fully protects the workers from the evils of the spy system."

Senator Black, in explaining the bill further, called attention to the fact that the measure does not in any way authorize price fixing, mon-

opolies nor legalize agreements interfering with the free flow of commerce and trade.

Discussing the hour and wage situation further, he said that "in passing upon the minimum wage and hours of work the new labor board is required to act within certain definite and fixed standards, and must give consideration to certain conditions set out in the bill. In determining what shall be a minimum wage other than that set out in the bill, the board, for instance, must take into consideration the cost of living; the wages established for work of a like character by employers who voluntarily paid a fair wage; and facts which would influence a court in determining a fair and reasonable value of services rendered."

At a press conference last week Secretary of Commerce Roper, discussing the proposed labor legislation, said that he believed that "good business will favor the objectives of the bill, because good business is anxious for stabilized conditions and normal business relations. The points raised in regard to these matters are clear and I believe will be worked out wisely through congress.

"The two most important factors involved are first, simplicity in legislation in the interest of successful administration and a board of administration of the highest qualifications for research and just analysis of the many intricate and difficult problems of adjustment.

"My confidence in well managed business is that it is becoming more and more socially minded and that there is a growing recognition of the interdependence of employer and employe. This means a better understanding of the problems of the one by the other and of their responsibility to the community."

SCRAP EXPORTERS FORM WEBB LAW CORPORATION

Papers were filed last week with the federal trade commission organizing the Scrap Export Asso-

ciates of America, under the Webb-Pomerene export trade act, for the exporting of iron and steel scrap.

It is assumed that establishment of this organization was hurried because of the recent formation of a cartel in Europe to import scrap, which would have a tendency to fix prices. Under the new American organization, it is granted exemption from antitrust laws under certain conditions.

As far as can be understood here there is no connection between the new association and the pending legislation in congress.

The papers filed with the commission give Hiram Winternitz Jr., as president and governor; Robert Joseph, secretary and governor; and Michael V. Bonomo, governor. The members are the Charles Dreifus Co., Philadelphia, and Robert Joseph and Schiavone-Bonomo Corp., both of New York. The offices will be established at 350 Fifth avenue, New York.

It will be recalled that the Webb-Pomerene act grants exemption from antitrust laws to an association entered into and solely engaged in export trade, with the provision that there will be no restraint of trade within the United States or restraint of the export trade of any domestic competitor, and with the further prohibition of any agreement, understanding, conspiracy or act which shall enhance or depress prices or substantially lessen competition within the United States or otherwise restrain trade therein.

TRADE AGREEMENT WITH ENGLAND IS DISCUSSED

There is considerable renewed talk here, especially since the return from Europe of Norman Davis, of a possible trade agreement with England. The talk is mostly of conjecture as to whether such an agreement will be with England only or with all of the British Empire as well.

While having been in Europe ostensibly in connection with sugar problems reports here are to the effect that Mr. Davis, at the request of the president took time to discuss such an agreement with leading British government officials. However, none of our government officials will even admit this.

Considerable renewed interest was occasioned last week when a message reached here from London to the effect that members of all of the political parties in England are urging such an agreement. Of course an agreement with England, which both buys and sells so much to and in this country, is a matter of considerable importance and requires the greatest care. The only definite thing that any government

officials will say is that it is being gone into in all of its angles but that there have been no official conversations up to this time.

CHAGRIN AT SMALL SUM FOR ECONOMICS STUDY

Secretary of Commerce Roper and several assistants who have been interested in establishing a new division of industrial economics in the department, are somewhat chagrined because as the commerce department appropriation bill passed congress \$100,000 is provided for this work.

The amount asked to begin this undertaking started at \$1,000,000. The idea had the approval of the President and the director of the budget. The latter stretched a point and suggested that congress appropriate \$400,000 for the first year. However, congress cut this to \$100,000 and that being the case it is possible that the department will not even make an effort to begin this work. The money will be available as of July 1, but those who have looked into the matter carefully are of the opinion that not even a start could be made with that sum.

EMPLOYMENT ON INCREASE AND PAYROLLS LARGER

Secretary of Labor Perkins announced last week that studies made by her department show further gains in employment and payrolls in April. She said that the figures indicated that approximately 98,000 additional workers found employment and weekly payrolls in April were more than \$8,000,000 greater than in the preceding month.

"The employment gain in April continued the succession of increases which have been shown each month, with but one exception, since February, 1936", she said. "Compared with April, 1936, there has been a gain of nearly 1,500,000 workers in industries and weekly payrolls have been increased \$71,700,000."

She pointed out, however, that wage rate increases were again a factor in the rise in weekly payrolls. During the period March 16 to April 15 manufacturing establishments numbering 1549 reported increases in wage rates affecting approximately 850,000 factory wage earners.

MARK STEEL PLOW ORIGIN

Effort is being made in the house by Representative Reed, Illinois, through a joint resolution, to commemorate the invention of the steel plow by John Lane in the winter of 1833-1834, by the authorization of suitable memorials or plaques.

It is pointed out in the resolution that Lane was a village blacksmith

who resided at a settlement now called Homer, Ill., and that having invented the new steel plow, he received no financial return because he "preferred to forego such financial gain in order that he might share his invention with his fellow pioneers so that they in turn could more readily till the soil." The resolution provides that the secretary of agriculture shall place a suitable memorial in the building of the department of agriculture here and he would be further authorized under the resolution "to erect or place an additional suitable memorial or memorial plaque at or in such other place as in his judgment may be fitting and proper."

SECURITY FORMS READY

Guy T. Helvering, commissioner of internal revenue, last week announced that certain forms which have been prescribed for use by employers in making information returns under title eight of the social security act have been released. Copies of these forms are now being printed and will be made available in the near future at offices of collectors of internal revenue throughout the country.

Every employer is required to file an information return on these forms. The first returns cover the period from Jan. 1 to June 30, 1937, both dates inclusive and must be filed not later than July 31 with the collector of the district in which the employer's principal place of business is located. Subsequent returns on these forms will be made four times a year, covering the three calendar months.

DODGE IDENTICAL BIDS

Conversations are now being held between officials of the federal trade commission and the department of justice in connection with alleged collusive bidding of certain steel companies on government building contracts.

These conversations are the direct result of a report on this subject, made several weeks ago by the justice department to the President in which the attorney general pointed out that he did not believe that with the evidence the department could obtain any favorable decision under the Sherman antitrust laws, because of the way in which the courts construe that act.

Mr. Cummings did intimate, however, that the situation might be reached through a cease and desist order of the commission. Officials of the commission, however, are not disposed to act unless they have reasonable assurances from the department of justice that they would have a case even if the department did not. The purpose, therefore, is to try to get the justice department on record.

Editorial

Steel Industry Emerges From Quiet Revolution

FOR several years discerning observers have sensed the fact that subtle changes were taking place in the thinking of executives in the iron and steel industry. At the recent annual banquet of the American Iron and Steel institute a definite outward sign of the significance of these changes was flashed to the institute's members when retiring president Grace, in introducing his successor, Mr. Girdler, alluded to his election as a "real contest."

That free, impersonal expression of opinion attended the selection of a new president constitutes a radical departure from past policy. The incident marks a distinct turning point in the development of the institute and in the attitude of the executive personnel of the industry. It is tangible evidence that steel's leaders at last have broken away from one of the traditions of the past and are in the process of establishing a new order. It signals an important step in the democratization of steel. It reflects a transformation in the industry comparable to that occurring in a nation when a democratic form of government supplants an absolute monarchy.

Solidarity Had Certain Advantages, but Repressed Initiative of Executives

This is not to say that the change is desirable in every respect. Much can be said in favor of the benevolent dictatorship exercised by the late Judge Gary when the institute was launched as an improvement over the famous Gary dinners. Throughout most of the period when the judge held the presidency of the institute, the steel industry enjoyed certain distinct advantages in that it presented a united front on all matters of policy and possessed an outstanding spokesman in the person of the institute president.

On the other hand, this solidarity had certain disadvantages which assumed increasing importance in the last few years of Judge Gary's regime. Looking back to that period, one suspects that the long term of the Gary dominance tended to discourage younger executives of the industry from expressing their convictions freely. Initiative for leadership was smothered in the blind adherence to tradition. In the eyes of the public, the steel industry became a ponderous entity—its executives a herd meekly following in the path of the leader.

During the past decade the industry has been in

the throes of a quiet revolution, in which numerous individuals have been straining at the restrictive bonds of tradition. Those bonds having been broken, the industry now is attempting to re-establish a more democratic leadership—one in which individual initiative and independent, constructive thinking will be encouraged.

The first test of the new order is presented by the current labor situation. Under conditions prevailing a dozen years ago, the industry would have met the unionization drive with a solid front. All companies, large and small, would have united on a single policy and would have fought on to victory or have gone down to defeat together.

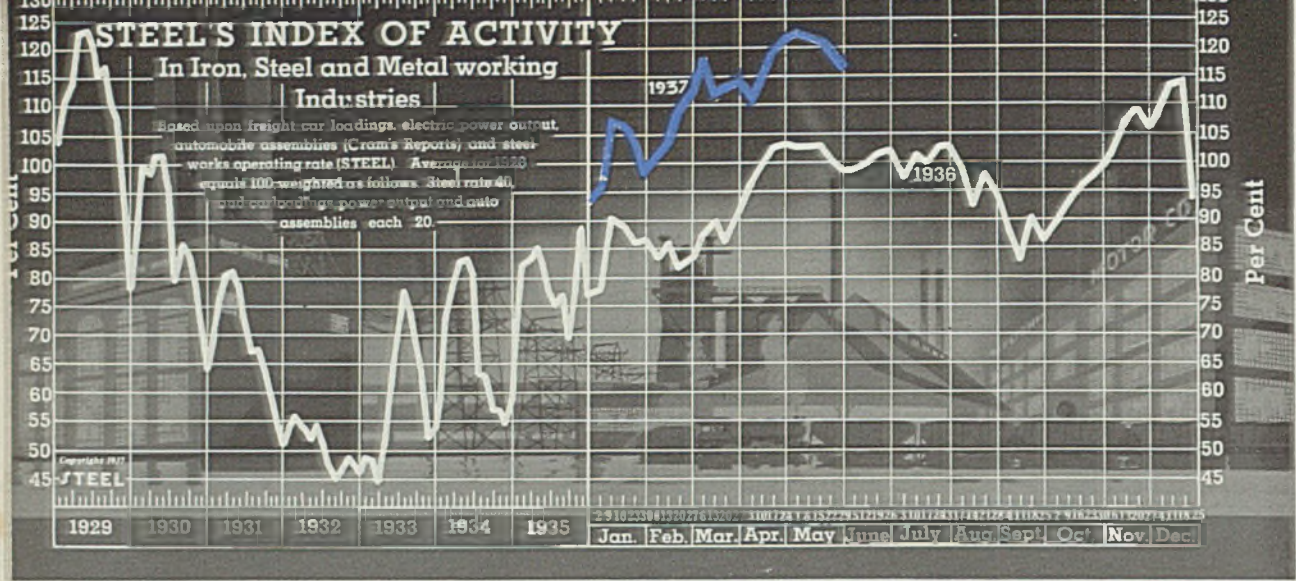
Solution of Labor Problems, Sought by Divergent Paths, May Lead to Same Final Goal

Today, imbued with the new spirit of independent initiative and free thinking, the heads of the principal companies are attempting to solve the common labor problem according to their own judgment as to method. In all cases the ultimate goal is a peaceful, enduring relationship between employer and employe, but the industry is sharply divided upon the means to that end. United States Steel has elected to recognize CIO as the collective bargaining agency for its own members. Jones & Laughlin has relied upon an election and abides by its outcome. Republic has refused to sign a contract with CIO and is trying to afford work for its employes who desire it. Youngstown and Inland have not signed a contract and have not tried to operate their plants under strike conditions.

In these and other instances individual company managements are pursuing different lines of strategy to attain the same ultimate goal. The diversity of method has advantages. Undoubtedly some one plan will prove superior to the others. The company which is fortunate enough to evolve the best solution will enjoy and deserve a temporary advantage over its competitors, but in the end all may follow suit and share in the benefits.

This exercise of independent judgment has much to commend it. Many of the aggressive younger industries have found it more satisfactory than the system of blind adherence to the will of a benevolent dictatorship.

The steel industry is to be congratulated upon its courage in shaking off the bonds of tradition. It has much to gain in its forthcoming task of establishing a new, virile democracy erected upon the foundation of its essentially sound but out-moded monarchy of the past.



STEEL'S index of activity declined 7.5 points to 116.2 in the week ending May 29:

Week ending	1937	1936	1935	1934	1933	1932	1931	1930
April 10	112.8	99.6	85.4	82.2	52.6	52.6	80.9	102.9
April 17	119.6	103.1	86.3	85.0	55.8	53.4	81.1	103.1
April 24	122.0	103.6	84.9	87.5	59.5	52.3	80.6	103.7
May 1	123.9	103.2	84.6	86.0	60.3	52.5	87.7	103.3
May 8	123.5	103.0	79.4	84.4	62.5	54.7	79.7	102.8
May 15	123.2	103.1	80.5	82.4	65.2	54.3	78.7	102.5
May 22	123.7†	100.4	82.8	81.9	66.1	55.1	78.3	102.3
May 29	116.2*	98.6	71.9	75.7	65.3	54.2	75.7	94.9

*Preliminary. †Revised.

Index of Activity Reflects Labor Conflict in Steel

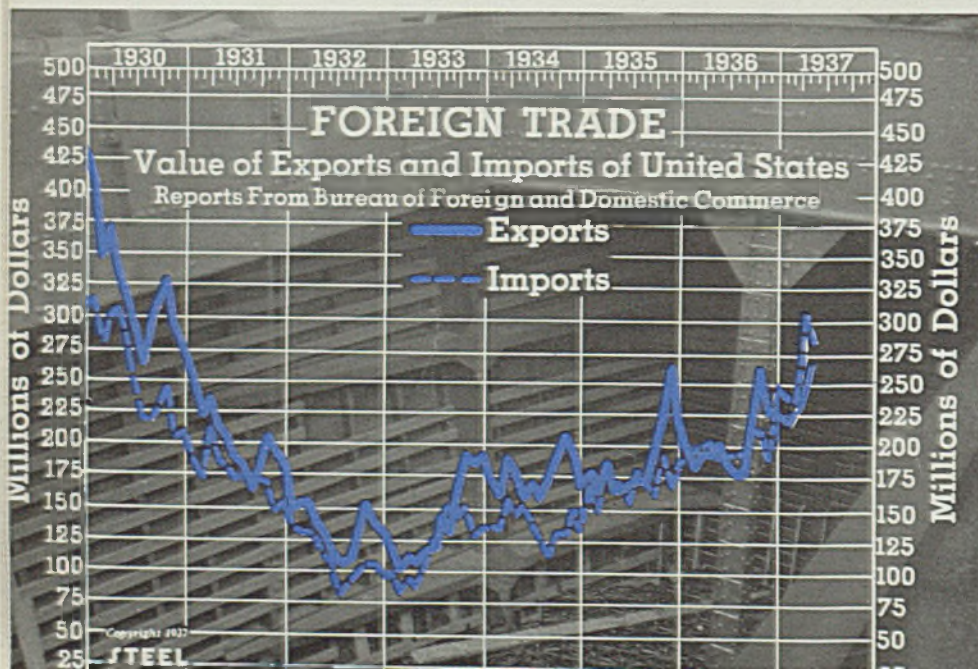
SINCE Jan. 1 STEEL'S index of activity has suffered sharp, abrupt recessions on three occasions. The first was a drop from 104.0 to 99.6 in the week ending Jan. 30, caused by a combination of labor trouble in motordom and serious floods in the Ohio valley. Again in the week ending March 13, the index declined from 117.9 to 112.7—this time due to a wave of sit-down strikes in the automobile industry.

The third violent break occurred in the week ending May 29, when strikes in the plants of three independ-

ent steel producers, combined with a slackening of activity in anticipation of the Memorial day week-end, depressed STEEL'S index from 123.7 to 116.2.

On all three occasions the contributing factors to the declines were abnormal in that they lay outside of the ordinary scope of supply and demand. In the latest week the dominating influence was labor trouble which cut the steelworks operating rate from 91.5 to 75.0 per cent of capacity. This happens to be the sharpest recession in steel operations since that occurring in the July 4 week of 1934 when a drop of 24 points was registered.

The three companies now affected in whole or in part by labor trouble account for about 16 per cent of the country's ingot capacity. Therefore the progress of the strikes will exert an appreciable influence upon STEEL'S activity index.



	Dollars (000 omitted)		Dollars (000 omitted)	
	1937	1936	1937	1936
Jan.	221,550	240,396	198,654	187,482
Feb.	232,504	277,805	182,024	192,774
March	256,390	306,699	194,790	198,686
April	269,171	287,252	192,795	202,779
May	.....	.....	201,042	191,110
June	.....	.....	185,188	192,233
July	.....	.....	178,324	193,409
Aug.	.....	.....	178,249	195,016
Sept.	.....	.....	219,976	215,525
Oct.	.....	.....	264,708	212,001
Nov.	.....	.....	225,766	196,423
Dec.	.....	.....	229,739	244,321

BUSINESS TREND

April Building Awards Highest Since 1930

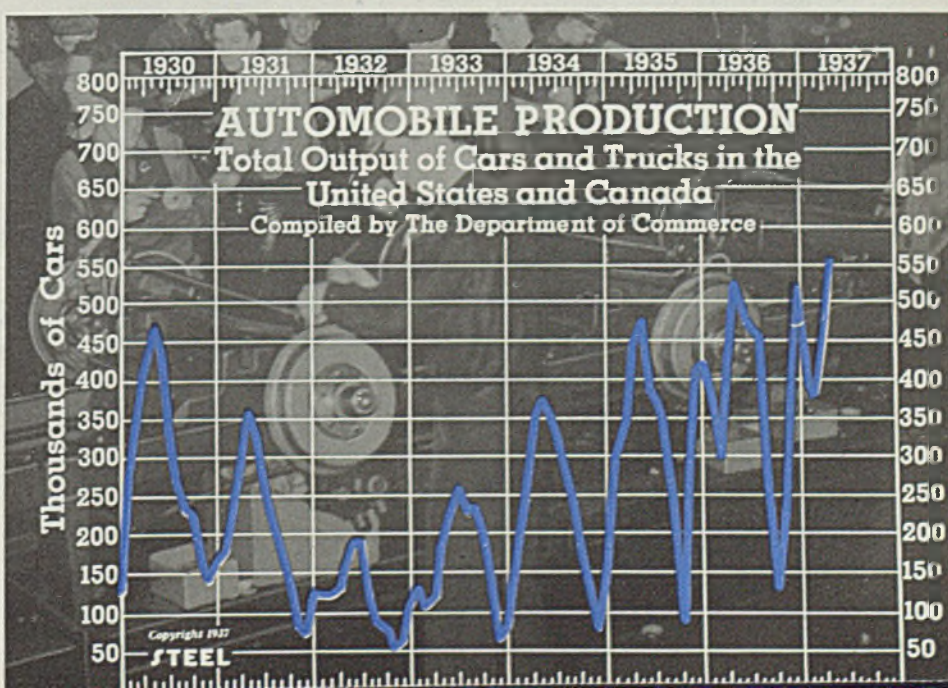
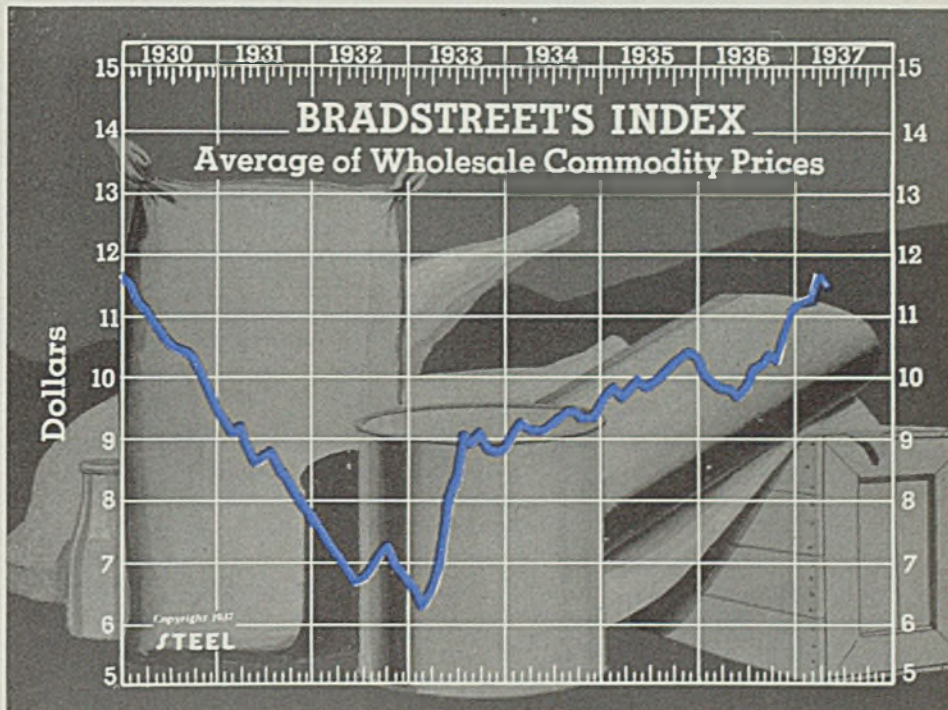
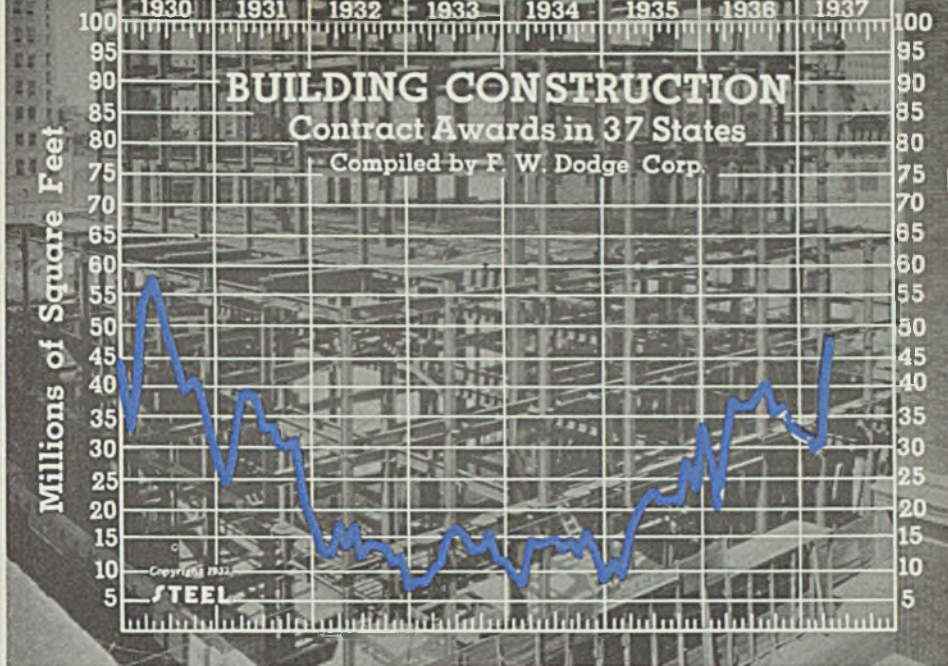
	Square Feet		
	1937	1936	1935
Jan.	33,470,000	27,053,300	11,245,100
Feb.	29,942,100	20,856,700	9,670,300
Mar.	41,567,800	31,257,900	15,845,300
Apr.	48,396,100	37,490,200	19,917,300
May	36,362,100	22,276,200	
June	36,883,900	22,878,800	
July	38,762,500	21,565,900	
Aug.	40,285,100	21,545,400	
Sept.	35,448,000	21,365,700	
Oct.	36,718,900	27,775,900	
Nov.	34,947,500	24,120,700	
Dec.	33,632,600	33,441,900	

Commodity Price Index Off Slightly on May 1

	1937	1936	1935	1934
Jan. 1	\$11.13	\$10.36	\$9.49	\$9.01
Feb. 1	11.23	10.02	9.78	9.26
Mar. 1	11.34	9.92	9.79	9.17
Apr. 1	11.81	9.85	9.66	9.16
May 1	11.51	9.81	9.79	9.14
June 1		9.73	9.90	9.24
July 1		9.85	9.84	9.32
Aug. 1		10.14	9.91	9.48
Sept. 1		10.19	10.00	9.45
Oct. 1		10.27	10.17	9.27
Nov. 1		10.22	10.28	9.29
Dec. 1		10.78	10.40	9.49

April Automobile Output Continues Upward Trend

	1937	1936
January	399,634	377,244
February	383,698	300,810
March	518,977	438,943
April	553,415	527,625
May		480,571
June		470,887
July		451,474
August		275,951
September		159,785
October		229,989
November		405,702
December		519,132



Three Decades of Development in

BY MACDONALD S. REED
Sales Engineer, Erie Foundry Co.
Erie, Pa.

THE original steam forging hammer, designed presumably by Naysmith just 99 years ago, was a flat-die double-frame hammer with the anvil not connected directly to the rest of the hammer, and mounted on a separate foundation. Steam drop hammers today are direct descendants of the double-frame hammer and just as scientists sometimes think they have discovered the "missing link" between monkey and man, so this hammer readily reveals the ancestry of the present-day hammer.

The anvil was just a double-frame hammer anvil with a wing added on at each side so the frame could be mounted on the anvil. The ratio of anvil weight to rated size was perhaps half of the ratio now generally used, and to keep the weight down and still provide the wings for the frame the anvil was made shallow.

Practice Has Improved

Today we know the value of higher anvil ratio in providing more inertia to back up the bottom die is known, and with the greater weight it has been possible to provide much greater depth and to place the weight, as far as possible, directly under the sow block, where in the first place it is most effective, and in the second place it provides the greatest depth of section at the point where there is the greatest strain on the casting due to the driving of the sow block key and the expansion of the sow block with increase in its temperature.

Until recently, however, anvils still carried the mark of their descent from the double-frame hammer. There was still a slight extension at the right and left ends of the anvil, what was left of the wing that was added to the original anvil block. Finally, however, the modern trend registered, and now anvils are no longer undercut at the end but the bottom surface is greater than

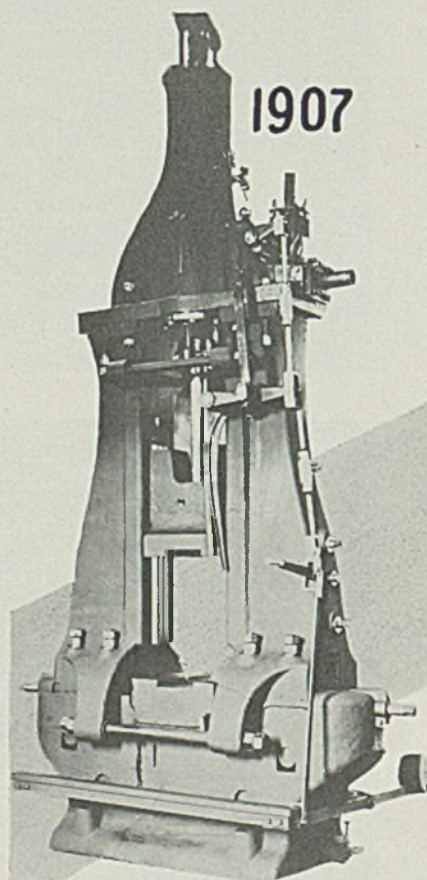
the top, measured both right and left, and front and back.

Foundry practice has improved since then, too. Formerly, nut pockets were cored in, and the use of the cores at these points frequently set up strains in the casting which resulted in breaks running from the corner of the sow block opening to the corner of the nut pockets. Now these holes are all machined from the solid.

Formerly anvils were cast upside

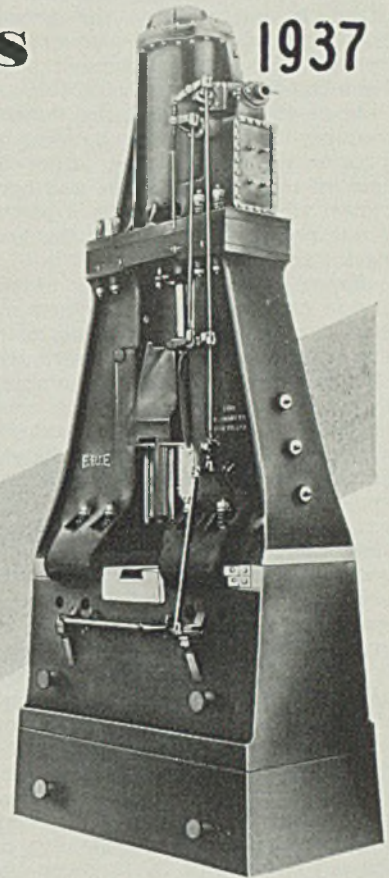
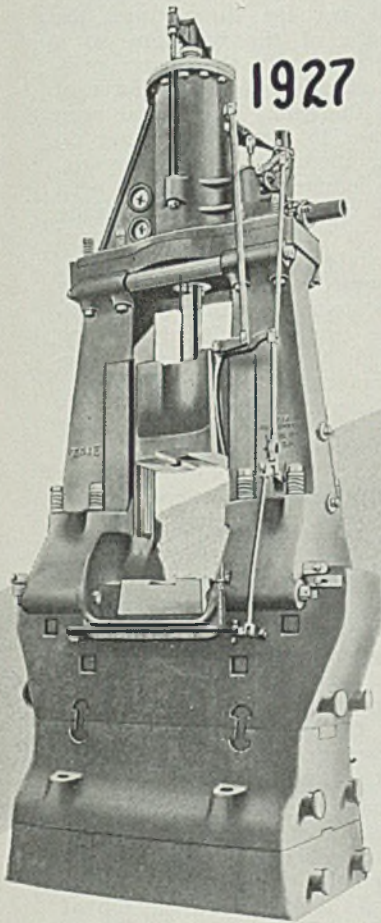
down, with various types of risers—sometimes a single riser in the center of the bottom of the anvil, sometimes two risers, one at either end. Now, in many cases, the anvil is cast on end, just as an ingot is cast, so the section which has been immediately under the riser, where there is a tendency for a pipe to form, is removed as far as possible from the critical section immediately under the sow block.

In early days the treadle of the



ACCOMPANYING discussion of design progress in forging hammers is from a paper presented by Mr. Reed before the Drop Forging association in Chicago recently

Drop Forging Hammers



hammer was a carryover from the treadle practice on single-frame forging hammers, and the treadle consisted of a heavy bail running all around the anvil block, pivoted on treadle lugs cast on the anvil at the back. This feature of the treadle lugs at the back of the anvil dates the hammer as at least 25 years old.

The sow block of the early hammer was keyed into a slot in the anvil and doweled, just as today the shank of the bottom die is secured in the sow block. This, however, had disadvantages for a part that was supposed to be keyed permanently in place, and the next development was a sow block which was lipped over the anvil at the front and back,

to prevent it from shifting. General criticism of this was similar to that of the dowel construction, namely that when the sow block heated up and expanded it became loose on the anvil.

The next development was the V-type sow block, still in use, in which the expansion of the sow block, due to heating or due to the pounding on it, only tends to tighten it all the more. There has been wide acceptance of the V-type sow block design, although one leading builder still prefers the sow block held by lipping it over the anvil.

Principal function of hammer frames 30 years ago was to keep the cylinder up off the anvil. Steam

pressures in general were low, cylinder areas small, and the weight of the anvil light, so the hammer did not strike a blow at all comparable to that of modern machines. Moreover, the blow was usually concentrated near the center of the die as the complexities of modern die design had not yet been introduced. Little was required of the frames as far as guiding the ram was concerned; no doubt many will recall the spindly frames of those days, with the voluptuous curve on the back.

As hammers developed, designers first increased the frame sections, then straightened out the curve on the back to get greater depth. The next step was the extended frame,

bearing on the anvil to the extreme end at the right and left. The frame was originally a hollow box section, which is thought to give the greatest strength and rigidity, for a part meeting loads coming in several directions. Recent improvements have been the addition of ribs on the outside of the corners of the frames, running from top to bottom, to provide greater rigidity; larger fillets on the corners inside, and horizontal ribs bracing the back of the guide pocket and carrying the load back into the sidewalls.

Extension of the bearing of the frame on the anvil to the extreme end was an important factor in increased hammer rigidity. Previously the base of the frame was so small it could, and frequently did, rock on the anvil so that it hollowed out a curved seat. Now, with the height of the frame only about two and one-half times the length of the bearing right and left in an average case, there is a pyramid effect and because of the increased area of the bearing, together with its greater spread, the wear at this point is greatly reduced and the condition is still further improved by recent developments in lubricating these surfaces. If one assumes that when the ram strikes against the frame it tends to pivot about the heel, and is held from tipping by the pull of the housing bolts, then the new construction has twice the rigidity of the old because of the greater distance from the heel to the bolts.

Clearance Is Magnified

The greater length of bearing of the frame on the anvil has one curious effect in magnifying changes due to expansion with heat. Shortly after one of the first large hammers with this type of construction was installed, the customer requested an investigation of a curious condition which developed. The hammer was forging heavy crankshafts and the work was well organized so there was hot metal between the dies most of the time. The anvil, therefore, expanded at the top and this caused it to hump up in the middle; likewise the two inner faces of the frames were hotter and expanded more than the backs of the frames, causing them to bow toward each other in the middle. When the parts were all cold the frames seated perfectly on the anvil, but when the parts heated a clearance opened up between the bottom of the frame and the anvil at the extreme right and left, and the clearance was great enough that a feeler was not required to measure it.

Of course this same condition occurs in all hammers whether they have extended frames or not. It is merely that the extended frame magnifies the clearance, and shows it up at a point where it is seen readily, whereas ordinarily it is hid-

den back of the adjusting wedge. The fact that this does occur, however, emphasizes the difficulty of minimizing wear between the frame and anvil, in spite of the improvements made.

One feature of Erie drop hammers for many years has been that the entire upper works of the hammer can be shifted right and left on the anvil, for aligning the dies. There is no question of the ability of the die sinker to locate the impression in exact relation to the die shank, but there are conditions of wear on the sides of the die slot and on the die shanks which occur with use of the hammer and dies, and in many cases due to the shape of the die impression there is a tendency for the hot stock to force the ram to one side or the other, so that dies perfectly lined up when the hammer is at rest will not produce perfectly matched forgings.

Tends to Bend Rod

In many cases the dies can be aligned more readily to produce perfectly matched forgings by shifting the upper works of the hammer rather than by shimming on the die shank. Pulling the ram sidewise in the guides puts increased friction on the ram and not only tends to slow it up but causes increased wear and cutting between the ram and the guide on one side, increased wear on the cylinder bore on the same side of the hammer, and of the rod gland on the opposite side.

Furthermore, consider the effect of the rod. As the ram comes down in its stroke, it is wedged to one side by the guide and there is a tendency to bend the rod. The ram is tipped slightly and when the dies come together they do not hit square all over the die faces but, instead, along one edge. Because the inertia of the ram is concentrated at the center of gravity the ram immediately tries to square itself up so that the die faces come together. This results in a strain on the piston rod, with a reversal of the stress which reaches a maximum at the top of the fit between the rod and the ram.

A theory of machine design indicates the factor of safety should be made three times as great with a suddenly applied load and repeated stress in one direction, compared to a dead load, and five times as great for a suddenly applied load and a repeated stress, which is reversed. In other words, if a factor of safety of four is considered good practice for a dead load, then in the first condition the corresponding factor of safety would be twelve and, in the second condition twenty. This indicates the relative severity of this effect on the rod due to this reversal of stress, and the theory is borne out by the location of the break in most piston rods at about

the point where the rod enters the ram.

Mention of broken piston rods brings to mind another matter. Hammers originally were designed for operation on a pressure of 100 pounds per square inch, the pressure at which most boilers were operating some years ago. But boiler practice has changed and now more frequently than not the boiler operates at over 150 pounds pressure.

The drop forger discovered when his work was too large to be made satisfactorily in his hammer with 100-pound pressure, he could take care of it by stepping up the steam pressure. In general, the steam force is perhaps three times the rated size of the hammer, so a slight increase in the steam pressure gives a much higher force of blow of the ram. Thus it has been convenient to step up hammer capacity by increasing steam pressure, but the hammer builder has been hard put to build his machine strong enough to withstand the increased impact and shock.

Of course, with a heavy hammer and low steam pressure, the investment in equipment is higher and the fixed charges are of course correspondingly greater. Without doubt, however, repair charges are less, and the down time for repairs less.

Wedges Replace Screws

From another standpoint, metallurgists may be interested in this as well. In the case of drop forgings made from brass, the impact velocity is a factor in the quality of the forging. Possibly this is true of steel as well. Perhaps the critical point for steel is not reached even at the impact velocities with high-pressure steam, but that also is a matter for study.

Returning to hammer design and the question of frame-to-anvil construction, early hammers had a tongue on the bottom of the frame fitting into a groove in the top of the anvil. This prevented movement of the frames front and back, and the right and left adjustment of the upper works was accomplished by means of adjusting screw. These adjusting screws were soon replaced by end wedges, so long ago probably most engineers have forgotten the screws were ever used.

The next step was to interpose a tapered key between the front face of the anvil and the overhang of the frame so that as wear occurred and lost motion developed in the front and back direction, it could be taken up. It is a curious fact that for many years after the front key was used the tongue was retained, although of course it is obvious as soon as the key is used to take up wear all the thrust is taken on the key in one direction

and on *one* side of the tongue in the other direction; a much better arrangement is to eliminate the tongue and have the overhang of the frame bear against the back face of the anvil, and by the elimination of the tongue increase the horizontal bearing area.

Eventually this was done. However, it was still several years before another queer condition was discovered and corrected. Front taper keys were secured to the frames, since the bottom spreader bolts were convenient for this purpose. However, the corresponding taper was placed on the front of the anvil. As a result every time the upper works of the hammer were shifted right and left to align the dies, the fit of one frame front and back was tightened, and that of the other one was loosened.

For several years this was a source of annoyance, yet no die setter apparently ever complained. However, when it was finally discovered it was readily corrected by securing the taper key to the part with the corresponding taper; thus parallel surfaces were provided on which the frames were guided as they were moved. In the present standard construction the front keys are not used; instead hardened and ground wearing strips are secured to the anvil and similar strips under the overhangs of the frame and lubrication for these surfaces is provided. Thus wear is minimized and although it cannot be taken up at frequent intervals, whenever it is desirable, the wearing strips can be replaced readily and the fit renewed.

Wanted Frames Tied

Because of the shifting of the upper works to align the dies, it was considered desirable to have the frames tied together at the bottom as well as at the top and, for many years, bottom tie bolts and separators were used. This construction was even used on board drop hammers at the request of shops familiar with it. In general, there have been more adaptations of steam drop hammer design to board drop hammers than the reverse, but in this particular case the steam drop seems to be patterning after the board drop, since now many steam drop hammers are being built with the housing bolts set on an angle to pull the frames back against the end wedges, and with the bottom tie bolt and separators between the frames eliminated. One advantage of this construction is the greater accessibility of the sow block key.

For many years Erie hammers have had top tie bolts and separators reinforcing the plate which ties the frames together at the top and supports the cylinder. This may appear to be a needless detail, but generally

these bolts are fitted with springs and in such a case they have an important function of always pulling the frames together at the top and, when the frames are separated by the side thrust of the ram, the springs cushion the blow as they are spread, and absorb some of the shock before it reaches the shoulder of the tie plate.

The use of a liner between the frame and the shoulder of the tie plate, made up of a number of laminations which act as a cushion, may make possible the omission of the bolt and springs. The situation at this point is also improved by the use of tie plates two and three times as thick as formerly used, and by the substitution of rolled or forged steel for the steel castings formerly standard.

Allow for Expansion

Some years ago Erie engineers found and attempted to eliminate two other possible causes of tie plate failure. Formerly, the end of the cylinder base fitted between shoulders at the end of the tie plate, and a close fit was made at this point. It was concluded the heat of the steam expanded the cylinder and placed considerable stress on the plate, thus causing some of the trouble. Therefore, in making this fit allowance was made for the expansion of the cylinder base, and the parts are fit with the cylinder hot.

Another contributing cause of breakage was determined to be the overhanging weight of the ends of the tie plate, and therefore the present practice was adopted of setting the shoulder part way in on the frame so the tie plate was supported fully and would not whip with the impact of the hammer. Now instead of having the *ends* of the cylinder base fit the tie plate, a shoulder is formed in toward the center of the hammer and in some cases instead of using the shoulder the bottom cylinder head it made to fit in a bore in the

middle of the tie plate so that it acts as a large dowel to maintain alignment.

Cylinder design has been steadily improving; the resistance of the cylinder to shock has been increased by improved ribbing to reinforce the highly stressed parts. Recently attention has been given to valves and porting, and remarkable increases in hammer effectiveness have been shown in recent tests. Consideration has been given to the fact the piston speed is high as the ram approaches the bottom of its stroke. Probably in many cases with the older design the ram was falling away from the steam. In other words, as the speed of the ram increased the velocity of the steam through the long, small port leading to the top of the cylinder caused so great a pressure drop through this passage the steam could not follow up the piston and maintain its pressure.

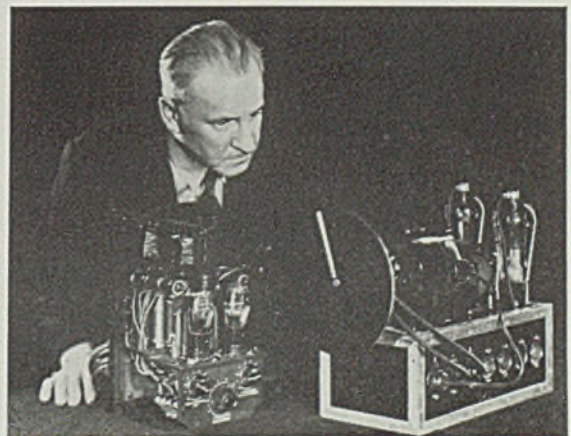
Valves Improved

At the same time the valve has been designed to open up greater port area with the same valve movement and thus reduce wire drawing through the valve. This has been done in two ways: By re-designing the familiar type of piston slide valve, and by utilizing a flat slide valve which is quadruple ported. Apparently it is all a question of free port opening for a given valve movement and the choice between flat valve and piston valve is largely a consideration of ease of maintenance.

From this quick summary of hammer developments in the past 30 years, it may be deduced great strides have been made in improvement of design. It is only by profiting from past mistakes hammer builders are able to make progress, and undoubtedly ten years from now the forging equipment which seems so up-to-date today will appear equally as crude as the hammers of 1907 do now.

Electric Brain for Generator

SYNCHRONIZING relay demonstrated by Dr. Phillips Thomas, research engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., shows here how industrial vacuum tubes are used to bring a large generator automatically into synchronism with the power system when more power is needed in the line



Factors Affecting Stainless

• Some of the difficulties and perplexities encountered in the industrial applications of stainless steels are discussed together with a short history of their development

TO ENUMERATE the modern types of stainless alloys is a fairly simple matter, although laborious. To describe their properties and characteristics is a more difficult assignment. But to emphasize their shortcomings presents almost insurmountable difficulties. The best criterion for judgment is the behavior of the metal under actual service conditions and with respect to the time element.

Thus we are fully able to maintain that in many of the standardized processes the difficulties encountered have been solved, the most suitable alloys installed and that as long as the conditions for which the problem was solved remain unchanged, we neither expect nor fear any difficulties.

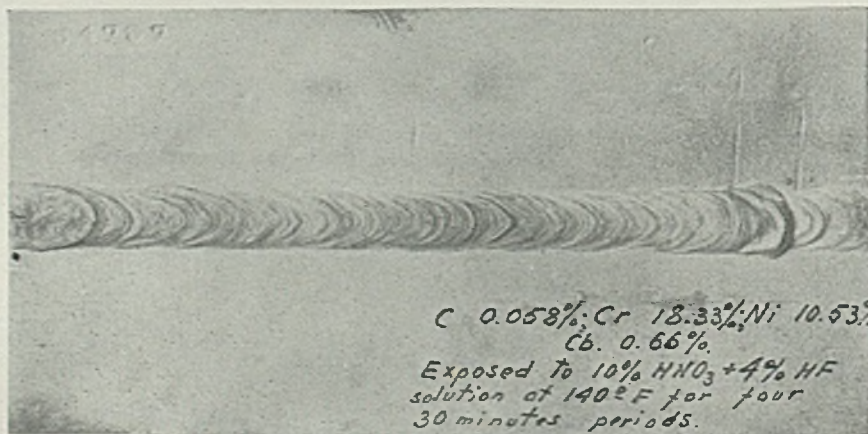
With ever moving progress our complex industries are also ever changing, ever striving toward further improvement, often creating ex-

tremely difficult conditions of service. At times the exact conditions under which the metal is to serve are either unknown or cannot be told.

As a consequence, a single process often presents literally a multitude of problems. Some of these cannot be foreseen. That is the reason why it may be difficult to emphasize the shortcomings of stainless and heat resisting alloys.

It is a psychological mistake to begin an address with what may be construed as an apology. It is not that. It is a plea addressed to the engineers, chemists, and executive officers of various concerns to extend to the metallurgists the necessary co-operation in first understanding the problem and then to

Weld in $\frac{1}{8}$ -inch plate of columbium bearing chromium nickel alloy



give us time in which intelligently to work out these problems.

For the purpose of logical and orderly presentations of the complex and lengthy subject we shall first offer the discussion of the commercially available stainless alloys and evaluate their mechanical properties, physical and chemical (corrosion) characteristics. This will be accompanied by the suggestion as to the proper material for each application.

Unrecognized 20 Years

The first introduction of "stainless" steels—the 12 per cent chromium class—was made approximately 25 years ago. While we are told that at the Paris Exposition in 1900 samples of chromium bearing steel were shown, its most valuable properties went apparently unrecognized for a score of years.

Since the introduction, the progress was very rapid. Between 50 and 60 modifications of the original analysis are now available, some differing in mechanical properties, others in their resistance to corrosion and oxidation at high temperatures, while still others, modified by the additions of various elements are used for definite and specific purposes.

All of the alloys derive their most important characteristic, that of resistance to corrosion, from chromium. All other additions not excluding nickel merely improve, to a greater or lesser degree, this inherent property. The addition of nickel, in substantial amounts, not only considerably improves the resistance

Steels in Industrial Uses

BY DR. V. N. KRIVOBOK

+

to corrosion, but results in the production of an alloy with totally different mechanical properties and physical characteristics. Thus, the subdivision of stainless alloys should be made into distinct classes: Straight chromium alloys, and chromium-nickel alloys.

Chromium Alloys

THE minimum chromium content necessary to secure the property of resistance to corrosion, in its broad meaning, is usually placed at about 10 per cent.

For some applications, alloys of lower chromium content were advocated, but such alloys cannot be properly placed in the same class with stainless steels.

The reason will be readily found in the measurements of chemical potential as influenced by chromium concentration.

Thus, straight chromium stainless steels, according to commercial specifications, contain a minimum of 12 per cent chromium, while their maximum content may be placed at about 30 per cent.

Carbon content in these alloys is usually between 0.07 per cent and 0.30 per cent, although in special cases it may be as high as 1 per cent for wrought alloys and 3 per cent for alloys to be used in making castings.

Additions of increasing amounts of chromium to an alloy with a constant carbon content, assuming the alloy to be low in carbon, will result in shifting temperature and concentration boundaries of allo-

ABSTRACTED on these pages is the address given before the American Iron & Steel Institute by Dr. Krivobok, associate director of research, Allegheny Steel Co., Brackenridge, Pa., and professor of metallurgy, Carnegie Institute of Technology, Pittsburgh, at the annual meeting held in New York May 24, 1937

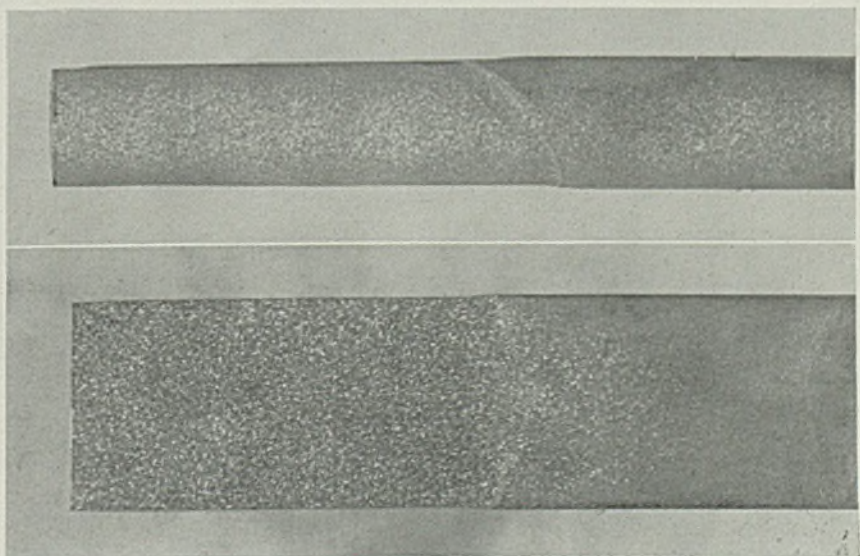
tropic changes, the basis of heat treatment.

Concurrently with this shifting

and, of course, because of it, we note diminishing in the effect of heat treatment. When the concentration of chromium is sufficiently high the A, allotropic transformation is altogether obliterated and the alloys no longer show any effects after undergoing heat treatment.

Hence the straight chromium alloys should be subdivided into these classes: Those which have properties which can be modified by heat treatment, and others in which no appreciable change in either constituents or properties can be brought about by heat treatment

Example of "solubility" corrosion



(within the general meaning of the term).

To these two sub-classes should be added a third one, to be dealt with in detail later: Alloys with various added elements to induce specific properties, while retaining resistance to corrosion.

In welding stainless steels no difficulty is experienced insofar as the processes of welding are concerned, but often it is necessary to consider the service for which the welded structure is intended.

If relatively high impact strength in the welded construction is imperative it is advisable to resort to heat treatment after welding.

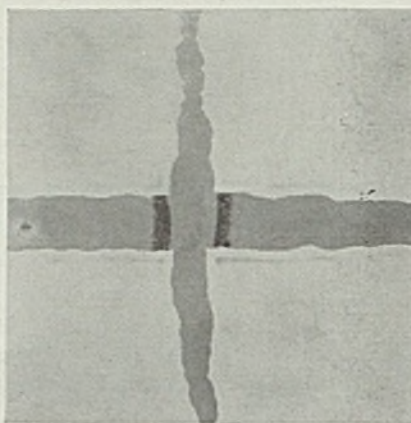
In ferrite-pearlitic steels (12 per cent chromium) weld embrittlement results from air-hardening characteristics of these alloys, while in ferritic alloys (18 per cent chromium and up) welding is accompanied by grain growth, also detrimental to impact strength.

Because of the impossibility of refining the grain size by heat treatment, welding of high-chromium alloys is not recommended, except in cases where impact strength is of no importance.

Internal Stress Created

The welding process brings about temperature gradient with resultant internal stresses introduced either during heating, cooling or both. The latter, in turn, form the basis for stress-corrosion, a phenomenon we sometimes encounter.

Properly conducted annealing of the finished article should eliminate the danger of stress corrosion; in addition it minimizes the danger of diminished resistance to corrosion at or near the weld proper and serves, as is well known, to relieve stresses



Cross weld in titanium bearing chromium nickel alloy, showing the effect of the second bead on the one previously deposited

dangerous from the strength (mechanical) point of view.

Instances may exist, however, when annealing cannot be properly conducted. In fact it may inhibit the satisfactory performance rather than safeguard it. Only the consideration of each individual case can indicate the proper solution.

Generally speaking, the property of resisting corrosive attack is increased with chromium content. Consequently, ferritic chromium alloys from 20 to 27 per cent chromium are the most resistant of the straight chromium group of alloys.

Ferritic alloys obviously do not exhibit very high strength at high temperatures. After the data for chromium-nickel alloys are presented it will be agreed that from the point of view of strength the last mentioned are far preferable.

Ordinarily a sufficient factor of safety is incorporated in the design

of a given installation and insofar as the service at high temperature is concerned, the selection of a given alloy is primarily but not necessarily a matter of resistance to oxidation.

Definite recommendations can be made for installations free from any additional corrosive condition, such as for example the excessive sulphur dioxide content in the products of combustion, or similar corrosive agent.

Chromium-Nickel Alloys

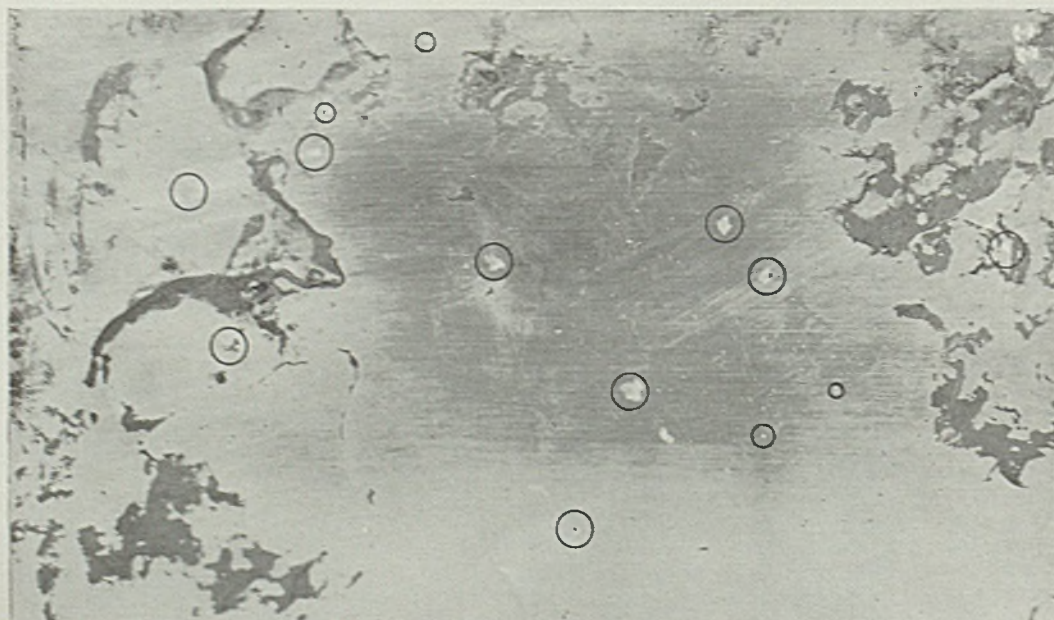
THE very valuable influence of additions of nickel to high-chromium stainless alloys is now well recognized. It is safe to state that many a layman is well familiar with such a term as "18-8," a universally adopted trade name for an alloy with about 18 per cent chromium and 8 per cent nickel.

As was already mentioned, an addition of as much as 8 per cent nickel to 18 per cent chromium alloy, or more nickel if the chromium content is higher, results in an engineering metal of totally different mechanical properties and physical characteristics, the most spectacular among the latter being of course the absence of ferromagnetism.

This influence of nickel is traced to its ability to lower critical points in steel below room temperature, or probably to obliterate critical transformation altogether.

As a result there is available a number of chromium-nickel alloys of "austenitic" type in which the structure, atomic space lattice, and many of the physical characteristics are identical with high temperature austenite of carbon and low alloy steels.

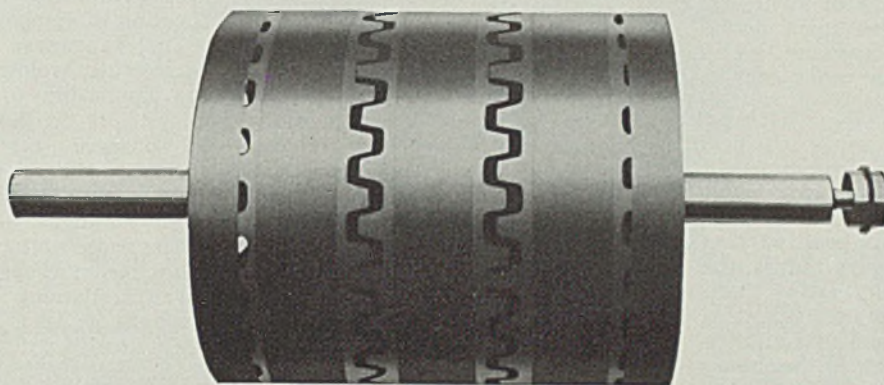
The exact process of evolution of



Typical appearance of pinhole type corrosion (formed under oxide deposit)

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This large pulley is installed in a remote location, 12,000 feet above sea level. Dependability is a very important factor. A shaft breakdown might involve weeks waiting for replacement. To safeguard operation, Dings Magnetic Separator Company selected Chromium-Vanadium Steel for the pulley shaft. This

Vanadium Steel shaft is 7½" in diameter, 100" long. It has a tensile strength of 160,000 pounds.

If you are not familiar with the toughness and fatigue-resistance of Vanadium Steel, or if you are having trouble with a severely stressed steel part, get in touch with the Metallurgists of the Vanadium Corporation of America. No obligation attaches to a request for information or metallurgical assistance.

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Plants at Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Laboratories at Bridgeville, Pa.

Vanadium *Steels*



FERRO ALLOYS
of vanadium, silicon, chromium,
and titanium, produced by the
Vanadium Corporation of America,
are used by steel makers in the
production of high-quality steels.

FOR STRENGTH • TOUGHNESS • DURABILITY

ferritic into austenitic alloys has been studied and described elsewhere. We need not consider it here.

But it is imperative to realize that although these alloys contain only one constituent, austenite, after relatively rapid cooling to room temperature the presence in such circumstances of only one phase does not necessarily denote true equilibrium conditions.

The first, and rather painful, realization of this assertion came when the phenomenon of carbide precipitation was discovered. The study of this and other phenomena made us aware that austenitic alloys possess different degrees of structural "stability," dependent upon actual concentrations of chromium, nickel and carbon and their ratios each to the other.

Chromium-Nickel Austenitic Alloys

RECENTLY it was realized that because of their very nature, the alloys do not readily adapt themselves to the accepted standard methods of testing and that a different testing procedure is necessary to evaluate their properties.

To do so a careful study for "proof stress" values was made. Proof stress is defined as the load in pounds per square inch which will produce, after being removed, a permanent set of a certain arbitrary value.

Following the specifications of the United States navy it was set at the figure of 0.0002-inch on 2-inch gage length.

These studies revealed much very interesting information not only on

the actual figures for proof stress, but also on the dependence of the other mechanical properties upon the relatively small variations in composition.

Since this work has been recently published in full only a digest of the most pertinent facts will be justifiable. Confining this digest to the general type of 18-8 alloy it has been found that variations in either chromium, nickel or carbon concentrations, within specified limits, have profound influence on attainable physical properties and on such commercial processes as forming, bending, spinning, etc.

Carbon and nickel content have a decided influence on the rate of hardening during cold work, also upon the ductility which is available after a definite amount of cold deformation.

These results enable us to establish the composition which is most desirable for high tensile material to be bent or formed into different shapes.

Depends Upon Composition

Proof stress is dependent upon composition and, with the proper selection of the latter as well as the necessary amount of cold reduction, can be made quite high.

All of the alloys possess in the annealed conditions low proof stress values; which, however, increase more rapidly with cold work than the corresponding tensile strength. The proof of stress is only from 20 to 30 per cent of the tensile strength in the annealed alloys.

After about 30 per cent cold reduction, the proof stress of all of the alloys becomes 50 per cent of the tensile strength.

Therefore in the selection of an

alloy to possess high tensile strength, high proof stress and highest corresponding ductility, it is important to consider the analysis because it determines the amount of cold work necessary to obtain the desired properties.

From the remarks concerning the outstanding ductility of these alloys it should become evident that such operations as forming, drawing, spinning, etc., are successfully performed.

Austenitic chromium-nickel alloys are to be preferred to straight chromium. But it should also be realized that the ability to form or to draw into intricate shapes and the ease with which it is done are the function of composition.

Various means of joining such as riveting, welding, soldering, etc., are applicable to chromium-nickel alloys. It is, however, necessary to observe certain precautions, either in the selection of the suitable material or in the treatment after joining.

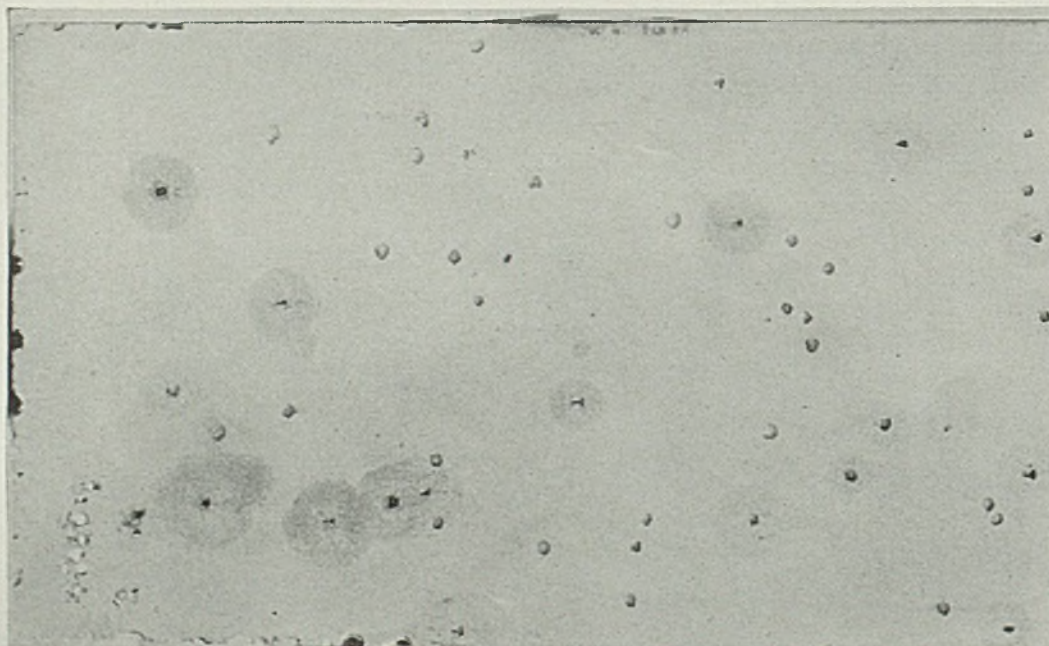
The successful application of chromium-nickel alloys to high temperature installations is contingent upon strength at high temperatures and resistance to oxidation at high temperatures.

Structural Stability Important

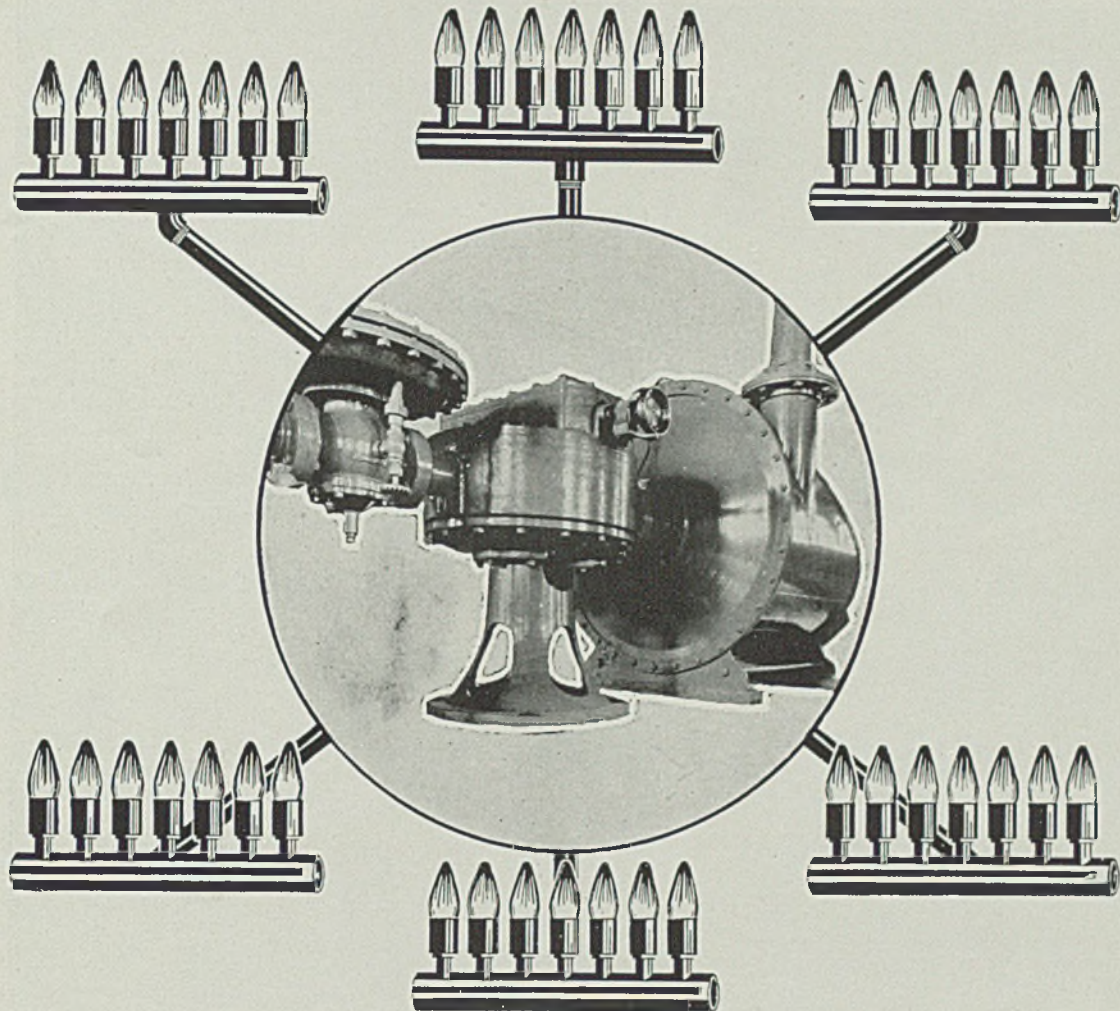
An equally important factor is the structural stability; a specific case of the latter was already alluded to as "carbide precipitation." Austenitic chromium-nickel alloys are characterized by the relatively high strength.

Within certain range of temperatures the structural characteristics may not remain constant. Carbide precipitation is an example of a

(Please turn to Page 78)



Typical appearance
of pinhole type corrosion
(in ferric
chloride solution)



When the **KEMP INDUSTRIAL CARBURETOR** takes charge of a heating job ***It Takes Charge!***

A single unit may handle half a dozen annealing covers or tin pots or both. Each of the six may require a dozen burners. Yet every flame on every burner will be *identical* in heat liberation, in pressure, in characteristics, and remain so hour after hour as long as heat is needed.

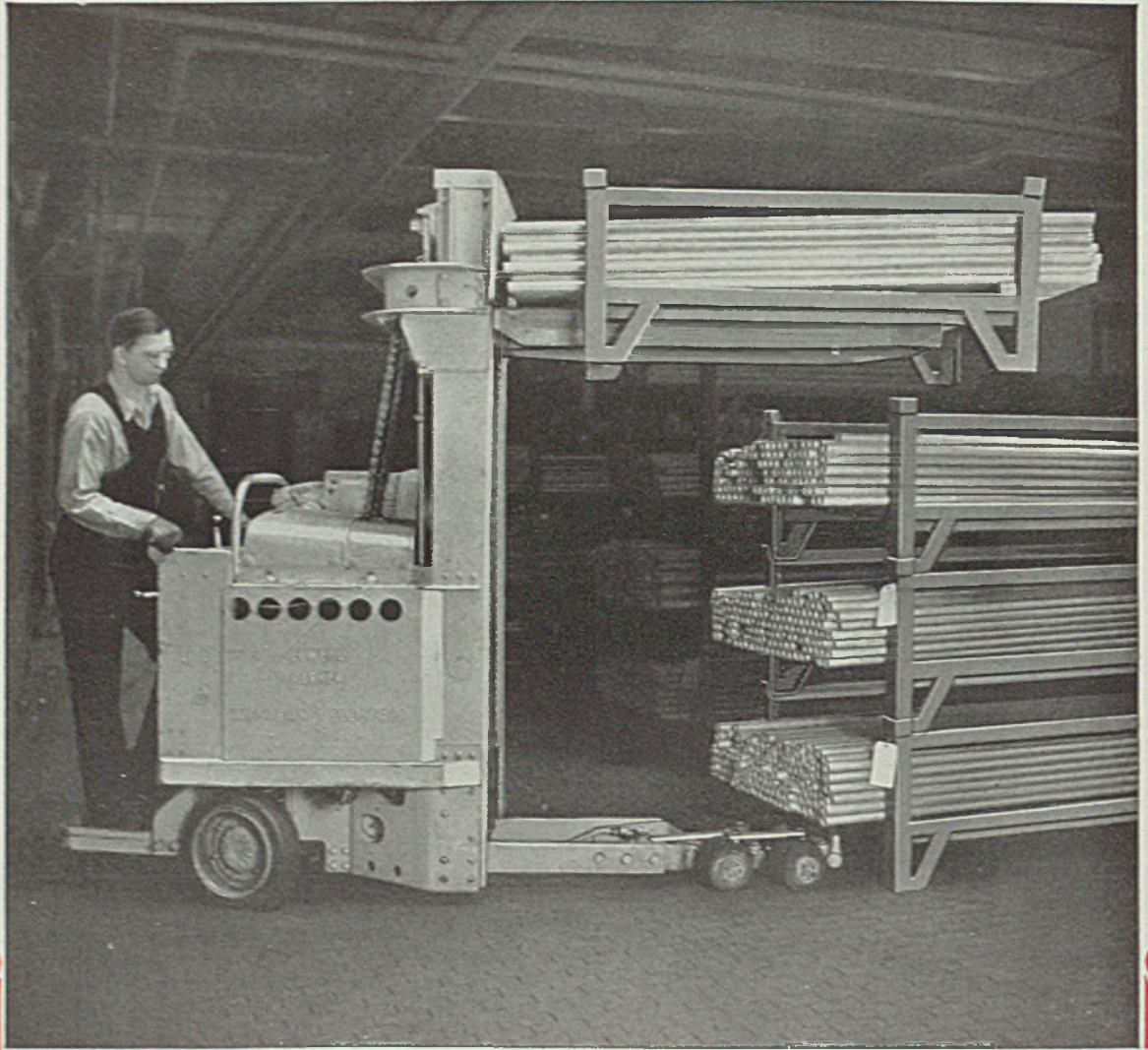
Obviously that means no more tinkering with burners, no more variation between units . . . which seems like a spacious claim until you discover that the Industrial Carburetor does its job by *completely* premixing gas and air before it goes to the burners,

that no secondary air is inspired and hence no variation is possible in the fuel mixture reaching the burners.

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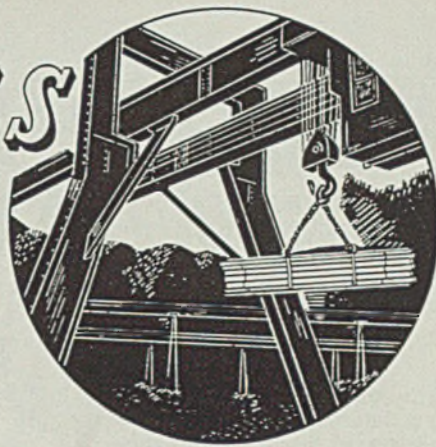
ADVERTISING on this page is continually showing the great economies made possible through the Elwell-Parker System of Materials Handling. Here is one fine example. This prominent company greatly reduced its costs in this department by handling skid racks and their loads *as a unit*. The racks themselves perform the same function as do skids or pallets used in the Elwell-Parker System for handling Boxes, Barrels, Bags or Bales. Racks are designed with special supports which

permit tiering material to reasonable heights. You know why tremendous reductions in materials-handling costs must be made in the near future. Why not call in an Elwell-Parker Engineer, with long training in Materials Handling, to discuss with one of your own men the newest methods of eliminating wasteful transportation practices? His successful experience elsewhere will surely help you. Send for him now. Elwell-Parker, 4501 St. Clair Avenue, Cleveland, Ohio.

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MATERIALS HANDLING



Interlocking Monorail Crane Bridges Facilitate Handling in Hammer Shop

INSTALLATION of thoroughly modern overhead handling equipment has aided substantially in stepping up the tempo of production in the new hammer shop of the Boeing Aircraft Co., Seattle, Wash., where the largest landplanes and seaplanes in America now are under construction.

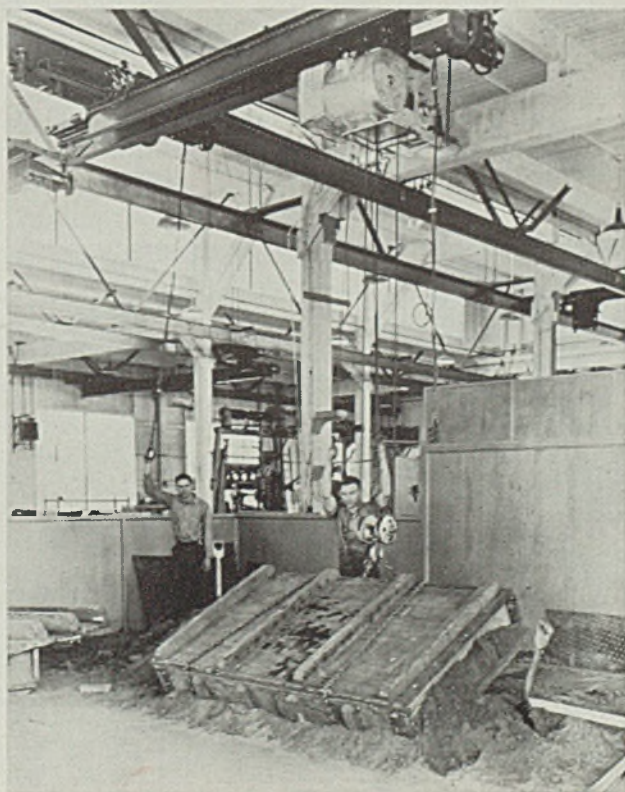
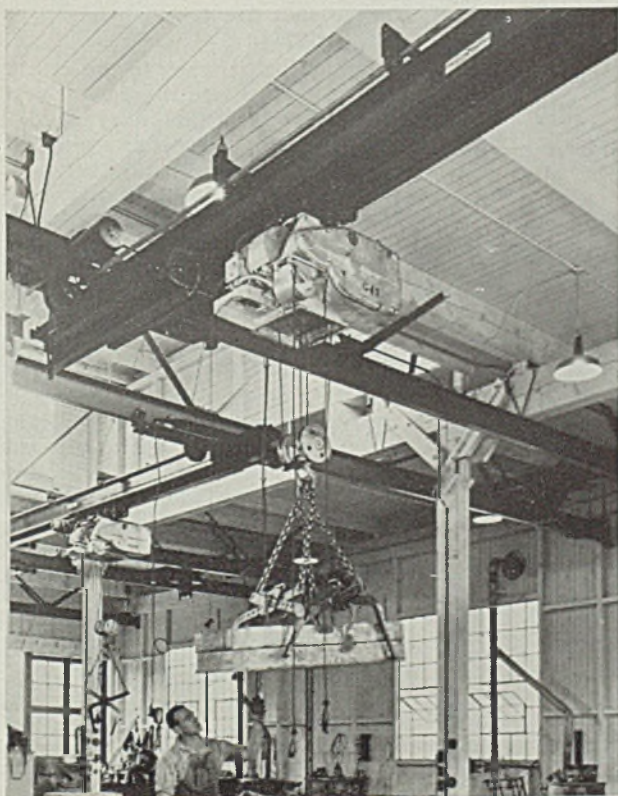
Recently erected as part of the Boeing plant expansion program, this new hammer shop building is a single story structure, 120 feet long and 90 feet wide, consisting of three 30-foot bays. In each of these

bays, a monorail crane is provided. Crane runways traverse the entire 120-foot length of the building, and crane bridges are interlocking for transfers between bays. The steel I-beam bridge rails are built into channel box section spans, each with an overall length of 28 feet 4 inches, consisting of a span of 22 feet 4

inches between runways and a 3-foot overhang at each end.

Eight-wheel trucks at each end of the crane bridges carry the bridges along the craneways. Traction is provided by two air wheels, double-tube type, applied to the bottom of runway rails, one mounted at each end of a squaring shaft which runs

FIG. 1 (left)—Close-up of crane in hammer shop showing operator holding one of the suspended pushbutton controls as the crane moves a heavy drop hammer die set. **Fig. 2** (right)—Two operators in the casting department use an overhead crane to turn over a flask in which a mold of a plaster of Paris cast is being made



MATERIALS HANDLING



the length of the bridge. Each driven by a 2-horsepower motor, the bridges will travel lengthwise of the building at a speed of 170 feet per minute with 5-ton loads. Operation is by suspended pushbutton controls. Clearance from the concrete floor of the building to the bottom of the crane bridge rails is 15 feet 9 inches, while clearance below the crane hoists themselves is 13 feet 9 inches.

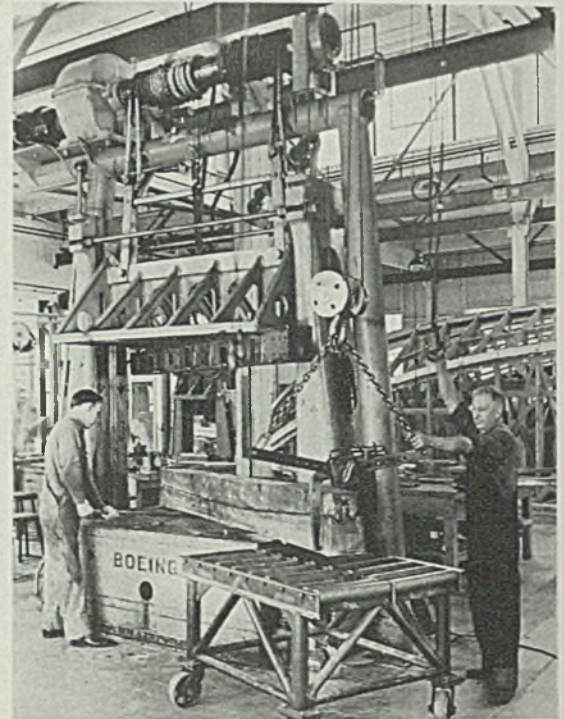
Hoists of 5-Ton Capacity

Suspended from each of the bridges is a 5-ton electrical hoist, one of which is shown in Fig. 1, propelled by a pushbutton controlled monotractor, which can transfer the loads from one bridge to another when bridges are lined up and interlocked. Each of these monotracors is driven by a 1½-horsepower electric motor, will travel 150 feet per minute and exert a drawbar pull of 240 pounds. Air wheels traveling on the bridge rails furnish the traction. The traveling pushbutton floor controls facilitate precision spotting of loads both in longitudinal and transverse movements.

Each hoist is operated by a 6-horsepower motor which gives it a lifting speed of 16 feet per minute. The motor is fitted with a rope-operated controller, which automatically returns to the "off" position when the rope is released. Two rope handles are suspended within easy

◆
FIG. 3 — This exceptionally long zinc die and lead punch set is being installed in one of the large drop hammers. The crane places it on a roller-top table from which it is rolled onto the hammer bed

◆



reach of the floor, one controlling upward movement and the other downward. An operator, following the crane, can control hoist operation with one hand and the monotractor pushbuttons with the other.

This hammer shop is departmentalized to carry on all operations from the modeling of plaster of

Paris casts to the forming of airplane parts in the heavy die-laden drop hammers. The shop is laid out so that work is circuted clockwise around the building from primary to final stages of construction. In one corner is a modeling department, where expert modelers produce plaster of Paris casts in intricate contours required for airplane parts. Although the majority

of these casts are moved by hand, larger ones are transported on the crane system.

In the next corner is the casting department, where the plaster casts are covered with foundry sand in large flasks. The cranes are used to turn over these heavy boxes as shown in Fig. 2, prior to removal of the plaster casts and pouring of molten zinc into the sand mold. When the zinc die has been completed, molten lead is poured over it to form a punch. Here again the crane is placed in service to pull the punch off the die.

With the aid of one of the cranes, the die is removed to a polishing stand for finishing operations, and is finally transported overhead to the die storage room in the next

(Please turn to Page 97)

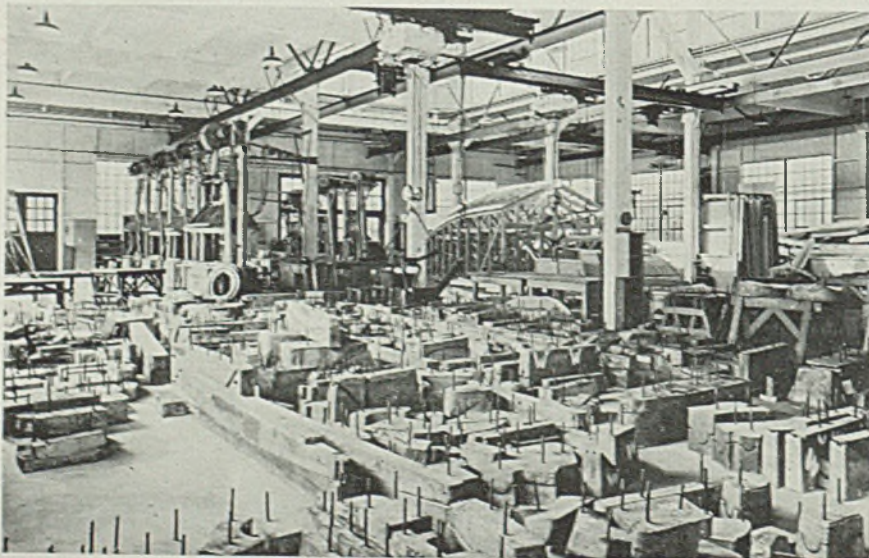
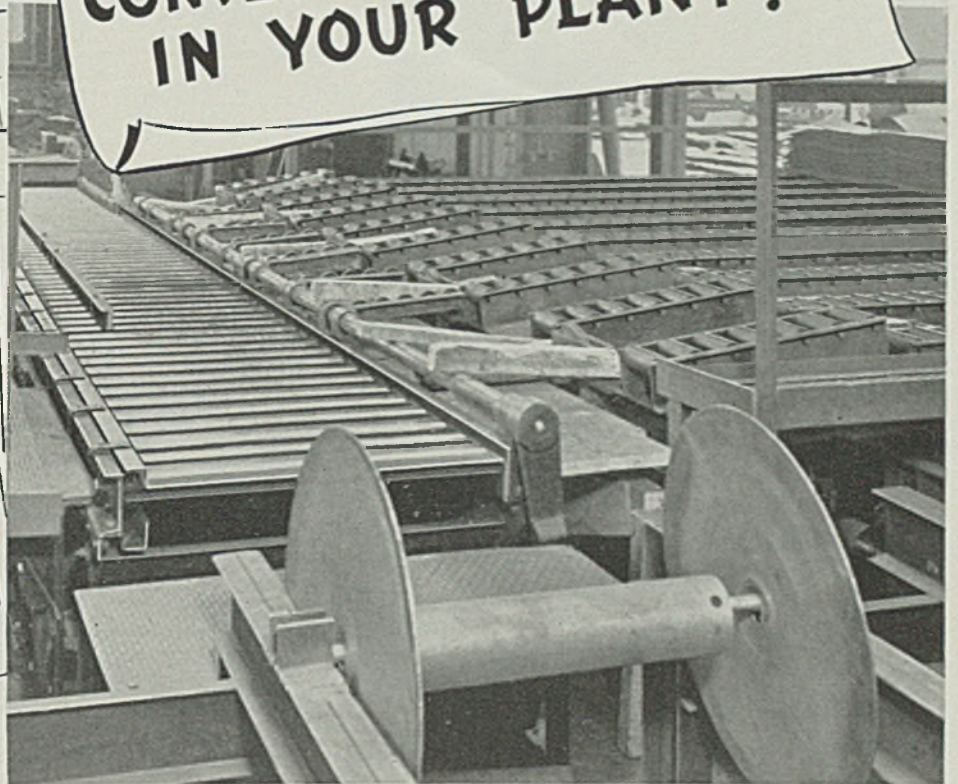


FIG. 4—In this area of the shop are stored a variety of hammer die sets used in making airplane parts. Overhead in the nonrail crane. In the background at the left are seven drop hammers which form the duralumin parts; in the background at the right is a wood mock-up used in making plaster of Paris casts

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PROGRESS IN STEELMAKING

Slag Viscosity Control Affords Greater Uniformity in Steel

ALTHOUGH frequently faced with wide variations in the composition of his charge the basic open-hearth operator is called upon to produce a steel that will meet specifications within comparatively narrow limits. One of the essential requirements to success in this respect is the ability to produce consistently a type of slag which, regardless of the variations in the charge, will give the desired quality of the steel.

The oxidizing condition, which pre-

IRON OXIDE in basic open-hearth slag may be held within narrow limits by controlling the fluidity and basicity of the slag. VisControl, the new method developed by Bethlehem metallurgists, makes this possible. Greater uniformity and cleanliness of the steel, less waste of iron in the slag, and savings in limestone and deoxidants are some of the benefits accrued

The extent of the elimination of phosphorus depends on the degree of oxidation and the basicity of the slag; a strongly basic slag is also essential for the removal of sulphur from the metal.

The basicity of the slag has a pronounced effect on the quantity and the action of the iron oxide in the slag. Generally speaking, a highly basic slag tends to give iron oxide content at the end of the heat, whereas a weakly basic slag is usually accompanied by a low iron oxide.

The problem in basic open-hearth



Fig. 1—Observing condition of slag in open hearth

vails in an open-hearth furnace, results in a partial removal of the carbon, phosphorus, manganese, and silicon in the charge. The oxides of the latter three elements float out of the steel and form a slag. This slag also contains a certain amount of iron oxide, resulting from the oxidation of the steel itself. To hold the phosphorus in the slag in a stable condition the presence of a strong base is essential. For this purpose limestone or burnt lime is added to the heat.

BY C. H. HERTY, JR.

Development and Research Department, Bethlehem Steel Co., Bethlehem, Pa.



Fig. 2—Tapping a 100-ton heat of open-hearth steel

practice then is to attain the happy medium of a slag which will be basic enough to eliminate phosphorus and sulphur to the desired extent, and yet not too basic, so that the slag will have the right viscosity and iron oxide content. By means of a recently devised method the viscosity and, hence, the basicity and iron oxide content can be conveniently and accurately controlled in the heat, as soon as a slag begins to form.

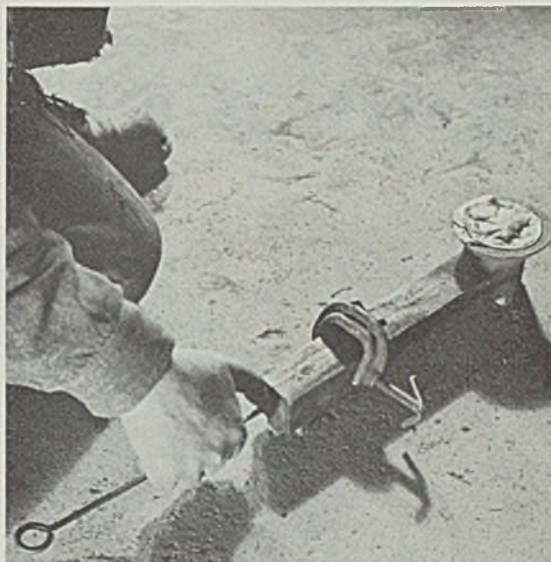
The rate at which the metalloids are oxidized and eliminated from the metal bath is also greatly affected by the fluidity of the slag. An extremely viscous slag, even though it may have a favorable composition, does not permit the necessary contact between the reacting components of the charge. For this reason it is necessary that the slag be kept sufficiently fluid to permit free interchange between slag and metal.

Take Many Tests

It is thus easily understood that a proper relation between basicity, iron oxide content, and viscosity of the slag is essential to efficient operation. Another important essential is that the slag-forming additions are made early in the heat, and that solution of these materials is insured in the time allowed; corrective additions made after the slag has begun to "shape up" do not have the same beneficial effect.

Such a control of the basic open-hearth slag recently has been perfected by the research, metallurgical and open-hearth staffs of Bethlehem Steel Co. VisControl, as the method is called, is now used for the regular basic open-hearth furnaces in all Bethlehem plants. Extensive research has demonstrated that the composition of the slag during the melting period can be determined qualitatively by measur-

Fig. 4 — Measuring fluidity of slag by means of a rectangular steel block with a well at one end



ing the slag viscosity. From this the composition of the final slag can be predicted accurately provided that the proper additions based on the slag viscosity test are made.

The instrument used for measuring slag viscosity, shown in Fig. 4, consists of a rectangular steel block with a well at one end. A $\frac{1}{4}$ -inch hole extends from this well to the end of the block, a distance of 10 inches. Slag is dumped as quickly as possible into the well and flows into the $\frac{1}{4}$ -inch hole; the distance which the slag flows is a qualitative measure of the fluidity of the slag. A heavy slag will flow a maximum of about 2 inches, a creamy slag 2 to 4 inches, and a thin slag 4 to 10 inches.

The general procedure of the control method is as follows: Limestone is charged in varied amounts according to an estimated silicon content of the charge. When the scrap is partly melted the hot metal is added and a short time thereafter

the first helper takes a slag viscosity test. One half hour later he takes another test, and with it a metal test. The two tests are sent to the laboratory and reported back before the heat melts. Viscosity tests are then continued at frequent intervals until the heat is melted.

Metal and slag analyses and the results of the viscosity tests then are referred to the proper schedule from which the basic or acid additions to be made are read. The additions are put into the furnace as quickly as the melter thinks possible, and the heat then is worked in the normal way by the first helper. Certain variations in making up and using the schedules are necessary at the various plants to take care of local conditions.

The narrow limits within which it is possible to keep the iron oxide content of the slag by the control method are clearly demonstrated by Table I, giving the iron oxide content in tapping slags on consecutive heats on four open-hearth furnaces operating on structural steel (permissible range 12 to 16 per cent iron oxide). The results for furnace No. 4 are particularly interesting because they show the erratic behavior of the slag prior to the introduction of control method.

Keep Within Limits

For slag low in iron oxide the permissible range is 4 per cent. Structural steel, for instance, generally is made with a slag containing 12 to 16 per cent iron oxide, and certain forging grades with a 14 to 18 per cent slag. As the iron oxide content goes up the range is increased; rails call for a 15 to 20 per cent slag, sheet products of various kinds 19 to 25, 20 to 26, or 21 to 27. An illustration of the ability of the furnace operator to keep within these specified ranges

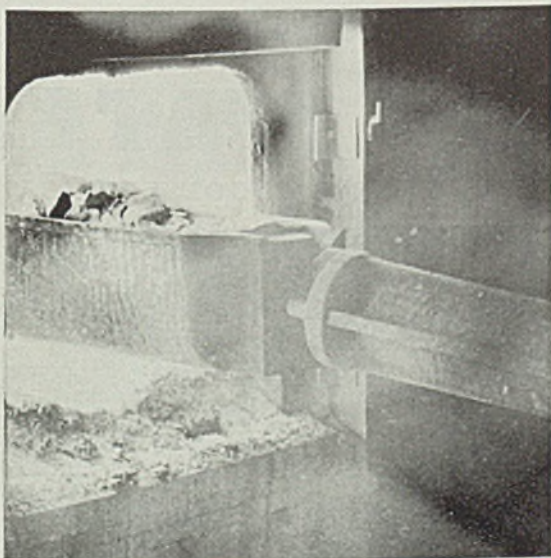


Fig. 3—Box full of lime being inserted through one of the charging doors of basic open hearth

"LIKE A SNOW MAN



TIDE WATER

THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS



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"**W**E formerly used an ordinary grease on our machinery," reported a superintendent. "Pressures ran around 900 lb. per sq. in., and due to the grease separating under pressure our lines were frequently stopped with soap. When we switched to Tycol Green Cast Grease trouble disappeared like a snow man in the sun."

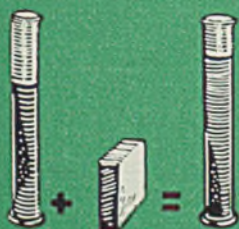
The unusual stability of Tycol Green Cast Grease is only one of the factors that contribute to more satisfactory lubrication performance. Tycol Greases are made of a fully refined cylinder oil, scientifically compounded with a minimum of soap. A consistency is provided for every application—for indoor or outdoor service. The net result is maximum lubrication satisfaction per dollar spent.

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Tycol Green Cast Greases are compounded to suit every operating condition—for indoor and outdoor service, for anti-friction or plain bearings.

is given on Fig. 6, a graphical presentation of the percentage of iron oxide in tap slags made over a period of one month, producing a 0.07 per cent maximum carbon rimmed steel. In 87 per cent of the heats

Table I

Iron Oxide in Tapping Slags

(Consecutive Heats for Structural Steel)
Furnace Number

1	2	3	4
Controlled heats	Controlled heats	Controlled heats	Uncontrolled heats
15.2	14.0	14.9	17.3
12.0	12.6	15.0	13.6
16.0	15.0	12.8	14.3
14.6	15.7	12.2	19.5
12.7	14.9	16.0	19.1
14.1	13.3	15.8	16.2
13.7	11.2	15.1	21.2*
16.2	14.3	15.6	13.1
13.8	17.8	14.8	12.8
13.1	12.2	13.9	13.3
13.6	16.1	15.0	13.5
14.5	10.9	15.7	13.8
13.0	11.0	12.0	14.3
13.0	13.0	13.8	15.3
11.5	Furnace off	14.3	14.3
13.5	....	14.0	13.6
13.5	....	13.3	12.2
14.5	....	12.6	....
(Aver.)	(Aver.)	(Aver.)	(Aver.)
13.3	13.1	14.3	15.9 first 7 13.6 last 10

FeO = Total Iron expressed as iron oxide, FeO.

*Vis-Control schedule put on this furnace starting with next heat.

the slag was within the specified limits.

The actual variations in the silicon content of the pig iron during this period is shown in Table II. The uniformity of the finishing slags as indicated by Fig. 6 shows that the control schedules have compensated properly for considerable variations in the silicon content of the iron.

The fact that the control method

makes it possible to operate with the lowest content of iron oxide in the slag that will give the desired removal of phosphorus and sulphur has important bearing upon the subsequent deoxidation of the steel. As the available iron oxide in the slag decreases, the amount of deoxidizer required is reduced. Furthermore, the reoxidation of the metal by the slag, in the ladle, is greatly minimized. The latter is particularly serious for low-carbon steels when the slag is fluid and high in iron oxide. A ladle reaction causing a marked decrease in manganese content frequently occurs under such conditions. With this method of control it is possible to maintain constant ladle conditions during the entire teeming period, so that the ingots poured last show little or no difference in analysis and physical properties from the first ingots of the heat.

If the slag is too highly oxidizing the rate of carbon elimination also may be so rapid that it is difficult to arrive at the proper carbon and manganese contents of the finished steel, particularly with steels which are not dead killed in the furnace.

The oxidation conditions of metal and slag also have a marked effect on the efficiency of the aluminum added in the ladle to give the proper grain size, as well as that of easily oxidized alloys, such as chromium.

A uniform slag oxidation from heat to heat should inevitably lead to the best standardization of deoxidation practice, with its attendant increase in the quality of the finished product. In all grades of steel today many qualities are desired which are believed to be affected by oxidation and deoxidation, and uniform practice should lead to a more rapid solution of many met-

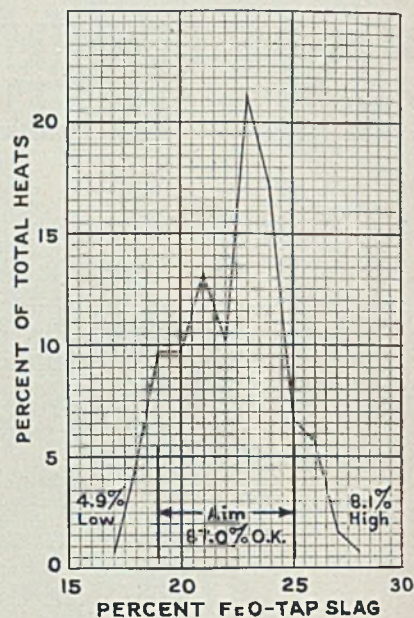


Fig. 6—Distribution chart showing percentage of iron oxide in tap slags over period of one month producing carbon rimmed steel with 0.07 per cent maximum carbon

allurgical problems than if a wide variation in these two items were prevalent.

The method of control also makes

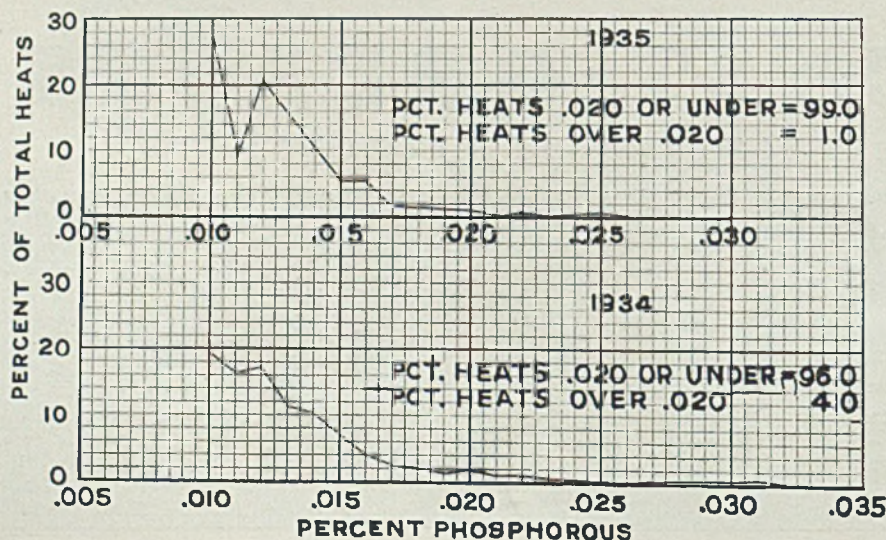
Table II

Silicon Variation in Pig Iron

(During Period Cited in Fig. 6)

Per cent Silicon	No. of Casts	Per cent of Casts
Under 0.60	50	11.4
0.60—0.79	163	37.1
0.80—0.99	176	40.1
1.00—1.19	42	9.6
1.20—1.39	6	1.4
1.40 or over	2	0.4
Total	439	100.0

Fig. 5—Comparison of phosphorus distribution in T-rails; 1935 with control method, 1934 without



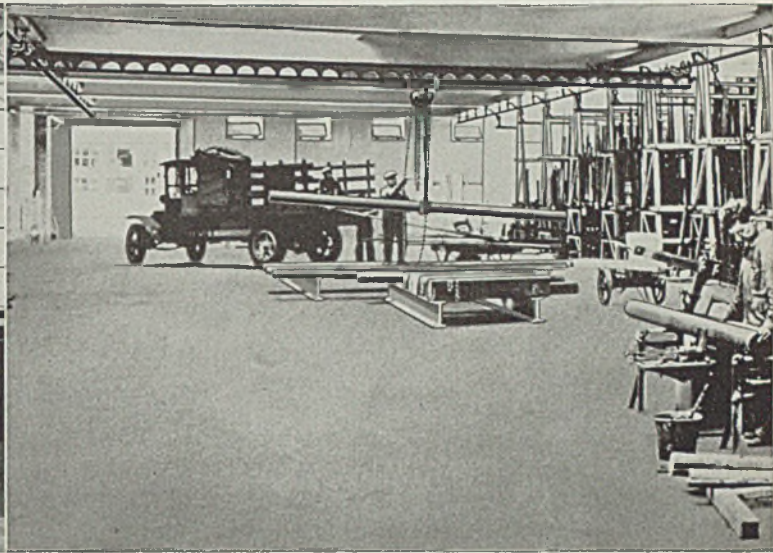
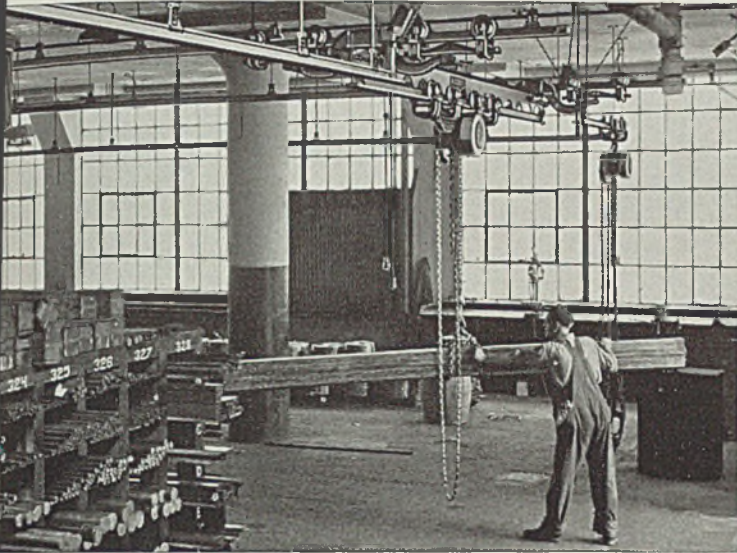
it easy to get any desired range of deoxidation. If, as time goes on, it is found that one degree of oxidation is better than another, the slag control schedule can be adjusted automatically to give the desirable degree of oxidation.

One of the important factors affecting the cleanliness of steel is the oxidation of the metal prior to deoxidation. The lower the iron oxide in the metal entering the ladle, the cleaner the steel.

An important advantage of the control is the high degree of uniformity in steels made to the same specification, not only in successive heats in one and the same furnace, but for every furnace, in every plant where this control is used, regardless of the analysis of the

(Please turn to Page 90)

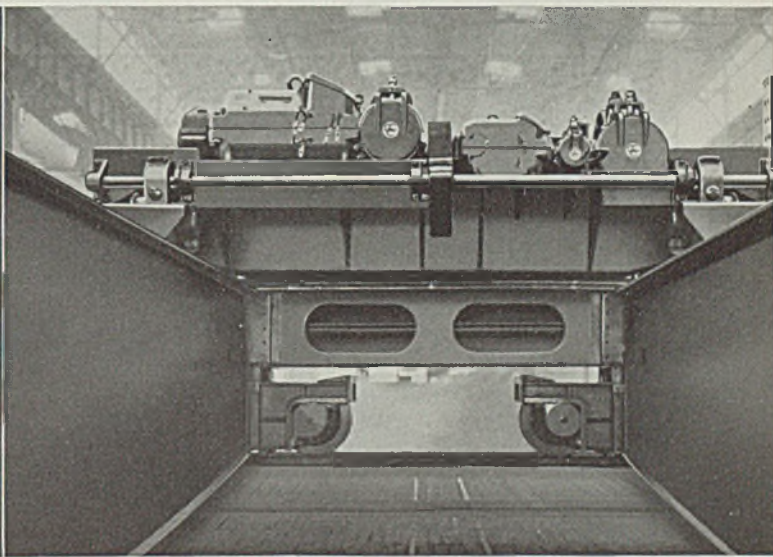
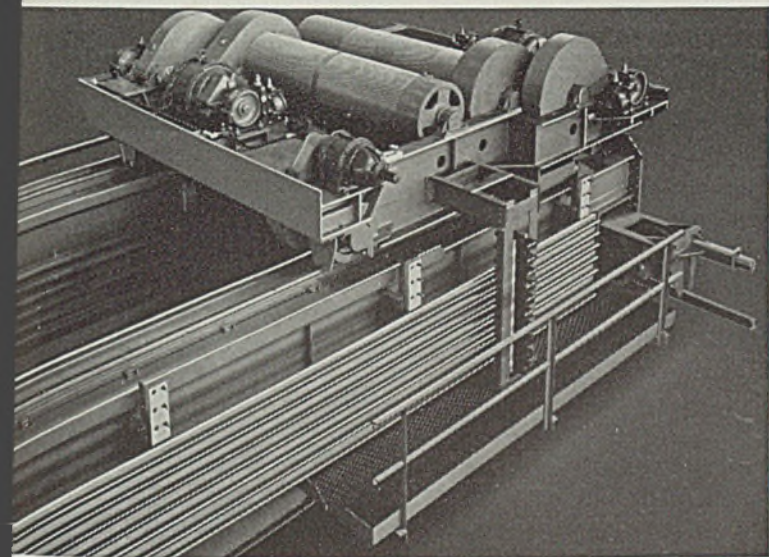
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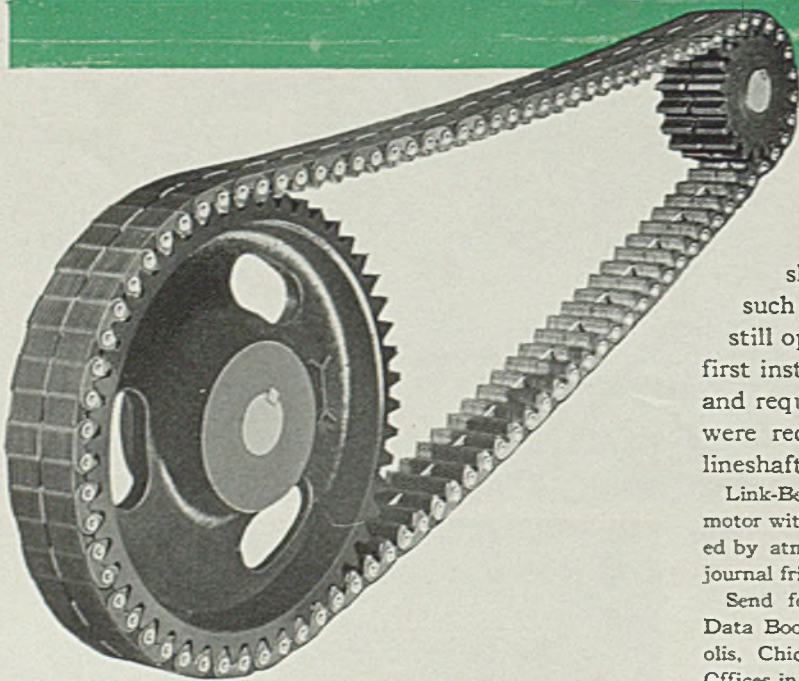
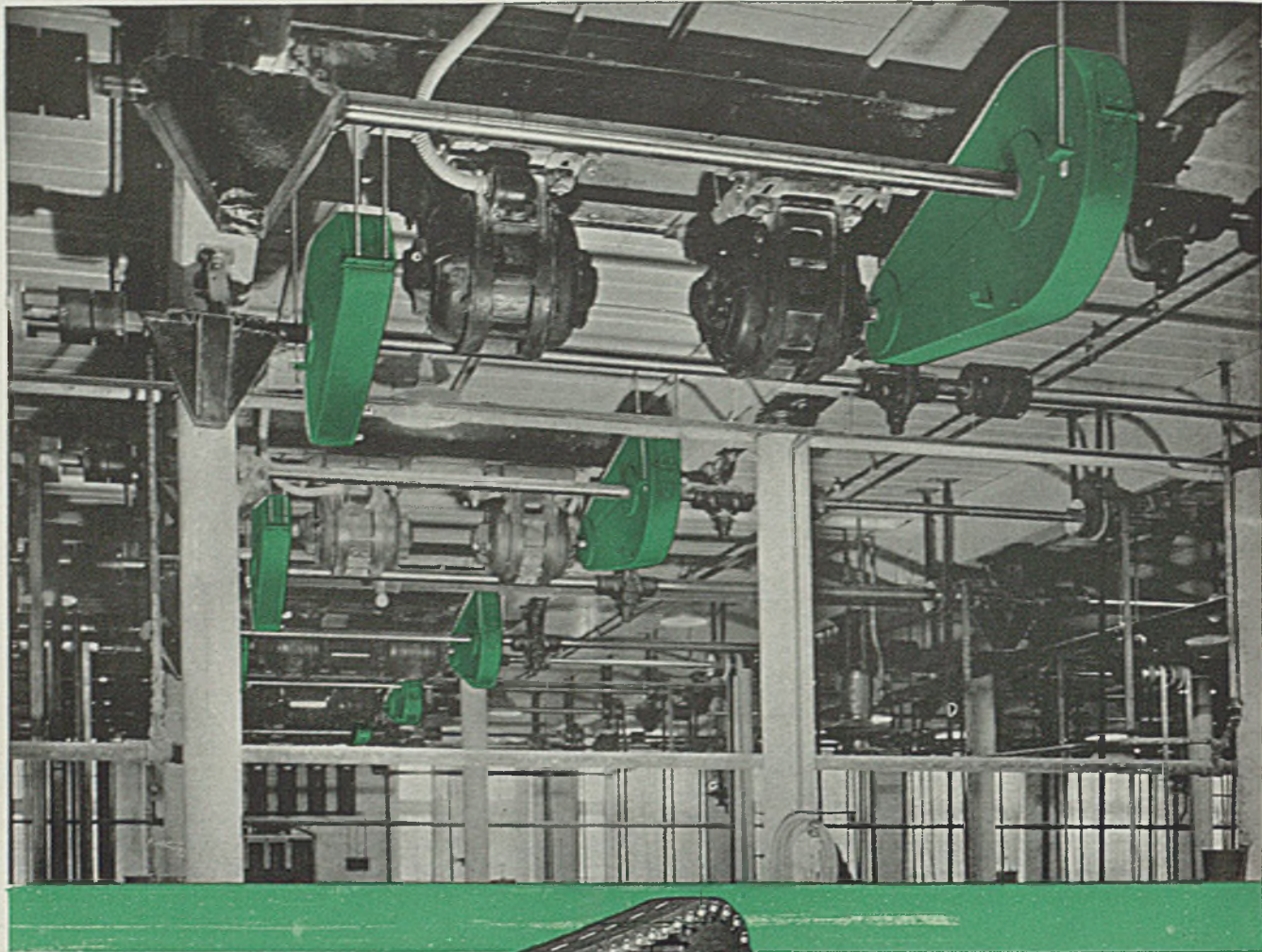
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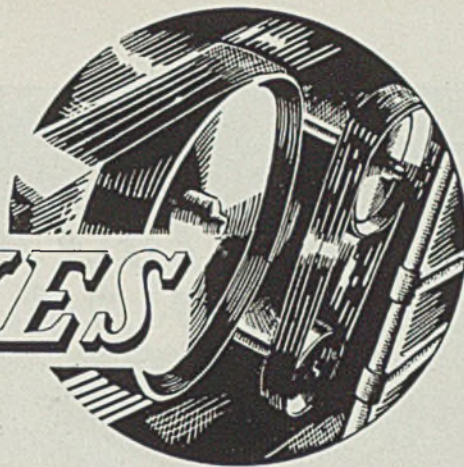
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POWER DRIVES



Machine Tool Electrification

IN THE belief that progress results from a free exchange of knowledge, the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., held the second Machine Tool Electrification forum at its main office. Almost a hundred builders and engineers of machine tool manufacturers attended.

This discussion covered some of the many interesting developments in drives and control as adapted to or built into machine tools during the past year. Abstracts of some of these papers have been published in this department. Two others on special applications to power chucking and grinding machines are reproduced herewith.

the same manner as an air cylinder, and those which are non-rotating, more popularly known as power wrenches. These latter serve to operate a temporarily stationary chuck in the same manner as a hand lever. They find their most common application on multiple-spindle machines, but they are adapted to a great many other kinds of stationary gripping devices.

In the rotating type, the unit is attached to the rear end of a machine spindle by means of a suitable intermediate plate with the result the entire unit with the motor frame rotates as an integral part of the spindle.

Describing the unit in more detail: A flange-type motor is attached to the housing of the power unit, a gear is multi-splined to the rotor shaft, and through a set of heavy gears in the unit housing a rotating motion is transferred to a central gear, on the face of which is a driving abutment.

An internally-threaded nut mounted on a large capacity ball-thrust bearing is rotated through a mating abutment with a central gear. The purposes of these abutments are to allow the motor to come to full speed in either direction without any load, and thereby to impart a heavy hammer-blow for releasing action that has never been known

Electrical Power Chucking

BY GEORGE A. HIGHBERG

Plant Superintendent,
Cushman Chuck Co., Hartford, Conn.

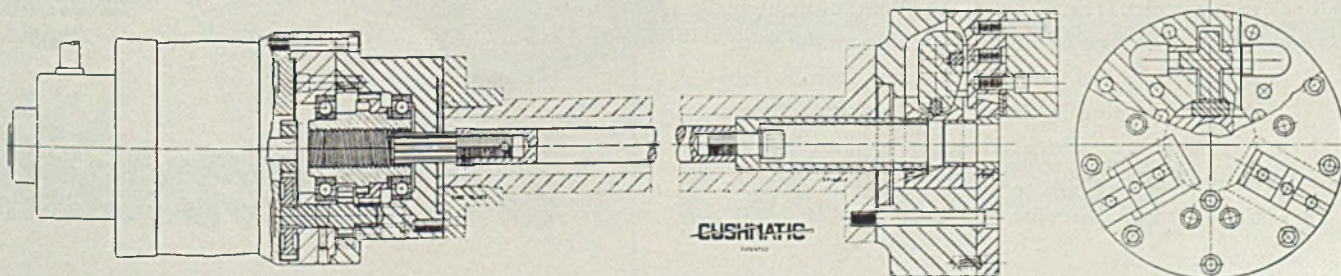
WITH high-production machines using the latest modern types of cutting tools, the work must be held securely in some form of chuck that is not only quick in its action but positive in its grip. With a machine operating at its tool limit greater production can be secured only through faster chucking methods than formerly prevailed. Also, an operator clamping through any hand-lever action becomes fatigued,

with the result that production suffers.

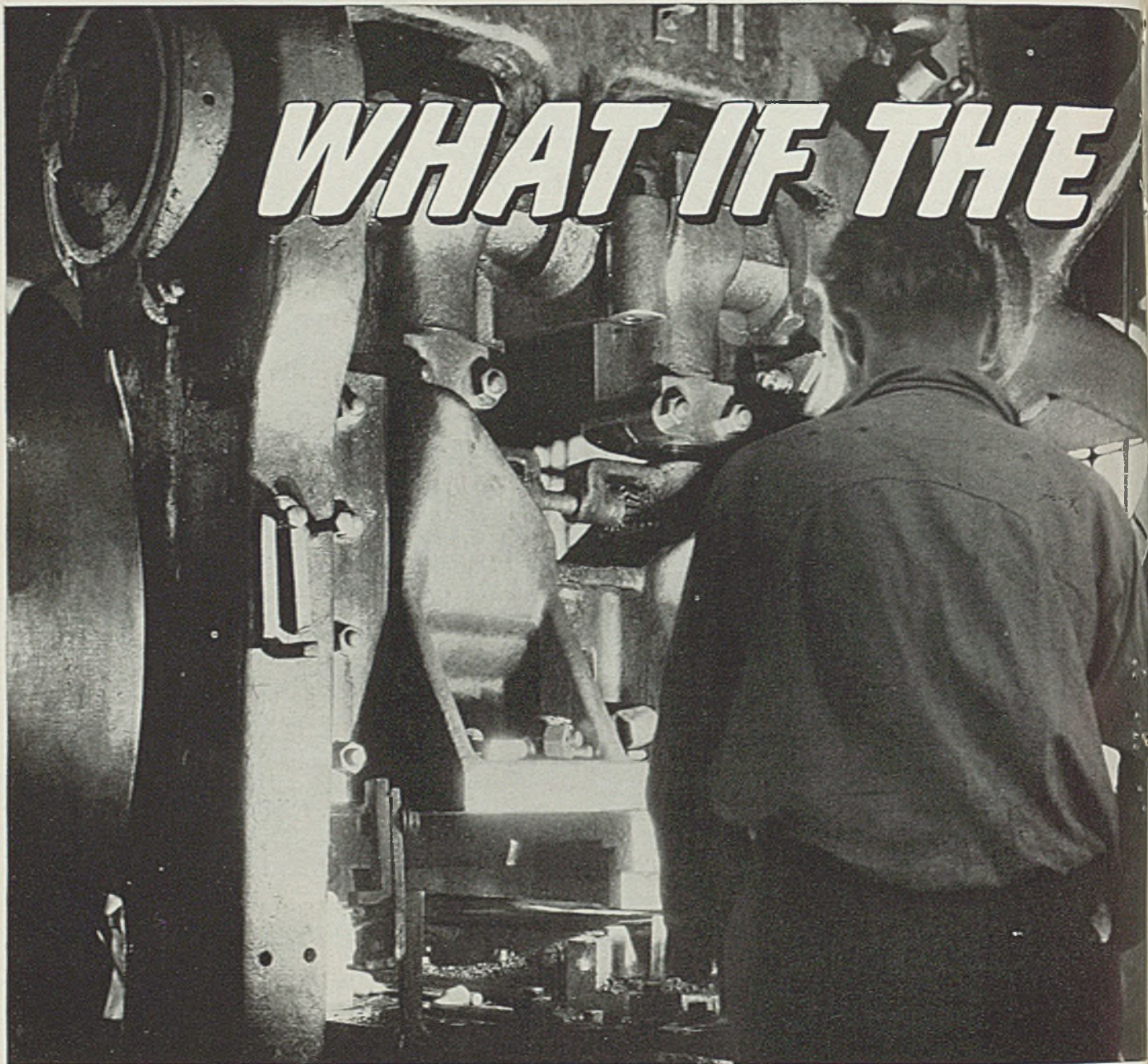
For some types of work a light, predetermined gripping pressure is required, and this can only be approximated by the operator, resulting in occasional distortion of the work. In attempting to meet the above conditions many kinds of chucks have been placed on the market, such as those which are operated by air, hydraulic power, hand-lever, magnetically and by electric motor.

Chucks driven by electric motors fall into two general classes: those operated by a motor-driven unit which revolves with the spindle in

SECTION view through center of chuck and power unit of Cushman rotating-with-spindle type chuck



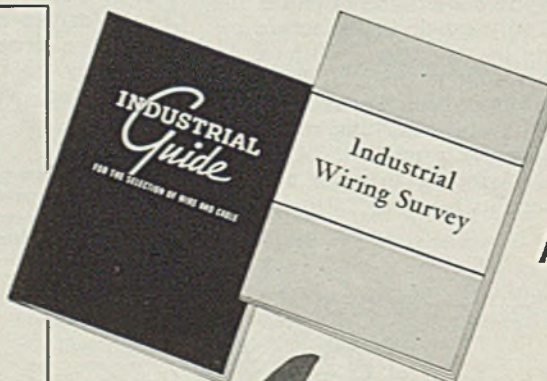
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to fail in breaking the strongest grip.

The Cushman nonrotating power unit, the A-840 power wrench, was originally designed to operate chucks on vertical multiple-spindle automatic lathes. A standard-base type motor of special high-torque characteristics is mounted on a frame of such design that the entire unit will swivel on a bracket attached to the base of the machine.

Within the frame is a train of gears driven by the motor in much the same manner as the rotating power unit, and having the same characteristic hammer-blow drive. Driven by these gears is a sleeve, the bore of which is multiple-splined to receive a shaft which is free to reciprocate back and forth within the sleeves by the operator, who grasps a knob at its end.

The other end of this splined shaft is of such a form that it mates with the pinion or nut of the chuck to be operated. As the entire unit can swivel, the operator will quickly become adept in mating this shaft with the pinion of the chuck as it is indexed by the machine to the chucking position.

Variable Pressure Control

After the operating engagement has been made with the chuck the unit will be operated in exactly the same way as previously described for a rotating unit. By our new pressure control, the torque of the motor is controlled and its speed is reduced in various stages, thereby reducing the inertia of the rotor.

It is a comparatively easy matter to make a squirrel-cage motor with a drooping speed-torque curve

which will operate at any speed, depending on the load which the motor has to carry. The problem then is to provide a load for the motor during the time that the jaws of the chuck are free, and to make this load variable so the motor will operate at various speeds, thus producing variable pressures on the jaws of the chuck.

A system was finally developed whereby the motor is loaded electrically in a way that has the same effect as loading it mechanically, as far as its operation on the speed-torque curve is concerned.

There are 9 stages of gripping pressure, each with approximately 9 per cent drop, until a low pressure of 25 per cent of maximum is obtained. The entire control scheme employs two small autotransformers mounted in a box with a panel which has the necessary studs to get the various voltage combinations.

Electrification of Roll Grinders

BY W. TRIBLE

Electrical Applications Engineer,
Cincinnati Milling Machines and
Cincinnati Grinders Inc., Cincinnati

FREQUENTLY, in the design and motorization of machine tools, it is found desirable to use direct-current motors for driving some of the units because of their adjustable-speed characteristics. To some, the path of least resistance would dictate the use of direct-current motors and control throughout the machine.

A large roll grinder is a highly

motorized machine requiring from six to nine individual motors for its drive, depending on the size and form of the grinder. An excellent opportunity is thus afforded to use the type of motor best suited to the individual unit-drive requirements.

Precision roll grinders with a roll diameter capacity up to 28 inches, are built as a traveling table type of machine which normally requires six motors for its drive. These motors are:

Main wheel drive motor, 3 to 1 adjustable-speed direct-current.

Headstock work drive motor, 4 to 1 adjustable-speed direct-current.

Table drive motor, constant-speed alternating-current.

Rapid-traverse cross-feed motor, constant-speed alternating current.

Spindle lubricating oil-pump motor, constant-speed alternating-current.

Coolant pump motor, constant-speed alternating-current.

Grinding technique on rolls to produce the ultra finish on rolled sheets requires the grinding wheel peripheral speed for finishing rolls to be approximately one-half the speed, a 2 to 1 motor-speed ratio normally being used for rough grinding and stock removal.

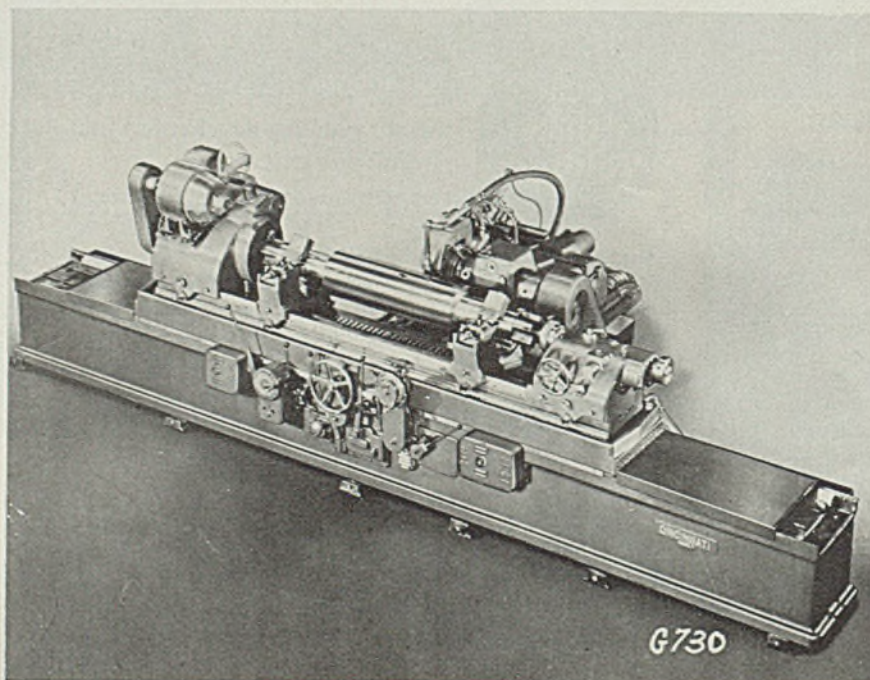
Grinding Speed Adjustments

In using the grinding wheels, there is a gradual reduction in diameter of approximately 25 per cent, brought about by breaking down of the wheel bond and grain structure and subsequent wheel dressing, and the wheel speed should be adjusted in accordance with its diameter. A secondary speed ratio and need for a controllable speed range is thus imposed on the main drive. Roll material and hardness and wheel properties make further wheelspeed control desirable. A 3 to 1 adjustable-speed shunt-wound direct-current motor best meets these operating requirements for the wheel drive.

In grinding rolls, the roll or work is driven by the headstock motor by an adjustable-speed drive in order to maintain a constant work peripheral speed regardless of diameter, for efficient grinding. A direct-current motor permits dynam-

(Please turn to Page 89)

DIRECTLY in front of the working position are placed headstock control panel, work and table control lever, power rapid cross feed lever and machine control panel. At the upper left, headstock motor; upper right, power rapid cross feed motor; to left and behind this, spindle oil pump motor



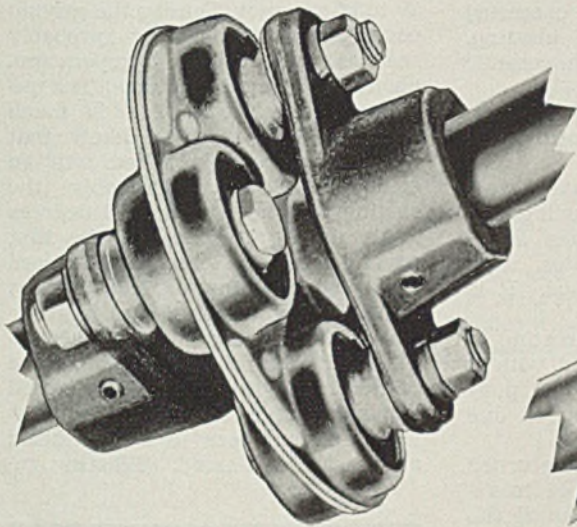
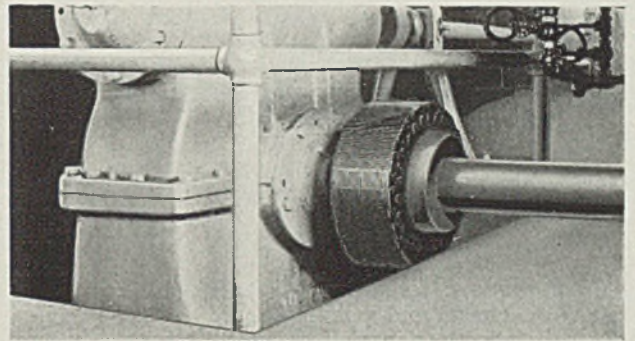
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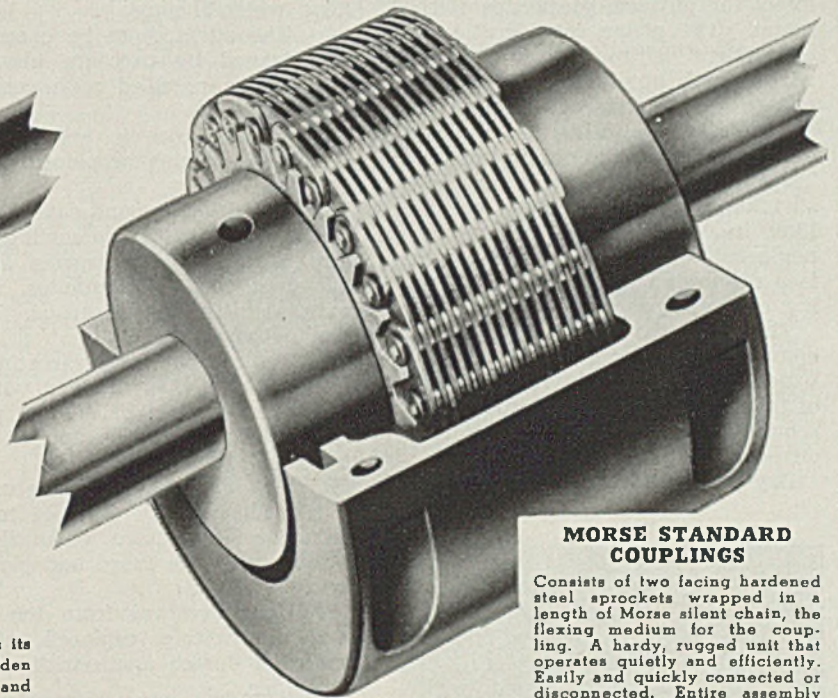
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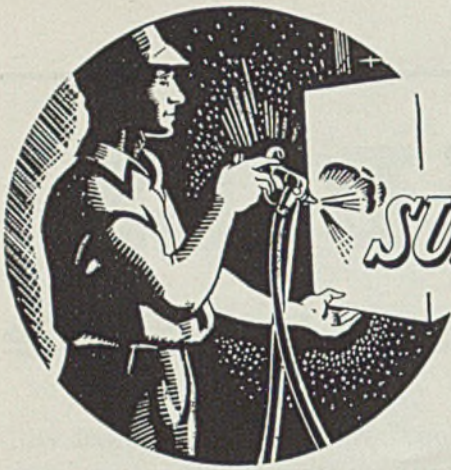
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SURFACE TREATMENT AND FINISHING OF METALS

Cast Iron Structure Changes During Firing Cycle of Vitreous Enamel

BY R. B. SCHAAL
Ferro Enamel Corp., Cleveland

WHEN vitreous enameled castings are fired certain chemical and metallographic changes take place in the iron which affect the physical properties of the metal. The prime consideration of enamellers is to obtain castings which will not cause the enamel to blister during firing and other considerations have been subordinated to obtain this end. The factors which affect strength, shrinkage, internal stresses and the like, however, cannot be entirely neglected and the following article is a discussion of the effects of firing on these properties.

There are two methods of vitreous enameling in general use each of which requires a different method of firing. These are dry process vitreous enameling and wet process vitreous enameling.

Dry process vitreous enameling is

accomplished in eight consecutive steps which include:

1. The surfaces to be enameled are cleaned by pressure blasting. Any holes are filled with ceramic filler.
2. Ground coat is applied wet, either by spraying or painting, and dried.
3. The dried, ground coated casting is placed in the enameling furnace at about 1600 degrees Fahr. and fired for 10-12 minutes, until material is thoroughly fused. It is then withdrawn.
4. The red hot casting, resting in a tilting cradle, is dredged with a thin, even coating of enamel powder, which adheres as applied due to partial fusing.
5. The dusted article is returned to the furnace, and allowed to remain for 3-4 minutes, or until the enamel is evenly fused and glossed over.
6. Upon removal from the furnace the casting, replaced in the cradle, is dusted again with enamel powder.
7. The casting is then returned for the final fire, of 2 to 3 minutes duration.
8. After the finished coat fire, the

casting is inspected tentatively while hot. If no flaws are visible, it is allowed to cool, usually protected from air currents and dust.

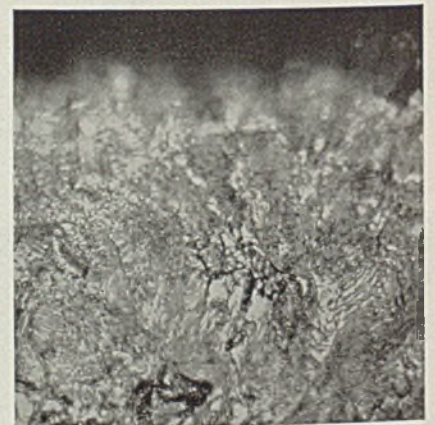
Firing and dusting take about 20 to 25 minutes. During the ground coat fire, the casting probably reaches the furnace temperature, about 1600 degrees Fahr. The period of cover coat fire is much shorter, so it is quite likely that the temperatures reached will be somewhat lower. Probably the casting will not reach 1550 degrees Fahr. during the fire of the first cover coat, and may not exceed 1500 degrees Fahr. or 1520 degrees Fahr. during the final fire.

Wet process enameling is accomplished in the following steps, some of which may be omitted, or varied depending upon the finish required:

1. The surfaces to be enameled are pressure blasted. Blasting re-



Fig. 1 (Left)—Unenameled casting at 100 diameters showing matrix to be largely lamellar pearlite with white ferrite adjacent to fine network-like graphite nests. Fig. 2 (Right)—Same casting at 500 diameters



quired in this case usually is more thorough than that for dry process enameling, due to certain differences in ground coat characteristics.

2. Ground coat is sprayed over the blasted surface in a booth and dried.

3. The pieces are placed in the enameling furnace at 1360-1380 degrees Fahr. and allowed to remain until the ground coat matures, usually about 30-50 minutes, depending upon the size of the load.

4. When the ground coat is matured, the castings are removed from the furnace, and placed in racks, to cool to room temperature.

5. The first cover coat is applied by spraying, and is dried.

6. The castings are placed in the furnace at 1320-1340 degrees Fahr. and are fired until gloss is thoroughly developed. The time required being usually 30 to 40 minutes.

7. After cooling to room temperature, finish cover coat is applied over the first coat by spraying, and the enamel again is dried.

8. The finish coat is fired in about the same manner as first cover coat; possibly a slightly shorter time may be required.

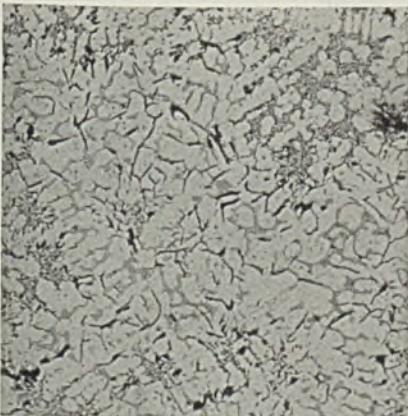
9. After removing from the furnace, the finished castings are cooled, on racks, to room temperature, and inspected.

Enameling by the wet process involves three heatings and coolings of the metal, over a period of about 2 hours furnace time, as compared to about 30 minutes continuously above red heat for the dry process, but, in general the trend of alteration in casting structure is in the same direction for either process.

Castings Are Annealed

In general, the effect of such thermal treatment of the castings would be that of annealing.

Annealing usually tends to soften and weaken cast iron, but usually it enhances the machinability. No marked change in analysis should be expected, except an alteration in the proportions of combined carbon and graphite. Annealing tends to



Difference in Properties (Heated and Unheated Bars)			
	Deflection at 200 Pounds Inches	Deflection at Breaking Inches	Breaking Load Pounds
Heated Bars			
No. 1	0.50	0.75	1020
2	0.45	0.60	880
3	0.55	0.80	1080
Total	1.50	2.15	2980
Average	0.50	0.72	993
Unheated Bars			
No. 4	0.30	0.45	1280
5	0.25	0.50	1340
6	0.35	0.50	1300
Total	0.90	1.45	3920
Average	0.30	0.48	1306

decrease combined carbon and increase graphite, without altering total carbon to a significant extent.

The general trend of structural change upon enameling 1/8-inch section castings by the wet process is illustrated by the accompanying micrographs.

Fig. 1 shows the unenameled casting at 100 diameters. The matrix is largely dark lamellar pearlite, with white ferrite adjacent to fine, network-like graphite nests. The whole structure is broken up in the usual manner with flakes of black graphite. The pearlite grains are bordered by a certain amount of transformed eutectic, or steadite. Fig. 2 shows this same unenameled casting at 500 diameters. Fig. 3 is from the same casting, after enameling, at 100 diameters showing the effect of the annealing action. The pearlite is converted almost entirely into ferrite and graphite, probably weakening the casting. Fig. 4 is the same as Fig. 3, at 500 diameters.

The transformation of pearlite, which contains combined carbon, into ferrite, which contains no carbon, and graphite, or free carbon, is accomplished with only an insignificant loss of total carbon.

Analysis of the casting follows:

	Before Enam- eling Per Cent	After Enam- eling Per Cent
Silicon	2.13	2.13
Manganese	0.67	0.67
Phosphorus	0.55	0.55
Sulphur	0.085	0.085
Graphitic Carbon	3.00	3.40
Combined Carbon	0.43	0.03
Total Carbon	3.43	3.43

The chemical and metallographic changes given are characteristic. In varying degree these alterations of

analysis and structure always will be produced in cast iron by the enameling process. The degree of change is dependent upon (1) the temperature attained by the casting during enameling, and (2) the time during which the temperature is maintained. A temperature of 800 degrees Fahr. probably will produce only a very limited transformation, while a temperature of 1300 degrees Fahr. may alter the pearlitic structure entirely, given sufficient time. Certain analyses tend to accelerate or retard the transformation of pearlite, but in general, after enameling, nearly all castings will show a ferrite-graphite structure, with pearlitic combined carbon reduced to a minimum.

Test Bars Accompany Heats

The precise effect of the enameling process upon any particular castings can be determined for any given physical properties.

Six 1 x 13-inch bars of the thickness of the average casting might be made, taking care that the dimensions as to thickness and width are exactly the same for each bar.

One of the bars should accompany each of three heats in the enameling furnace, and be treated thermally exactly like the castings being enameled, without actually enameling the bars. After preparing three bars

(Please turn to Page 90)

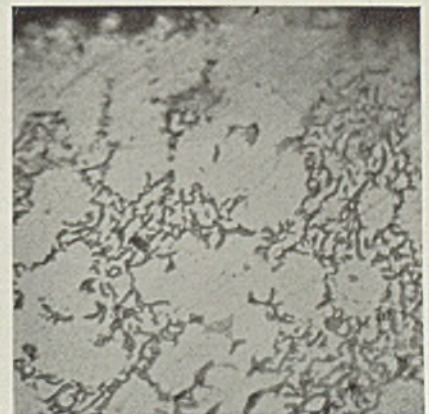
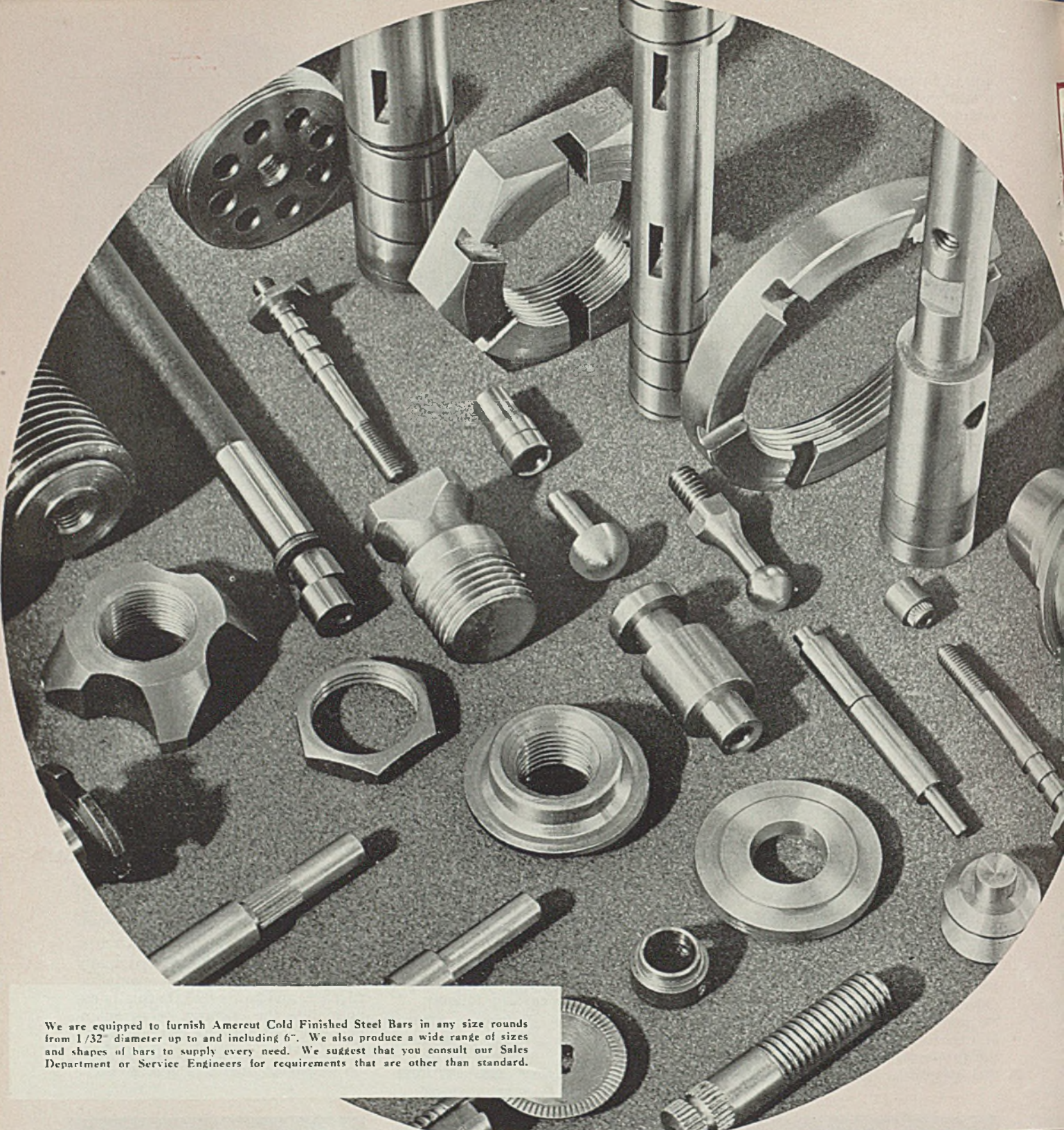


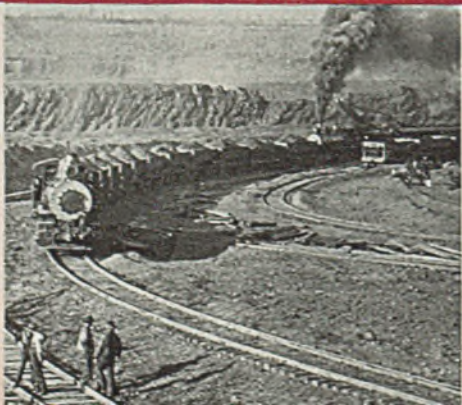
Fig. 3 (Left)—Same casting at 100 diameters after enameling showing effect of annealing action. Pearlite is converted almost entirely into ferrite and graphite, probably weakening the casting. Fig. 4 (Right)—Same casting at 500 diameters



We are equipped to furnish Amercut Cold Finished Steel Bars in any size rounds from 1/32" diameter up to and including 6". We also produce a wide range of sizes and shapes of bars to supply every need. We suggest that you consult our Sales Department or Service Engineers for requirements that are other than standard.

FROM MINE . . . TO MILL . . . TO MACHINE

Important to the manufacturer is the fact that Amercut Cold Finished Steel Bars are produced through our own facilities from mine to mill to machine. They pass through a unified system of selection, investigation, and absolute laboratory control. Each step is important in the quality of the finished product . . . we handle them all.



Improved Machinability
Superior Finish
Reduced Waste

You get them All!

WHEN you use Cold Finished Steel Bars in producing machined parts, you get all of these money saving advantages. Parts machined from Cold Finished Steel Bars can be made with great accuracy with a minimum of machining operations, and when completed have that smooth, shining finish which otherwise can be obtained only with additional work.

Amercut Cold Finished Steel Bars will give you the quality and uniformity characteristic of products manufactured by the American Steel & Wire Company. The cold drawing operation employed in making these bars improves the physical properties of the steel and gives it a smooth finish and accurate size. For

this reason there is no need for turning down the bar to remove surface imperfections, and considerable savings can be made in scrap and turnings as well as in time. For more than half a century these bars have been producing the finest results wherever they have been used.

Amercut Cold Finished Steel Bars are kind to your tools. Uniformity and freedom from imperfections not only improve their machinability but lengthen tool life.

Amercut Cold Finished Steel Bars are available in any type or grade you need and can be produced in the exact analysis and finish you require. We will be glad to furnish you with technical assistance at any time.

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Columbia Steel Company, San Francisco, Pacific Coast Distributors
United States Steel Products Company, New York, Export Distributors

UNITED STATES STEEL



WELDING, ETC.

BY ROBERT E. KINKEAD

Market Conditions in Welded Fabrication

CONDITIONS in the field of welded fabrication of large jobs at the present time present an interesting study for those who go in for long range prediction of trends in the field. The plain fact is that it is almost impossible to get a respectable number of bids on a job of any considerable size for welded assemblies in spite of the fact that the average loading of fabricating shops is probably not more than 60 per cent of capacity. It appears that once a shop has reached 60 per cent of capacity, it seeks a considerable number of relatively small jobs to fill in the remainder and positively does not want one single job that will boost production to maximum output. This is good business sense on the part of management.

Not the least of the fabricator's

IN this column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL.

troubles in trying to make an estimate on a large welded job which will require six months to a year to deliver arises from his inability to forecast labor costs and conditions.

While such conditions normally lead to higher prices the fact cannot be overlooked that these higher prices offer a great financial premium on finding better methods of doing the work. Thus, if a fabricator can get the higher price but, by the use of better methods, keep his costs down, he is in a fair way to earn substantial profits. One eastern welded steel fabricator rearranged his machinery and equip-

ment and doubled his shipments. Another machinery builder in the Chicago district put in an improved welding process and reduced his labor cost of welding by more than 50 per cent.

One thing may be safely forecast. The fabricating shop as it exists today is in for some radical changes in methods, processes and equipment. The present plate fabricating shop, for instance, is built around bull riveters, punches for rivet holes and bending rolls. Such welding equipment as has been installed is usually portable, the most inexpensive type possible, and connected to the power lines by temporary wiring. The work is done by methods which invite labor difficulties. That these conditions will be changed is forecast by the fact large profits may be earned by use of improved methods, processes, and equipment.

* * *

Errata

OFTEN we are at fault, sometimes it is the printer. Recently there appeared in this column a sentence which said in effect that welds in strip coils had to be successful 999 times out of 10,000. One more 9 would have made the statement about right. Again, a statement was made that there were 150,000 to 200,000 spot welders in the country. A short hop of the decimal point one place to the left would make the statement conform to the facts more accurately.

Modern Covered Wagon Houses X-Ray Equipment



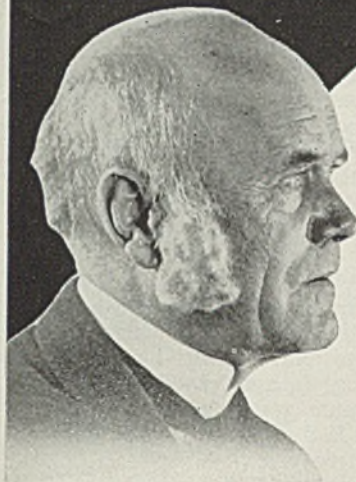
New Electrode Announced

Announced by Champion Rivet Co., Cleveland, is a new heavily coated, shielded arc electrode for welding the low alloy and higher carbon high tensile steels. Known as "Champion Blue Devil-85," this electrode can be used in any position—flat, vertical and overhead.

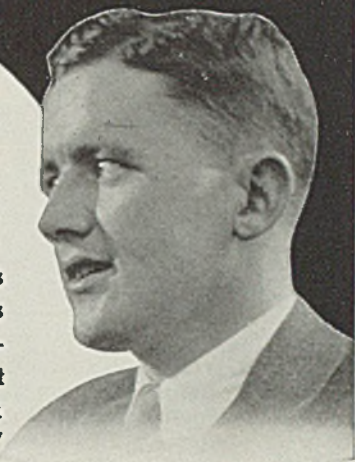
Steel Cabinets Cool

Constructed of rust resisting furniture steel are new beverage and water cooling cabinets manufactured by Norge Division, Borg-Warner Corp., Detroit. Modernistic cabinet of the beverage cooler is built around and supported by heavy, all steel, welded center and bottom frames of battleship construction. High baked enamel is used for exterior finish while chrome plated tubular steel is used for bases and heavy gage galvanized sheet steel for interior tank. Cabinets of water coolers, finished in high baked lacquer, have top and base of gray iron finished with vitreous enamel and drain grill is of stainless steel.

DESIGNED to facilitate radiographic inspection in the field, this unique portable X-ray unit has capacity to penetrate 3 inches of steel in a 1-minute exposure. It is mounted on a trailer chassis and is particularly suitable for examination of welded structures. The latest development of St. John X-Ray Service Inc., Long Island City, N. Y., it is referred to as "the modern covered wagon which is blazing new trails for industry"



"I'm stumped trying to cut costs, Lad. You know, I'd gladly give a \$100 bill to be able to squeeze just one buffalo nickel out of the cost of every machine I produce."

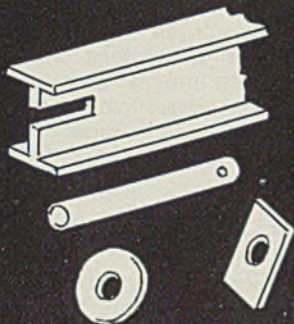
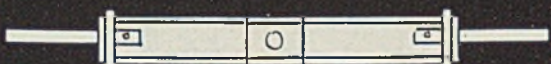


"Here's a squeeze play that's simple, Pop! Those buffalo nickels are roaming around in the machine PARTS. Change a part at a time to welded steel and you won't be buffaloed any longer!"

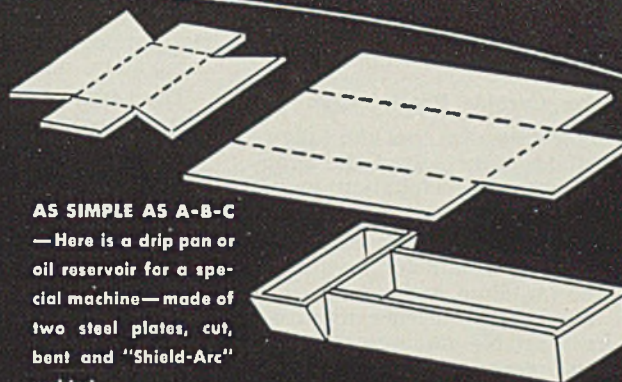
Sketchbook of Welded Parts



\$12.68—That's the cost of this axle of cast steel construction. Machining frequently disclosed defects in castings, necessitating scrapping of part and loss of machining man-hours.



\$6.73—This is the cost of a "Shield-Arc" welded axle, for identical service, built from stock steel shapes as shown. With added refinements the axle was finally produced for \$8.00. Also defect losses have been eliminated.



AS SIMPLE AS A-B-C
—Here is a drip pan or oil reservoir for a special machine—made of two steel plates, cut, bent and "Shield-Arc" welded.



STREAM-LINE THOSE LEGS!—Take rolled steel plate, cut and form it as shown—then "Shield-Arc" weld the component parts into a design such as shown.

Write for Machine Design Application Sheets. Issued periodically.

THE LINCOLN ELECTRIC COMPANY, DEPT. Y-392, CLEVELAND, OHIO

Largest Manufacturers of Arc Welding Equipment in the World

LINCOLN SHIELD-ARC WELDING

BUILDS LIGHTER AND STRONGER PRODUCTS • FASTER • AT LESS COST

History of Stainless Steels and Problems Met in Industrial Use

(Concluded from Page 54)

structural change which affects somewhat the mechanical properties, and affects quite definitely the corrosion resistance of the alloys.

For alloys of variable composition (although of the same austenitic type) the maximum rate of carbide precipitation corresponds to a certain temperature. It is obviously of extreme importance to weigh all the conditions of service for the use of alloys within the danger zone (carbide precipitation zone) even though it may be below the maximum temperature at which the alloy is still heat-resistant. The application of these alloys in the oil industry is a good example.

Solve Carbide Precipitation

We now recognize that the following methods have solved the problem of carbide precipitation to all practical purposes:

(a.) Additions of such elements as titanium, columbium, vanadium and tantalum with which carbon unites in preference to chromium. Variable amounts of these elements, depending upon carbon content, is required. Some manufacturers recommended the use of a so-called "stabilizing" treatment which usually consists of heating from 1400 to 1500°F. for a considerable time.

(b.) Adjustments in chromium, nickel and carbon concentration to form what is termed a "balanced" alloy (in applications where only a short-time heating is involved) as for example in welding. Welded constructions of these alloys are used with safety and satisfaction when high temperatures are not involved.

Another recent development in the field of austenitic chromium-nickel alloys is that of an alloy with 3 per cent or so of molybdenum added. For manufacturing reasons it was found expedient to modify the composition somewhat and in the stainless steel code its analysis is stated as follows:

Type 316: Carbon, 0.10% max.; chromium, 16.0-19.0%; nickel, 14.0% max.; molybdenum, 2.0-4.0%.

It is suggested that this alloy possesses increased resistance to attack by solutions of sulphurous and sulphuric acid, hence its use has been advocated in such installations as in digestors for pulp and paper industries.

It is advisable to mention, how-

ever, that very satisfactory performances have been rendered by the alloys of 20 per cent chromium-10 per cent nickel type and that equally good results are to be expected from the alloy of 25 per cent chromium-20 per cent nickel composition.

Type 316, chromium-nickel-molybdenum alloy has one advantage: It is markedly less susceptible to the type of corrosion which is generally referred to as "pitting" or "pinholing," which is the formation of either very small or, at times, quite large holes, which may penetrate through the whole thickness, while the material immediately adjacent remains completely unaffected.

The addition of columbium to the chromium-nickel-molybdenum alloys to combat the carbide precipitation phenomenon, and yet to preserve its desirable characteristics is practiced. It is a rather recent thought, thoroughly feasible.

We should also mention the alloy having the general composition: 0.10 per cent carbon, maximum; 25 to 30 per cent chromium; 3 to 5 per cent nickel; and 1.5 per cent molybdenum.

Since engineers are constantly asking for stronger materials, especially at high temperatures, the addition of some special elements to the straight chromium alloys is made with that problem in mind.

Tungsten Proves Worth

In recent years alloys containing approximately 3 per cent tungsten in both 12 to 14 per cent chromium and 16 to 18 per cent chromium series have been developed; to the best of our knowledge tungsten is the only element that has noticeable influence in increasing strength as measured either by short-time tests or by the present day methods for estimating creep strength.

Further developments of stronger alloys are indeed urgently needed. A promising element appears to be boron, but it has to be further investigated before a more definite statement can be made.

While additions of nickel and copper increase the hardenability of straight chromium alloys, the elements titanium, columbium, and aluminum have the opposite effect, rendering alloys practically unhardenable after standard heat treating processes. Quite recently it was also found that titanium (about 1 per

cent) is very helpful in inducing grain refinement in the ingot.

Of the non-hardening alloys one with aluminum (12 to 14 per cent chromium, 0.20 to 0.30 per cent aluminum; 0.10 per cent carbon) is best known commercially. It possesses fair strength (89,000-100,000 p.s.i., hot rolled, 69,000-75,000 p.s.i. normalized), ductility which is maintained down to -25°F., and low hardness.

Its main application will be found in welded structures, where annealing (to correct air hardening in welding) is not feasible. To secure maximum weld ductility a welding rod of 18-8 or 18-8 with modifications should be used.

It must be realized that when we speak of the problem of surface corrosion we really mean a great variety of problems because of the great variety of conditions under which metals corrode.

We believe that the behavior of the metals in corrosive media is dependent upon the properties of the oxidized film formed at the surface.

Cannot Predict Behavior

Among these should be mentioned first of all its continuity, its chemical stability, once the film is formed, its characteristics such as brittleness or toughness or adherence, its ability to permit diffusion of oxygen through it, etc.

But although we sense the vital importance of enumerated factors we do not know as yet what properties the most protective film should possess, and until it is solved the problem of corrosion will remain.

We will accumulate a great deal of data as to how a certain alloy or metal behaves in this or that acid, but we cannot predict its behavior, except in a very general way, when transposed from one environment into another.

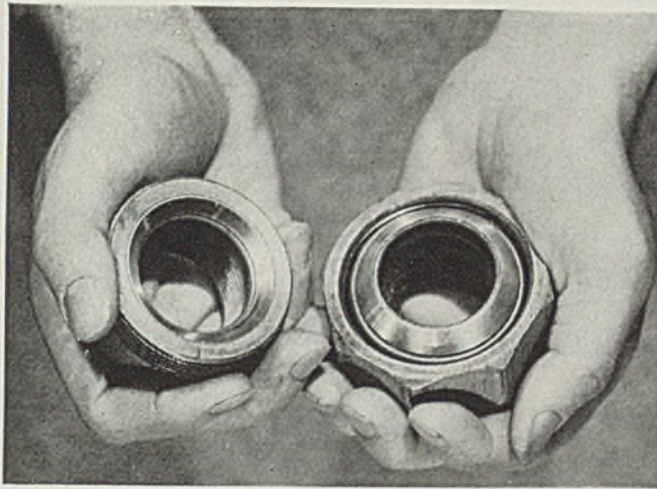
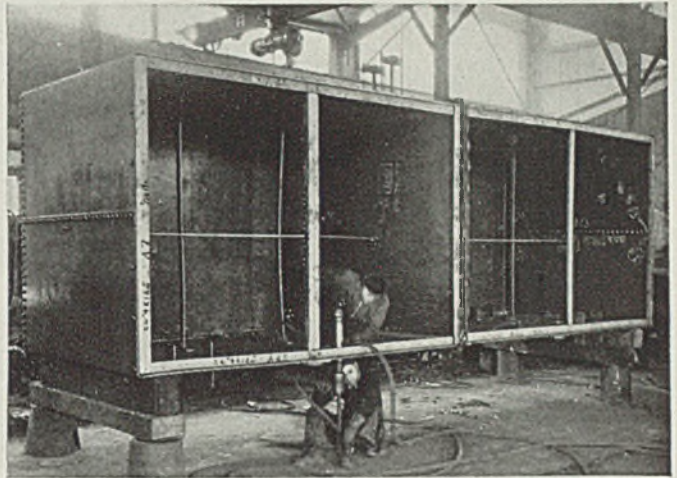
The usual classification of forms of corrosion is as follows:

- I. General chemical attack (direct)
- II. Local, pitting
- III. Local, galvanic (two metal) cell
- IV. Local, concentration cell
- V. Stress corrosion, fatigue corrosion

The task of a metallurgist is not an easy one: the ingenuity of our fellow-workers in industries of every description places a burden, sometimes very heavy, on our shoulders. But the metallurgists are not asleep. We continually acquire additional engineering knowledge, gain is fabricating experience, study fundamental problems. Thus, we confidently face the future of our as yet infant industry, a future we believe, full of possibilities for new developments and application.

**FOR A 7000-GALLON TANK
—OR A 1-INCH PIPE UNION SEAT**

● The 6' 9" x 20' x 7' tank shown is an excellent example of a popular application of Revere sheet Herculyoy.* The tank, constructed by the Dover Boiler Works, Dover, N. J., is designed to hold 7,000 gallons of water and is installed on the roof of the Bronx County Jail, New York City. Herculyoy is especially recommended for tanks and pressure vessels because of its high strength, ready weldability and resistance to corrosion.



● The Rockwood Sprinkler Company, Worcester, Mass., required a metal for its pipe union seats that would resist corrosion, contain no zinc, be ductile enough for cold working and forming without springing out of shape or causing excessive strain and wear on dies, and at the same time be able to withstand wrench abuse with minimum liability to scoring. Herculyoy proved to be ideal for this service.

The Rockwood Union is used largely on process pipe lines where a heavy duty union is required to withstand high pressures and temperatures as well as severe corrosive and erosive action. The seat joint of this union is the vital part, and is double-locked into position. The manufacturer says: "We picked Herculyoy principally because of its ability to stand up under these severe service requirements."

Revere *HERCULOY**

MEETS ALL REQUIREMENTS PERFECTLY

● Revere Herculyoy is the ideal material to specify for any purpose where a metal is wanted that has the corrosion-resisting qualities of copper, plus the strength and toughness of steel. Yet it can be readily stamped, drawn, hot and cold forged, welded and worked by other standard methods, on a profitable commercial basis.

Revere Technical Advisory Service will cooperate with manufacturers, fabricators and others who are in a position to benefit by using a metal having this unusual combination of characteristics. For information regarding this service, or further data about Herculyoy, write our Executive Offices: 230 Park Avenue, New York City.

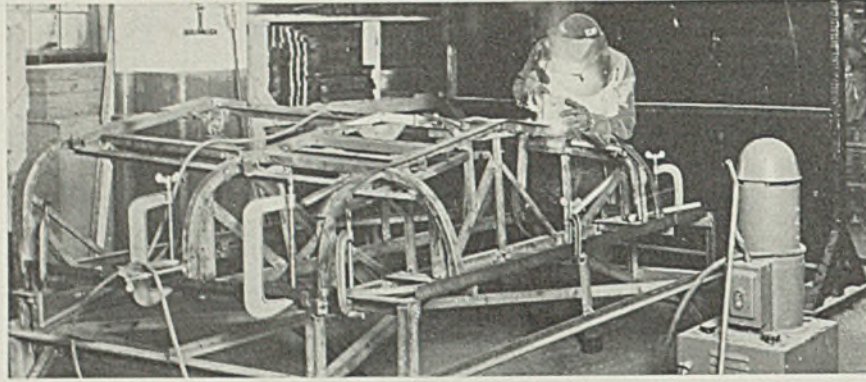
* U. S. Patent Nos. 1,468,879; 1,924,581; 2,002,460; 2,109,977

Revere Copper *and* Brass

INCORPORATED

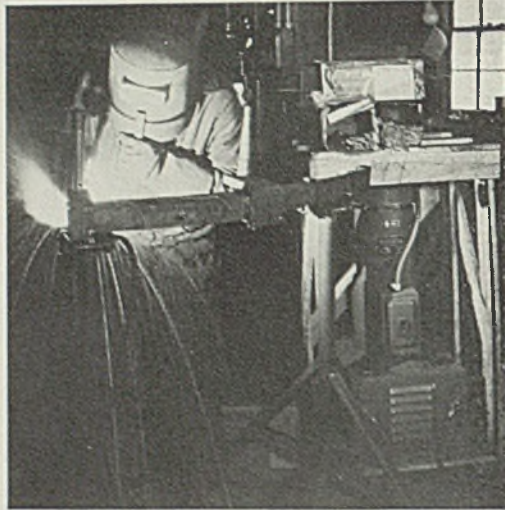


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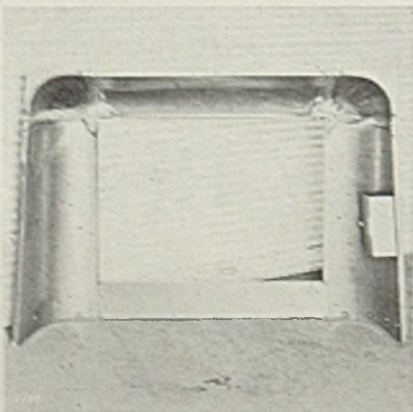
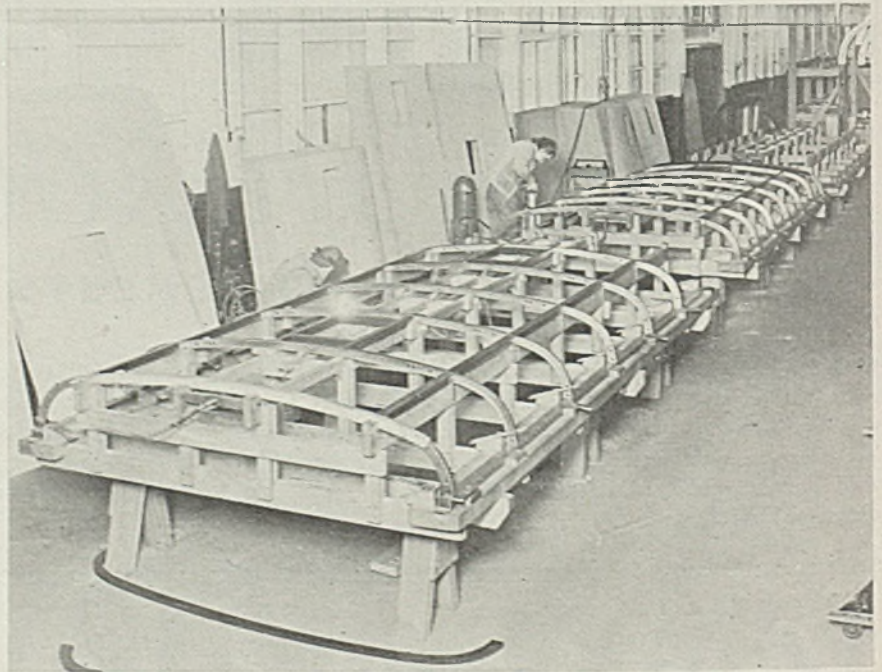


Using In Trailer

SPECIAL jig used in assembling and welding one of the body frame sections is shown above, while at right is an operation on a spring and knee-action assembly



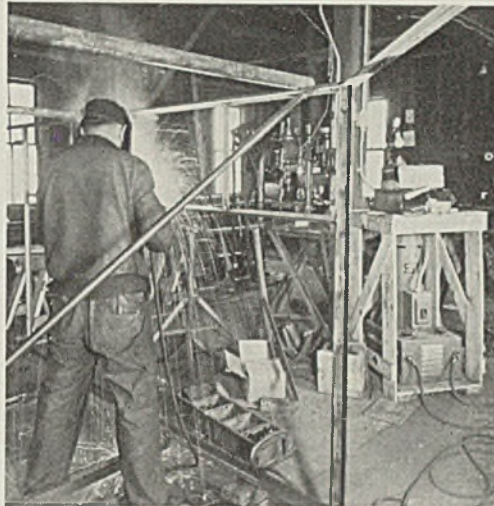
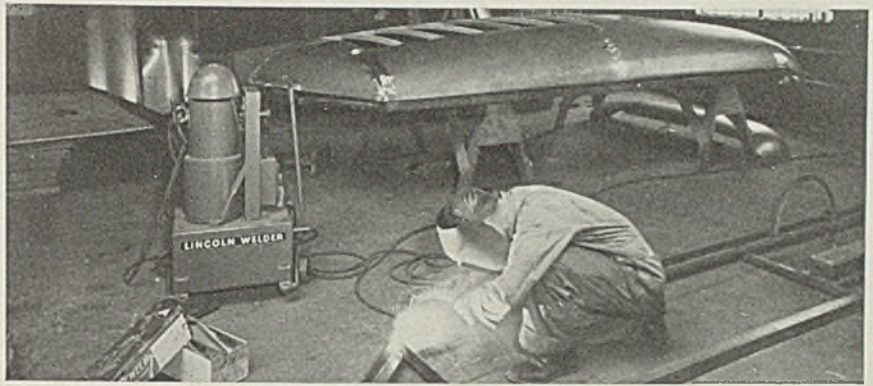
MANUFACTURE of trailers is one of America's newest and fastest growing industries. Two years ago practically all trailers were homemade, while today the field is crowded with nearly 300 manufacturers. Estimates of trailer production for this year give a figure approximating 60,000



FABRICATION of the roof frame section of a trailer by electric welding is shown above. The operation consists of placing the components in the jig illustrated and fusing them with the electric arc. Trunks are made as shown at left of 18-gage sheet steel and are welded on the rear of the frame

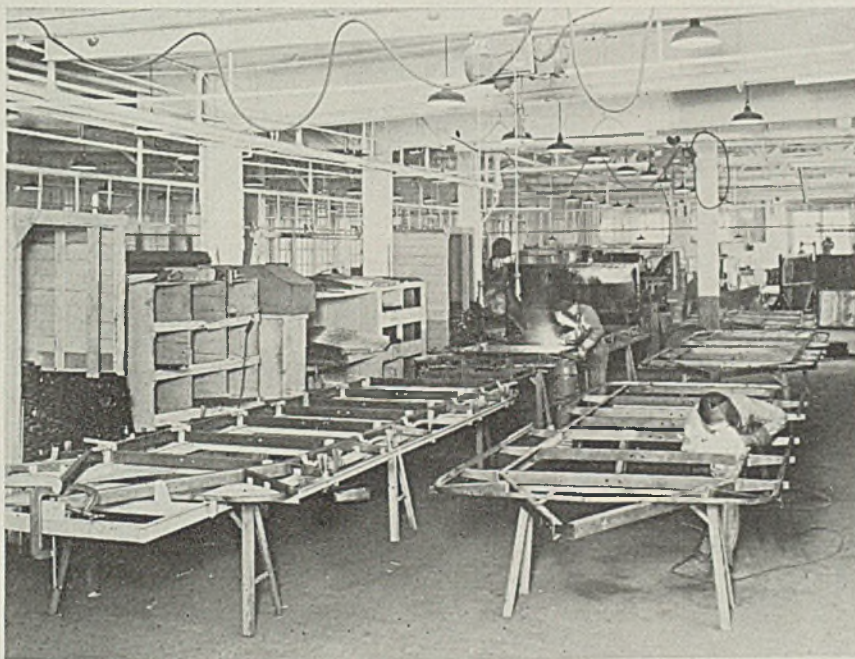
Welding

Fabrication

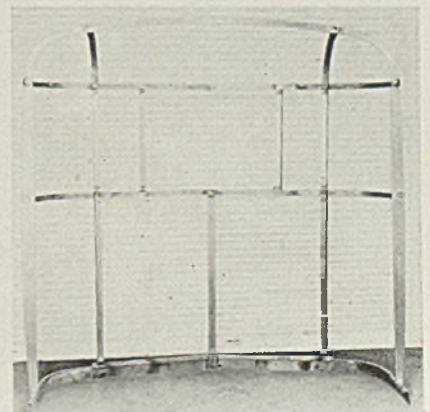


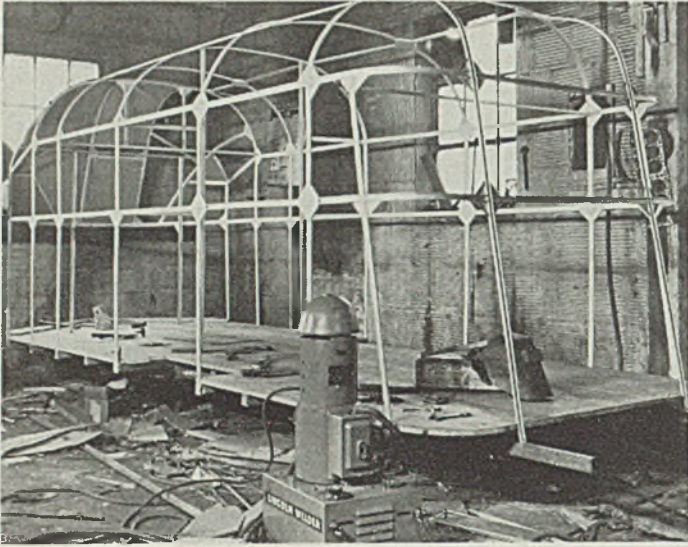
TRAILER frames consisting entirely of standard angles are being welded together above, while the left photo shows welding on the frame of a camp trailer

units, a large majority of which will be largely steel construction. Many of the larger manufacturers are using welding partially or entirely in fabrication of bodies and chassis, and through the courtesy of the Lincoln Electric Co., Cleveland, steps in the construction of welded steel trailers are presented herewith

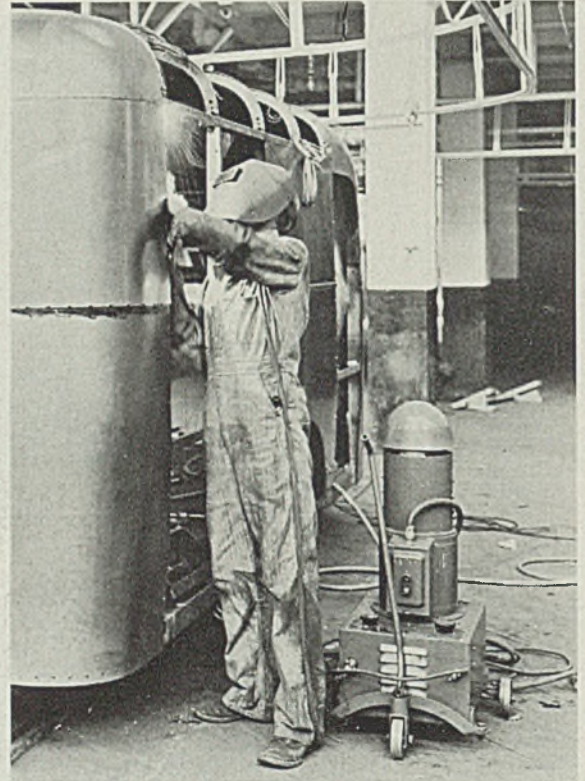


VARIOUS parts of the trailer chassis frame are assembled in jigs as shown above, where they are tack welded together and then finish welded. All parts are standard plates and shapes. Front section of the trailer body frame, at right, is built in the same manner, being held in a jig and then welded

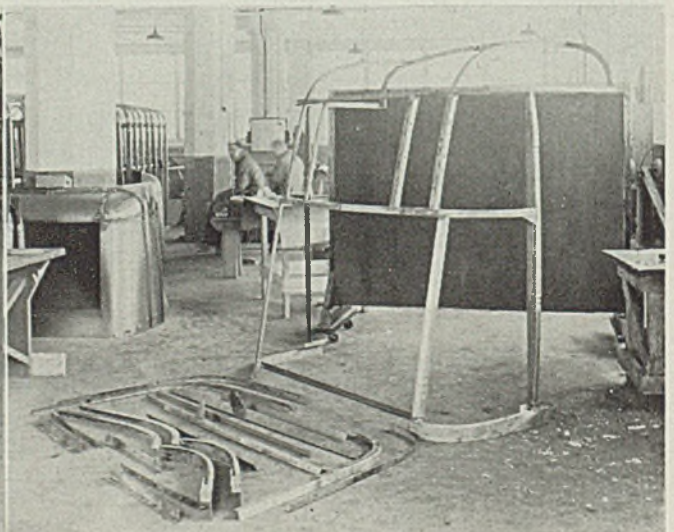
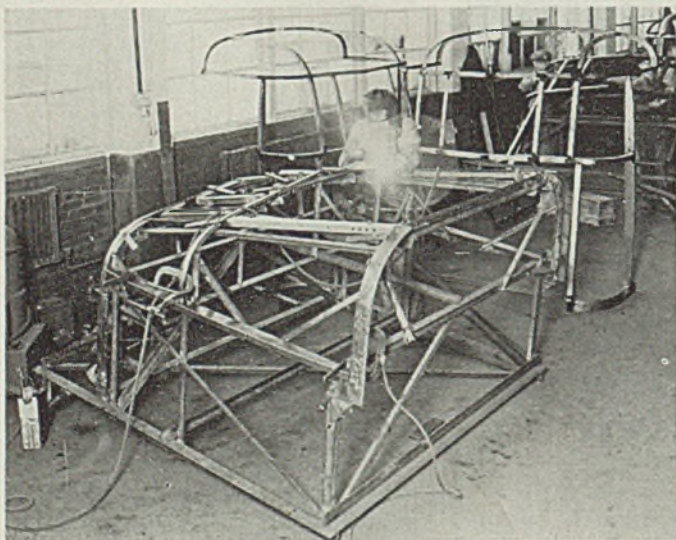
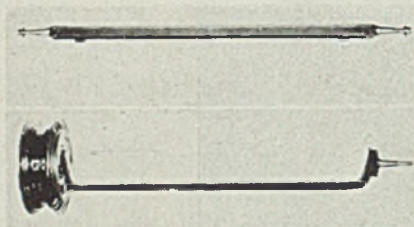




F RAME for a large trailer shown at left is built up of light channel and plate, flame cut to size and electrically welded together. Below an arc welding operator is shown welding the roof section of the framing to the side frames of the body



TWO types of welded house trailer axles are shown below. One is a bent bar, the other a straight length of hexagonal stock. Wheel spindles are welded to the axle bars. Jig used in welding and assembling the body frame sections is shown at bottom left. Bottom right shows a welded body section and its component parts disassembled



Accurate Assembly and Extensive Testing

Insure Trouble-Free Operation of Engines

BY FRED B. JACOBS

TROUBLE free operation is the most important feature of a modern diesel engine. One of the most important factors in insuring positive operation at all times and under all conditions is a strenuous testing program. In outlining methods used by the Hercules Motors Corp., Canton, O., it is interesting and pertinent to note that this company has sold and is still selling many diesel engines for European service, in the territory where the diesel was born and largely developed.

Problems of Production

Production problems in this plant do not differ greatly from those of any other heavy machinery production plant. Rigid inspections insure that all parts are within prescribed tolerances. Special care is exercised to make sure that crankshafts and flywheels are in perfect running balance, modern dynamic balancing machines being used for this purpose. Slight errors in balancing result in motors which wear bearings excessively and operate inefficiently.

Assembly operations are in a large measure responsible for the final operation of the motor and great care is taken in both the main assembly and all subassembly lines

to be sure that all parts are assembled according to specifications. To expedite this work, labor saving and automatic tools are used as much as possible. This is especially true in assembling materials which require exact pressures, notably aluminum alloys, where excessive pressure on a nut might strip threads.

From the assembly line, the motors go through the dynamometer test. In this department are located 45 of the latest type dynamometers. Among the most important data revealed by this test are the maximum torque in foot pounds developed at various speeds and the power delivered at the flywheel.

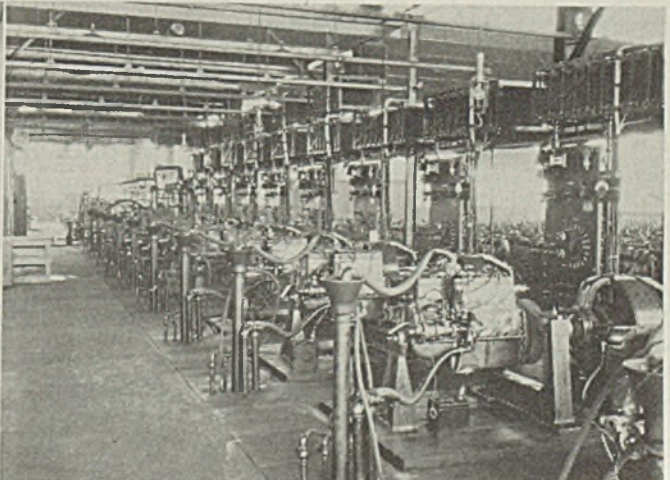
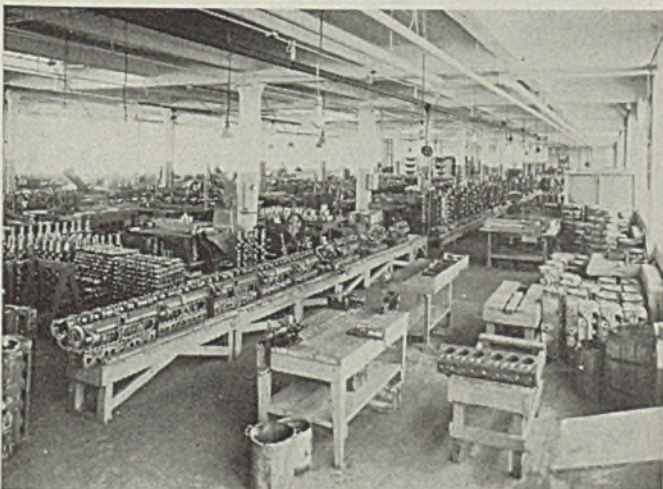
From carefully tabulated data, the results of years of research, plant engineers know just what to expect of each model. If an engine fails to develop the required power it is proof that something is wrong. If a diesel engine shows a low rating it might be that the fuel pump is not operating properly. In a gaso-

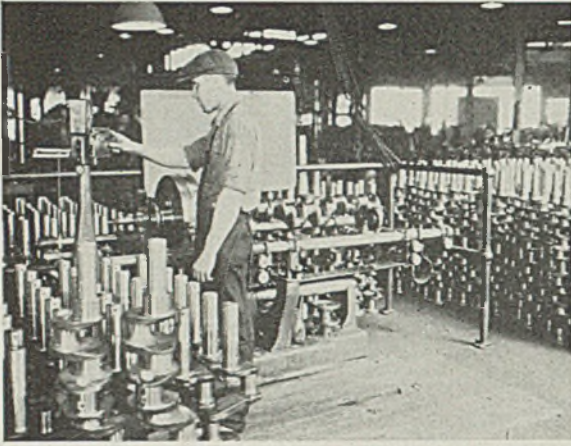
line engine it might be caused by incorrectly fitted valves, incorrectly fitted pistons or a faulty fuel supply. With both diesel and gasoline engines loss of power accompanied with undue heating is readily determined by the temperature of the cooling water as it comes from the engine. This generally means that something is out of alignment or fitted too closely. The dynamometer test is a sure means of locating and correcting many evils that result in the so-called "lemons," since trouble is found and remedied before the engine leaves the factory.

When a motor fails to function correctly in the dynamometer test it is torn down and inspected thoroughly and the errors corrected. As may be imagined, a dynamometer test involving 45 units is an expensive procedure but it pays excellent dividends as a higher quality product is assured. As a consolation for this expense the power developed by the generators in the dynamometer test is turned into the company power line and 45 dynamometers can develop considerable horsepower, especially in cases where comparatively heavy units are being tested.

After the test is completed the sump is taken off each motor and a thorough examination made. This

ONE of the assembly lines is shown at left below. Accuracy in assembly is the main reason why tests show positive, efficient operation. The motors on dynamometer test at right are proving that they develop the required number of horsepower before they are shipped out





CRANKSHAFTS must be accurately balanced on dynamic balancing machines to insure freedom from vibration and excessive bearing wear

inspection is to make sure that no parts have worked loose to cause damage later. A broken cotter or lock washer would show up in this inspection and if not corrected serious difficulty might develop later. Out of each day's production a number of engines are entirely dismantled and thoroughly inspected. Unusual precautions are taken to make sure that none but perfect engines reach the shipping room.

Mention also should be made of the testing laboratory. Here new models, or existing models with improvements, are given a thorough dynamometer test so the results can be tabulated accurately. This test is run for the purpose of de-

termining under actual working conditions, or as near a simulation of them as possible, just what happens when changes are made with the object of bringing about improvements. This test reveals that some changes show economy while others do not. For example, let it be assumed that with a gasoline motor it was desired to test a different make of carburetor. The dynamometer test would show very accurately just how much gasoline was consumed and how much power developed. These data could of course be compared with that obtained in foregoing tests and the results studied intelligently to determine the better unit.

Gas Fired Furnace for Normalizing Steel Castings Has Cooling Door

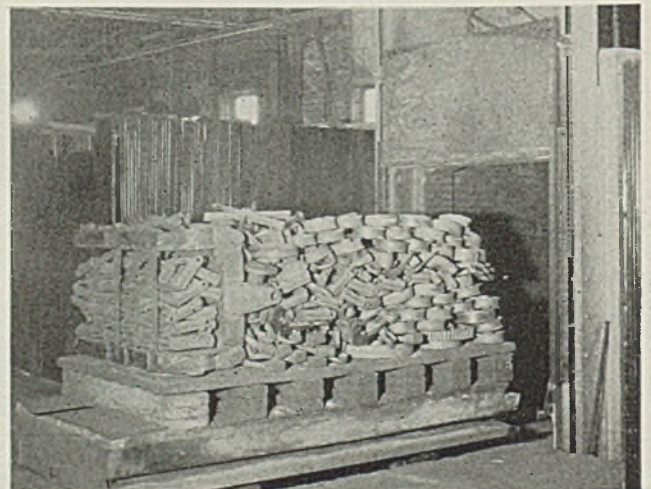
BY RALPH M. FISHER,

General Manager, Reed Foundry & Machine Co., Kalamazoo, Mich.

REED FOUNDRY & MACHINE CO., Kalamazoo, Mich., recently completed installation of a new, gas fired annealing furnace for normalizing steel castings. Operating with low gas consumption and with a comparatively low tonnage cost, it permits the company to obtain physical properties to meet all American Society for Testing Materials and government requirements both in hard and mild steel. It has capacity for treating approximately seven tons of castings of average size. The castings are charged on a car which is pulled into the fur-

nace by a car puller located at the rear. Bottom of the furnace and the car tracks are 15 inches below floor level. The alloy plates on which

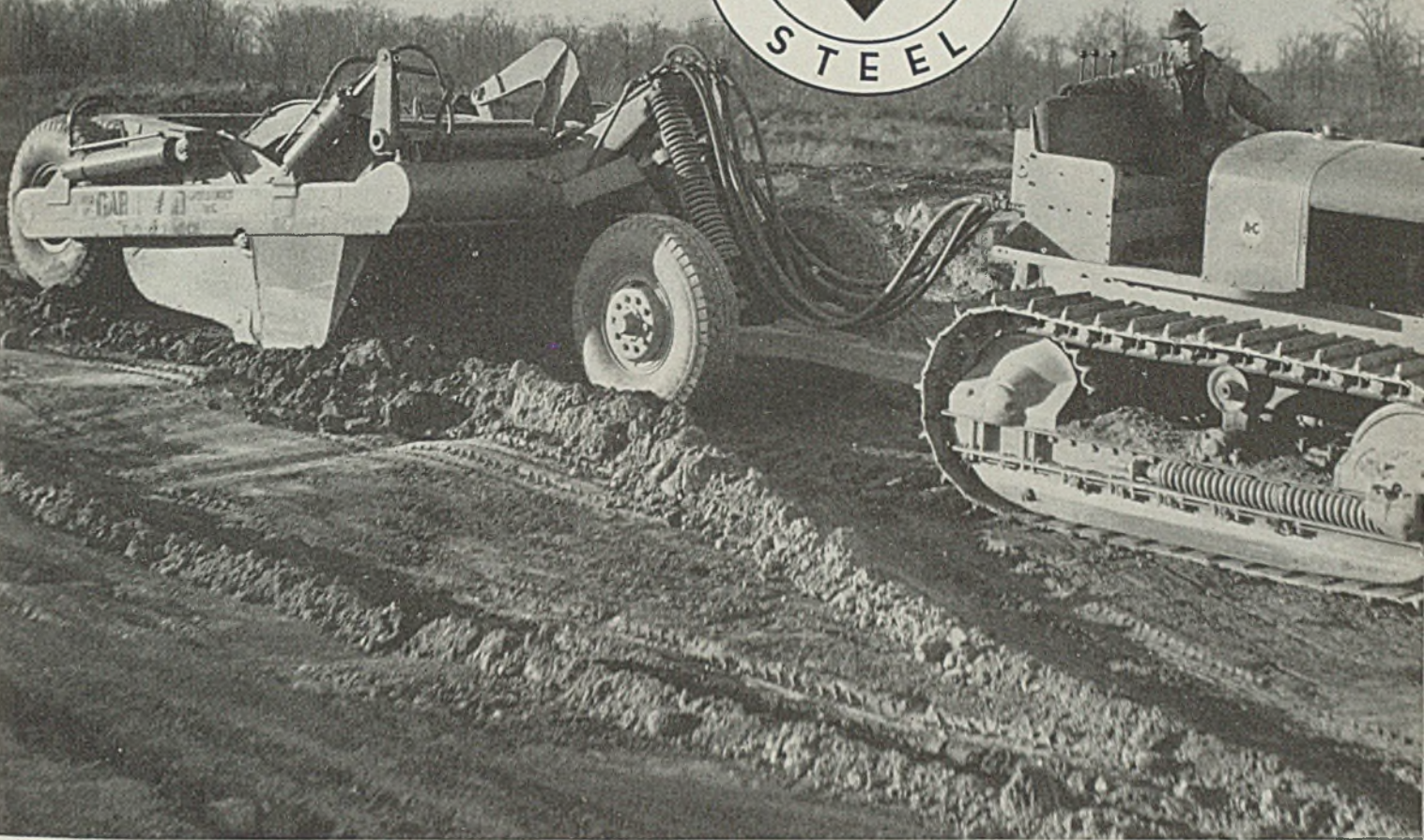
NEW car type, gas fired furnace normalizes seven tons of average sized steel castings in one load; it has a specially designed cooling door and low pressure blowers and other equipment are located at top of furnace instead of rear as is usual



the castings rest and the piers supporting the plates on the car are perforated so as to allow the heat to radiate and circulate throughout the load of castings.

The furnace is a light weight structure composed of refractory insulating brick, followed with magnesite and ordinary firebrick. The shell then is substantially tied and fully covered with a heavy band of steel. Combustion is obtained with 12 low pressure burners of the McKee type; six are staggered and fire beneath the castings while the other six are staggered and fire above the castings. This arrangement provides adequate circulation and positive treatment to each casting throughout the load. Temperature is controlled by a recording instrument furnished by Leeds & Northrup Co., Philadelphia, and automatic control valves furnished by Minneapolis-Honeywell Regulator Co., Minneapolis. Low pressure blowers and other equipment are located at top of furnace instead of rear as is usual.

Temperatures for normalizing the product range from 1440 to 1640 degrees Fahr. as governed by the carbon and alloy contents. The castings are soaked at the correct temperature on the basis of 20 minutes for each 1-inch of metal section as taken from the heavier castings loaded. Because the furnace is well insulated it is possible to heat from room temperature to the maximum 1640 degrees Fahr. in approximately five hours. On the other hand, the effectiveness of the insulating refractory brick set up a problem in the cooling of the castings to below the scaling temperature of approximately 1000 degrees. To overcome this difficulty a duplicate door has been installed. It opens and closes independently of the insulated door. The cooling door is built of steel only; it is chambered and perforated and packed with glass wool. This door allows satisfactory cooling without formation of scale on the castings.



CHANGE TO YOLOY INCREASES PAYLOAD 25%

Youngstown Alloy adds 2 cubic yards to payload of Gar Wood hydraulic scraper, decreases fatigue failures, increases corrosion resistance

More profitable capacity because of lighter weight . . . longer life because of greater strength and corrosion resistance . . . better service because of less metal fatigue — all these are assured when you build or buy equipment made of Yoloy, the special nickel copper alloy of Youngstown Sheet and Tube.

Gar Wood Industries found they could increase the payload of their 10-yard road scraper by two cubic yards of pay dirt, increase strength 10% to 20%, and minimize

corrosion and fatigue — all because of Yoloy's extraordinary strength in light weights.

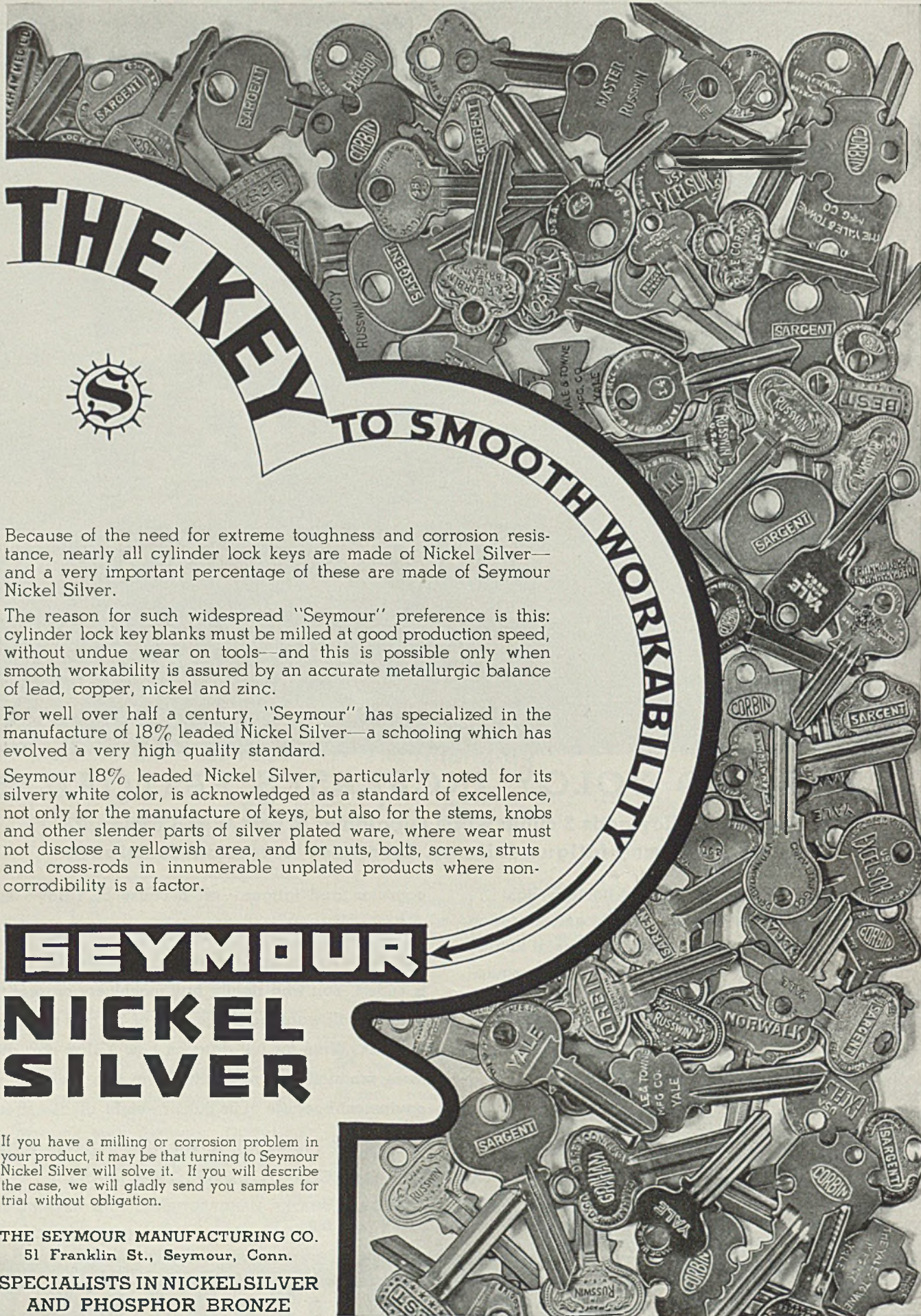
The day of ponderous tonnage for powerful machinery is ended. You who rightly buy machinery on profit, not pounds, will want the whole story of Yoloy's remarkable features. Write for full data on how Yoloy can assure more production, longer life, more net profit in your equipment because of its lighter weight, greater strength.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels • GENERAL OFFICES: YOUNGSTOWN, OHIO

HIGH-TENSILE STEEL YOLOY IS AVAILABLE IN SHEETS, STRIPS, PLATES, BARS, SHAPES, MANUFACTURERS' AND WELDING WIRE, SEAMLESS AND ELECTRIC WELD PIPE.

YOUNGSTOWN



THE KEY TO SMOOTH WORKABILITY



Because of the need for extreme toughness and corrosion resistance, nearly all cylinder lock keys are made of Nickel Silver—and a very important percentage of these are made of Seymour Nickel Silver.

The reason for such widespread "Seymour" preference is this: cylinder lock key blanks must be milled at good production speed, without undue wear on tools—and this is possible only when smooth workability is assured by an accurate metallurgic balance of lead, copper, nickel and zinc.

For well over half a century, "Seymour" has specialized in the manufacture of 18% leaded Nickel Silver—a schooling which has evolved a very high quality standard.

Seymour 18% leaded Nickel Silver, particularly noted for its silvery white color, is acknowledged as a standard of excellence, not only for the manufacture of keys, but also for the stems, knobs and other slender parts of silver plated ware, where wear must not disclose a yellowish area, and for nuts, bolts, screws, struts and cross-rods in innumerable unplated products where non-corrodibility is a factor.

SEYMOUR NICKEL SILVER

If you have a milling or corrosion problem in your product, it may be that turning to Seymour Nickel Silver will solve it. If you will describe the case, we will gladly send you samples for trial without obligation.

THE SEYMOUR MANUFACTURING CO.
51 Franklin St., Seymour, Conn.

SPECIALISTS IN NICKEL SILVER
AND PHOSPHOR BRONZE

Electrification of Machine Tools

(Concluded from Page 70)

ic braking and quick stopping of the roll.

The table, which carries the roll and headstock, is reciprocally traversed past the grinding wheel. The various grinding conditions require table traverse rates in the ratio of thirty to one. Since a gear box would be necessary, the table is driven by a constant-speed alternating-current motor with a gear box.

The remaining drives require single-speed, constant-speed motors. Alternating-current induction motors are selected because of their lower cost, smaller size, and lower servicing requirements.

The rapid-traverse cross-feed motor is used to move the grinding wheel in or out relative to the roll. This is a reversing drive and the motor is operated only when rolls are placed.

The coolant water pump is driven by a vertical self-contained motor. The oil-pump motor to supply oil for the grinding wheel spindle bearings and for the wheel truing device is a constant-speed flange-mounted motor.

Location of Controls

In order to place all control devices within the operator's command for efficient operation, they have been grouped in two general panel sections on the front of the machine. These panels house the devices used infrequently during the grinding operation and are lever operated. The left-hand panel in conjunction with the table and work-control lever provides control for the headstock or work-roll rotation.

The first selector switch, in series with the lever-operated limit switch, stops the headstock although the table is in motion. The second selector switch provides optional dynamic braking of the headstock motor. For measuring operations during grinding, dynamic braking is employed for rapid stopping of the work rotation. The power rapid cross-feed lever and the right-hand panel supply the remaining manually-operated electrical control devices.

The right-hand control panel contains a field rheostat and a selector switch for wheel-speed control, and start and stop push buttons for the wheel-drive motor, the table-drive motor, the coolant pump and the oil-pump motors. The machine is pro-

vided with a number of electrical safety and protective features.

The vital point of such a design as this is the grinding wheel spindle bearings. On the Cincinnati roll grinder the spindle runs virtually in a reservoir of oil. If the oil pump motor is stopped or if pressure falls below a safe level, the wheel drive is automatically stopped, thereby protecting the spindle and bearings.

With the use of an adjustable-speed direct-current motor for the wheel drive certain precautions are necessary to prevent unsafe peripheral speeds for new large diameter wheels. As the wheels are repeatedly dressed by the truing device, the wheel truing bar with two cams is fed in, reducing the diameter of the wheels. At predetermined points the limit switches operate to give two fixed steps of speed increase. The limit switch circuit is so arranged that failure of circuit or contacts can only produce the low safe speed.

Protection of Controls

Control equipment for Cincinnati roll grinders is preferably housed in heavy-duty vault-type and dust-tight control cabinets so placed as to be readily accessible for inspection or maintenance and be more readily protected from the water splash and spray.

Underwriters require separation of alternating-current and direct-current control equipment, and the use of separate conduits for alternating-current and direct-current

power wiring. Separation of control equipment is accomplished by the use of a metal partition in the control cabinet.

All conduit wiring is in two separate readily-accessible systems. Wires and conduits for all devices on the machine, with the exception of the main drive motor, are extended to alternating-current and direct-current enclosed terminal boxes containing marked terminal strips. The installation wiring is thus materially simplified. Wiring to moving parts is through flexible armored conduit. Where the amount of movement is large a reel and collector ring system is used.

Western Foundry To Make Improved Type Cast Iron

Acme Foundry & Machine Co., with plants at Blackwell, Okla., and Coffeyville, Kans., recently placed on the market a new and improved cast iron under the tradename "Acme Metal." This iron, which is manufactured through License agreement with the Sorbo-Mat Process Engineers, is a fine pearlitic or sorbo-pearlitic cast iron claimed to exhibit a uniform density and structure throughout all metal sections and to possess definite physical properties in line with specific engineering requirements.

The metal is made to various specifications depending upon the particular service application involved.

Metals Make Streamlined Exterior



NEW Greyhound bus terminal, Louisville, Ky., shows effective exterior use of colorful porcelain enamels and decorative metal strips with glass brick. Grilles over doors and windows and balustrade for stairs inside are of white metal. Porcelain panels were furnished by Porcelain Metals Corp., Louisville, Ky., from enameling iron by American Rolling Mill Co., Middletown, O.

Cast Iron Structure Changes During Firing Cycle of Vitreous Enamel

(Concluded from Page 73)

in this manner all six bars should be broken between 12-inch centers on a standard transverse breaking machine, noting the deflection under various loads and at breaking. The readings for each group of bars are averaged. As for example, in the accompanying table using purely hypothetical figures.

This test should establish any weakening effect of the enameling process.

A drill press should be arranged so that the feed carries a definite, constant load. A jig sharpened or brand new $\frac{1}{4}$ -inch drill is placed in the chuck. A vise is securely mounted on the bed of the drill press. The 12 pieces produced by breaking the bars are drilled one after the other, being careful to alternate heated and unheated pieces, and to see that all pieces are mounted in exactly the same manner in the vise.

A stop watch is started when the point of the drill first comes in contact with the top surface of the piece, and stopped when the first evidence of penetration through the bottom surface is discerned. A separate average of the times required for drilling the six heated and the six unheated pieces is made.

The average drilling time for the six heated pieces probably will be less than that for the unheated pieces, showing an improvement in machinability on annealing. Whatever may be the direction of the result, the relative machinability will be indicated.

Chemical Analysis Made

For chemical analysis, drillings are taken separately from each set of bars, being careful to run the drill all the way through each time a hole is made. All of the drillings from each hole are collected carefully. Unheated pieces are completely analyzed. Heated pieces are run only for graphite, combined carbon and total carbon.

For microscopic examination, one heated, and one unheated piece should be sent to a competent metallographist, with instructions to take pictures of the polished cross sections, etched in nital, to 100 diameters, and report the changes found in general structural characteristics. The photomicrographs will reveal the alteration of structure produced by enameling.

For enameling purposes, the pro-

duction of castings of high tensile strength is probably of little advantage, or none, since the structure responsible for the high strength is largely destroyed during the enameling process. For example, $\frac{1}{4}$ - $\frac{3}{8}$ -inch castings of the following analysis may be very strong, though probably easy to machine, before enameling:

1. Silicon	.....	2.25
Manganese	.....	0.75 -0.85
Phosphorus	.....	0.18 -0.24
Sulphur	.....	0.065-0.075
Nickel	.....	0.40 -0.50
Total Carbon	.....	3.24

Initially weaker castings probably will result if the analysis is altered by eliminating nickel and steel scrap, and raising phosphorus, (replacing the nickel by $\frac{1}{3}$ its amount of silicon) as follows:

2. Silicon	.....	2.40
Manganese	.....	0.75 -0.85
Phosphorus	.....	0.70 -0.75
Sulphur	.....	0.065-0.075
Total Carbon	.....	3.40 -3.50

After enameling, these two types of iron probably will show fairly similar structure and strength.

Castings Differ in Behavior

There is likely to be a considerable difference in the behavior of these irons on casting, and in the strains produced in the casting due to shrinkage stresses set up on cooling. Iron of composition 1 is somewhat hypo-eutectic and will begin to solidify at a high temperature. Due to absence of a notable amount of phosphorus, total solidification will take place at a relatively high temperature. Such characteristics make for high shrinkage and great internal stresses in uneven sections.

Iron of type 2 will have a high degree of fluidity and will begin to solidify at approximately the temperature when iron 1 is completely frozen. Iron 2 probably will be more fluid during solidification than 1. Total shrinkage of iron 2 may be much less than iron 1.

Where, in designing certain castings, it was necessary to place light and heavy sections in juxtaposition, high tensile iron or semi-steel will readily accumulate sufficient stress to result in a crack on prolonged reheating or annealing. If the casting is to be enameled, an iron of composition 2 is easy to cast, and will be almost equally strong as iron 1 after enameling.

Enamel usually adheres better to a slightly roughened surface, such

as that produced by blasting, than it does to a smooth surface such as is produced by buffing.

Although the practice is to be frowned upon, castings very often, both here and abroad, are allowed to cool on concrete floors. Better practice indicates the use of insulated cooling chambers.

Slag Control Assures More Uniform Steel

(Concluded from Page 64)


charge and of other local conditions which may prevail. An illustration of this remarkable uniformity is furnished by the analysis of the slags from four different Bethlehem plants, operating on 0.10 per cent maximum carbon rimmed steel. Although the raw materials to these plants varied widely, the average yearly iron oxide content in the slags was 21.9, 22.7, 21.9, and 21.6 per cent, respectively, a remarkably close agreement.

A further illustration of this uniformity is presented by the fact that the number of heats outside the carbon and manganese specifications, over a year, dropped more than 30 per cent at one plant when the control method was introduced. The curves in Fig. 3 show the phosphorus distribution in T-rails for 1934 and 1935. With control, in the latter year, 99 per cent of the heats analyzed 0.020 per cent phosphorus or less, against 96 per cent in 1934.

While it is undoubtedly true that the physical properties of steel could be determined from the complete chemical analysis, if such an analysis were available, there are certain properties which cannot be fully predicted on the basis of the variations in the elements included in the standard analysis. As long as this situation exists, the question of uniformity becomes the more important. A steel made under the standardized conditions of VisControl will respond more uniformly to heat treatment, drawing, forging, and machining. The manufacturer thus is able to adjust his fabricating methods to conditions which do not change materially from time to time.

Bearing Layouts Available

For the use of engineers, designers and draftsmen, New Departure division, General Motors Corp., Bristol, Conn., has announced a set of 19 sheets containing full size drawings of ball bearings for layout work. Single row, double row, radax, duplex and self-sealed bearings are included in a complete range of sizes for all series. These sheets are sent free to all who request them.



**THE SOURCE OF PROFIT
CONTROL IN 1937**

Your source of profit control is often entirely dependent upon your source of raw material, its quality, its uniformity, its dependability—*and the technical service behind it.*

You will be assured of production economy in fabrication and maximum performance in service when you use Timken Steel.

Why not discuss your requirements for alloy and carbon steel billets, bars, and seamless tubes with the nearest Timken representative?

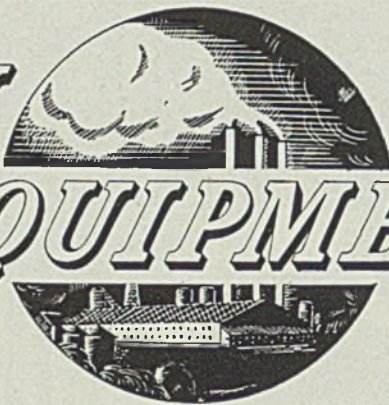


TIMKEN STEEL AND TUBE DIVISION
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

TIMKEN
ALLOY STEELS

NEW EQUIPMENT



Temperature Anticipator—

Bristol Co., Waterbury, Conn., has announced the "B-Linator", a device for use with automatic pyrometer controllers on industrial heating furnaces. Purpose of the new unit is to enable the pyrometer controller to anticipate temperature changes and correct the fuel consumption long enough in advance to prevent temperature from rising above or falling below the control point. The device can be used with practically all commonly used pyrometer controllers and can be added to present installations or incorporated in the control circuit of new equipment. Its ability to anticipate temperature change trends enables the control equipment to smooth out the usual wavy control record to a straight line. The B-Linator, through a switching device, adds or subtracts an electromotive force to or from the regular thermocouple circuit to cause the controller to act in anticipation of a temperature change. The auxiliary electromotive force is derived from thermocouples in the B-Linator case connected in series, but opposing each other. The degree of charge produced by these thermocouples is dependent on the temperature change trends. The varying electromotive force produced by the unit annexes the anti-

pating feature of the control apparatus, enabling it to maintain a close temperature in the furnace.

♦ ♦ ♦

Metal Sawing Machine —

Cochrane-Bly Co., Rochester, N. Y., has recently introduced a small circular saw arranged with a support track and stock feed for cutting small round bars in multiple. Vise has capacity for holding 8 1 1/4-inch round bars or 118 1/4-inch bars at one time, and will make a cut in 1 1/2 minutes. Machine uses a 16-inch diameter inserted tooth saw blade, and is motor driven by a 2-horsepower 1200 revolutions per minute motor through multiple V-belts with welded steel guard. A coolant pump is provided with a flexible tube and distributing nozzle over the saw blade. The unit can also be arranged for cutting single bars and is provided with three changes of feed for hard and soft stock.

♦ ♦ ♦

Scrap Truck—

All Steel Welded Truck Corp., Rockford, Ill., has added to its line of materials handling equipment a new scrap truck, made of 10 gage metal with angle frame and 1 inch pipe handle, electrically welded

throughout. Truck is 46 inches long at top, 27 1/2 inches long at bottom and is 18 1/2 inches deep. Two 9 inch diameter wheels and a 6-inch diameter wheel are of semisteel with



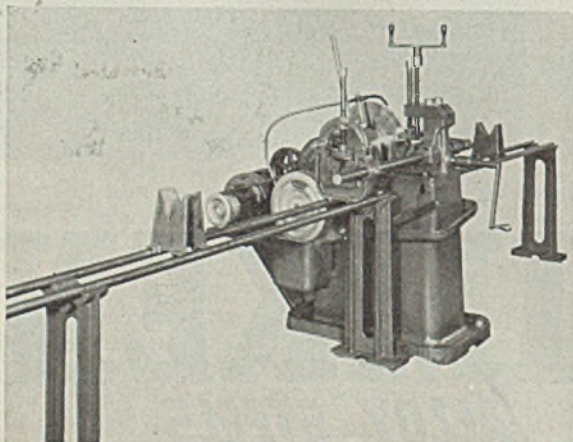
All steel, welded scrap truck may also have fitting for lift truck in place of caster wheel

Hyatt type roller bearings and Zerk fittings. As optional equipment the truck may be fitted with front leg and lock pin assembly for Clark lift jack in place of caster wheel.

♦ ♦ ♦

Sand Cutter—

American Foundry Equipment Co., Mishawaka, Ind., has announced a new sand cutter for heavy duty, portable sand conditioning on crowded foundry floors. Giving uniform results day after day, the cutter slices, beats, tosses and crosses sand from one side of the heap to the other, sand falling in a ridged windrow formation, loose, cool, and ready for molding. By driving cutter back and forth over windrow several times, sand is piled into a heap beside the bench or molding machine. Framework of the cutter is ruggedly built of heavy, bolted steel, while "knee action", obtained through use of an equalizer, permits the steering casters to raise or lower on uneven foundry floors without affecting bal-



Bars are cut in multiple on the new Cochrane-Bly circular saw which uses an inserted-tooth blade

ance of the machine. The unit is driven by four motors, no single motor being subjected to strain.

♦ ♦ ♦

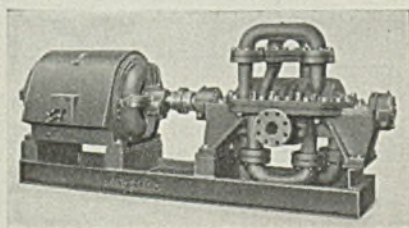
Wire Straightener and Cutter—

Lewis Machine Co., Cleveland, has announced a new flying shear automatic wire straightening and cutting machine, the No. 10-F. This machine feeds the wire from the coil, straightens, gages to accurate length and cuts on the fly, assuring a rod of uniform diameter and free from feed roll marks. Cutting knife is operated by a quick action cam on the flywheel shaft and by adapting this to a traveling cutoff head, wire is cut during the central portion of the forward travel of the head, permitting wire, after mechanically tripping the clutch, to move forward to the positive length gage traveling with the cutoff head. Approximately 45 degrees forward motion of the head drive crank is available for gaging the length before the knife strikes the wire, assuring accurate lengths without critical adjustment. Cutoff head drive is designed to permit low head construction, distance from the ways to center line of the wire being reduced to a minimum, eliminating tendency to rock at the end of the stroke or produce uneven wear on the head or bed ways.

♦ ♦ ♦

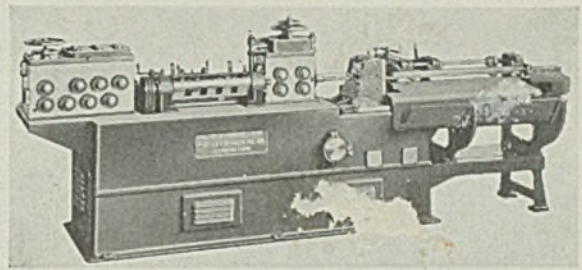
Boiler Feed Pumps—

Worthington Pump & Machinery Co., Harrison, N. J., is marketing a new line of multistage, centrifugal boiler feed pumps for pressures up to 1200 pounds per square inch. Type UX pumps have an even number of impellers facing in opposite directions which serve to equalize the axial forces and eliminate balancing drums or disks. Staggered volute construction effects radial hydraulic balance, reducing wear on initial clearances and eliminating stuffing box troubles. An internal interstage loop, a casing shaped to prevent erosion and eddy currents, and heavy duty oil lubricated ball bearings mounted in dirt proof housings are other improvements. The horizontally-split casing, with suction and dis-



Worthington Type UX, one of a new line of multi-stage, centrifugal boiler feed pumps

Lewis No. 10-F flying shear automatic wire machine feeds coiled wire, straightens, gages to accurate length and cuts



charge nozzles in the lower half, permits the pump to be taken apart readily.

♦ ♦ ♦

Control Station—

Monitor Controller Co., Baltimore, Md., has added to its line of control devices a new push-button control station of rugged, compact construction with pure silver contacts mounted on a molded bakelite base. Wiring is easily accessible, while cover can be removed without disturbing connections. Enclosing box and cover are die cast.

♦ ♦ ♦

Belt Vulcanizer—

James C. Heintz & Co., Cleveland, has combined in a single compact unit the equipment required for making splices in conveyor or transmission belting up to 28 inches in width. Vulcanizer is built to clamp across belt in the diagonal direction of the ply steps in the splice. Platen is 11 inches wide and long enough to span a 16-inch belt with the steps cut at a 45 degree angle or a 28-inch belt with the steps cut at a 22½-degree angle. Splices in belts up to 10 inches in width can be vulcanized in a single heat by clamping the belt lengthwise of the platens.

♦ ♦ ♦

Air Cleaners—

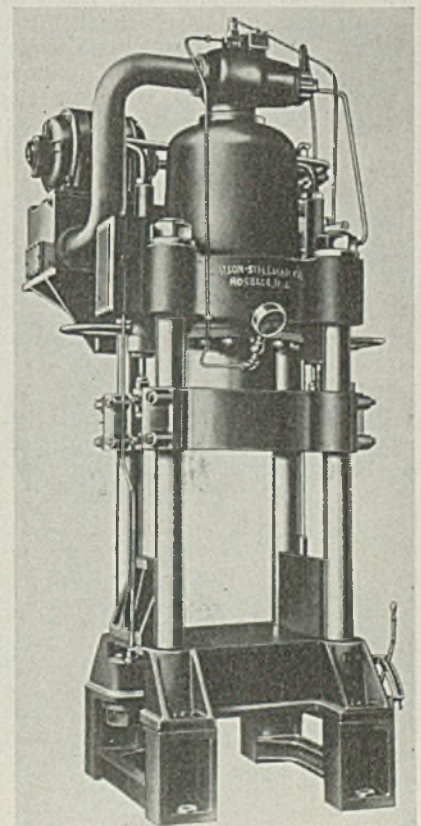
Donaldson Co., St. Paul, has developed two new oil washed air cleaners for use on tractors, automobiles, trucks, buses or power machinery. Designated as E-776 and E-775, the former will handle up to 262 cubic inches displacement and the latter up to 462 cubic inches displacement. Each is of heavy duty type, holding 4 pounds of dust, has straight line efficiency from idle to full load, will not become clogged and is easily serviced.

♦ ♦ ♦

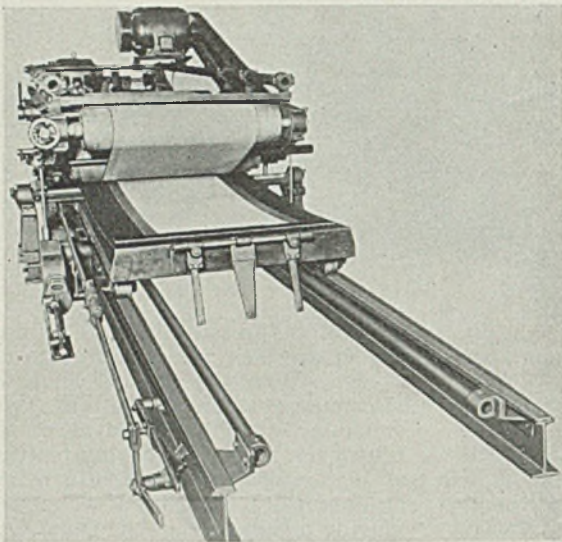
Hydraulic Press—

Watson-Stillman Co., Roselle, N. J., is manufacturing a new rapid acting hydraulic press of reversed cylinder type with self-contained power unit and designed for metal forming and straightening. Operating under

a hydraulic pressure of 2500 pounds per square inch on a 20-inch ram of 24-inch stroke, the press develops a maximum pressure of 400 tons. Two double acting cylinders advance and return the main and moving platens at high speed, high pressure being automatically introduced when the moving platen reaches the work. Operating speed, when using the maximum stroke of 24 inches, is 9 complete cycles per minute. Movement of the main ram is controlled by a single lever located at the right front corner of the press and can be restricted to any part of the maximum stroke by means of adjustable collars on the vertical control rod. Pressure is supplied from a variable displacement pump of the radial piston type driven by a 30-horsepower motor at 900 revolutions per minute. Main cylinder and platens are of high grade cast steel, main ram of close grained cast iron, tie rods



Watson-Stillman rapid acting hydraulic press of reversed cylinder type develops a pressure of 400 tons



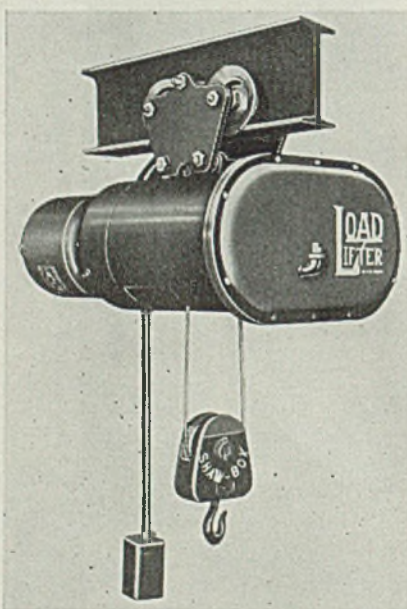
Excelsior No. 27-H is an automatic machine for grinding and polishing stainless steel sheets

of forged steel and the double acting cylinders of machinery steel.

♦ ♦ ♦

Electric Hoists—

Shaw-Box Crane & Hoist Co., Muskegon, Mich., has announced two new small electric hoists of the low head room type, one for 350-pound lifts and one for 700 pounds. These "Load Lifter Juniors" have a distance of but 12 $\frac{3}{4}$ inches from bottom of track to hook when in highest position, have a lifting speed of 20 feet per minute with rated capacity loads and give a hook lift of 18 feet. Weight of each, with trolley and ready to operate, is 185 pounds. They are equipped with an electrically operated motor brake and



Small electric hoist is of low head room type with but 12 $\frac{3}{4}$ -inches between bottom of track and hook in highest position

an automatic mechanical load brake of the roller ratchet type.

♦ ♦ ♦

Push-Button Station—

General Electric Co., Schenectady, N. Y., is manufacturing a new push-button station with a "mushroom" head, designed for use on machines where operator must make a rapid, positive shutdown while wearing heavy gloves or asbestos mittens. A slap of the open hand on the mushroom head is sufficient to stop a machine controlled by the device. Differing from standard equipment, the molded stop button is approximately $\frac{1}{2}$ -inch longer, mushroom head being screwed to a metal insert in the end of the button.

♦ ♦ ♦

Diesel Engine—

Fairbanks, Morse & Co., Chicago, has developed a new diesel, the model 42-E, for heavy duty, continuous stationary service. Available in two and three combinations with ratings of 60 and 90 horsepower at 450 revolutions per minute, it can be furnished for direct connected, belt or electric generator drive. Conservatively rated as to capacity, piston speed and bearing pressure, the new engines will operate continuously at rated capacity with no danger of overheating or strain.

♦ ♦ ♦

Stainless Steel Polisher—

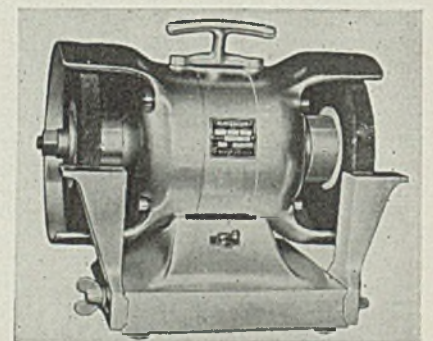
Excelsior Tool & Machine Co., East St. Louis, Ill., has announced its No. 27-H automatic stainless steel sheet grinding and polishing machine for plants that desire to polish sheets for their own product. The new machine is built to use commercial abrasive paper in any width specified for 12 and 16 foot endless belts and the assembly is sufficiently heavy to withstand

the power applied to the belt without setting up vibration. Polishing head consists of 2 steel diametrically balanced pulleys mounted in cast steel machined housings. Rubber covered roll applies pressure by gravity, any desired amount being distributed uniformly over the entire sheet. Operated by a 3-horsepower motor, the carriage is adjustable to any size sheet and makes a required number of passes back and forth beneath the grinding belt, latter being driven by a 40-horsepower motor at 1800 revolutions per minute. Two men are required to handle sheets and operate the machine while, without using cranes or hoists, grinding belts can be replaced within five minutes time. Heat of friction is reduced by applying a lubricant to the sheets, formula being furnished by the manufacturers.

♦ ♦ ♦

Bench Grinder—

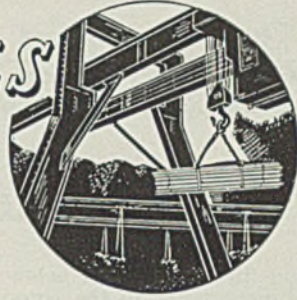
Black & Decker Mfg. Co., Towson, Md., has announced a new 6-inch junior ball bearing grinder equipped with full ball bearings which are protected against dust and dirt by special bearing sleeves. The unit is powered by a standard Black & Decker constant speed motor of $\frac{1}{4}$ -horsepower rating, except in 25 cycle which is 1/5-horsepower, and is offered in all standard alternating current single phase voltages and cycles. Wheel guards are made strong by new alloy combining lightness and high tensile strength. Ample room is provided for wire wheel brushes, while tool rests are firmly locked in base grooves but are easily adjusted to compensate for wheel wear. Grinder may be bolted to bench or moved, by means of carrying handle, to locations where



New Black & Decker 6 inch bench grinder is equipped with full ball bearings protected by special sleeves

four rubber feet act as stabilizers. Standard equipment includes two 6-inch wheels, one fine and one medium, and a 3-conductor cable.

MATERIALS HANDLING



Monorail Crane Bridges Serve New Hammer Shop

(Concluded from Page 58)

corner, or to one of a battery of drop hammers in the fourth corner of the building. When being installed in one of the drop hammer beds, a die set is lowered onto a casted table with a roller-top level with the bed of the hammer, as shown in Fig. 3. From this table the die set is rolled into position easily.

When the die set has completed its run in drop hammer forming operations, it is returned over the monorail system to the storage space. If future use is anticipated, the set is stored; if not, it is marked with yellow paint to indicate that it is no longer needed, is picked up again on the crane and lowered into one of the shop's melting pots so that the metal may be used again to build more dies.

Use All Floor Space

Only currently-used die sets are kept in the storage space, but in spite of this there are normally 700 to 800 dies arranged on the floor and ready to be picked up by the electric cranes for use at a moment's notice. Fig. 4 shows the manner in which these are stored. Although the dies themselves are destroyed eventually, all plaster of Paris casts for airplane parts used in current or recent projects are kept in storage in a separate building. Filed away in the storage racks are approximately 5000 such casts.

Drop hammer die sets weighing as much as 3½ tons are handled with dispatch by the monorail system. The system is far superior to the manually-operated hoists which were used formerly, not only from the standpoint of speed of operation, but also because of increased safety to workmen and the fact that the overhead handling equipment makes possible utilization of virtually all floor space in the building.

In addition to speeding construction of the modern four-engined landplanes, which are known as "Flying Fortresses," the new materials handling equipment is taking an important part also in producing four-engined landplane transports

for Transcontinental and Western Air and Pan American Airways. These latter planes are much larger than any transports now in service in this country, according to the company. The equipment also serves in production of giant clippers for the transoceanic service of Pan American. These clippers will be the largest airplanes in service in the world, each weighing more than 82,000 pounds gross and capable of carrying 72 passengers.

Need for Equipment To Handle Lighter Loads

AN ACCOUNT of some recently developed English materials handling equipment included a description of a small electric tiering truck of 500 pounds capacity with a lift of about 4 feet. Chief function of the unit is to carry and pile crates, boxes, cartons and similar items within its capacity.

To a large extent, handling equipment for comparatively light loads has not received the attention that its importance warrants. The American tendency has been toward de-

veloping equipment for handling extremely heavy loads or toward installing equipment rated considerably beyond the actual capacity required to provide a margin of safety.

American manufacturers are not entirely to blame for this situation. They know from experience that many industrial users install small units when they should have a larger one, and consequently overload the equipment on occasional heavy loads.

Many production executives might find upon investigation that more attention can be devoted profitably to providing easier and quicker methods of handling items of 50 to 125 pounds, or, still better, to laying out and arranging the flow of work so that such items need not be lifted.

• • •

Rely on Industrial Trucks

FOR several years, Republic Steel Corp. has been using industrial trucks to handle tin plate at its Warren, O., mills. When its new tin plate plant was installed at Niles, O., a similar handling system was utilized. According to Chief Engineer C. J. Duby, industrial trucks at this new plant are used for handling coils from the tandem mill to the cleaners. After the plate is cut to size, tin plate tractors transport it to the box annealing department. Tin plate trucks also are used in the tin house, assorting rooms and boxing, storage and shipping departments or at any point where tin plate must be handled.

"HERCULES" RED-STRAND WIRE ROPE

REG. U. S. PAT. OFF.

Furnished in Flattened Strand, Round Strand, Preformed, Steel Clad and Non-Rotating constructions.

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RECENT PUBLICATIONS OF MANUFACTURERS

Copies of any of the literature listed below may be obtained by writing directly to the companies involved, or by addressing STEEL, in care of Readers' Service Department, 1213 West Third Street, Cleveland

Vises—Columbian Vise & Mfg. Co., Cleveland. Catalog No. 37, illustrating and describing line of Columbian vises.

Foundry Refractories—Ironton Fire Brick Co., Ironton, O. Three circulars describing cupola blocks, bottom tile and pouring brick.

Milling Cutters—National Twist Drill & Tool Co., Detroit. Folder listing and describing Adjusto-lock inserted blade milling cutters.

Metal Hose—Chicago Metal Hose Corp., Maywood, Ill. Catalog of Rex-weld and Rex-tube flexible metal hose, an illustrated manual on flexible metal hose application.

Elevator bucket—Link-Belt Co., 307 North Michigan avenue, Chicago. Illustrated folder No. 1435, describing new "Super Salem" steel elevator bucket.

Air Heater—James Campbell Smith Inc., Cleveland. Circular describing new Smith automatic coal-fired air heater for air heating and air conditioning.

Plastic Refractory—Quigley Co. Inc., New York. Bulletin No. 327, describing "Insulag," new development in plastic refractory lagging for temperatures up to 2200 Fahr.

Welding—S. Morgan Smith Co., York, Pa. Bulletin No. 134, illustrating the company's new welding facilities now available to customers.

Rustproofing—Oxoseal Co. Ltd., Seattle. Catalog describing Oxoseal process for rustproofing by electro-deposition of alloy metal penetrating surface porosity.

Cutting Tools—Haynes Stellite Co., Kokomo, Ind. Catalog describing its J-metal cutting tools; includes numerous photographic illustrations of actual operations.

Tube Heating Elements—Surface Combustion Corp., Toledo, O. Bulletin, form No. 80, describing its horizontal gas-fired radiant tube heating elements.

Airefiner—Oakite Products Inc., 22 Thames street, New York. Bulletin No. 4164, describing its airefiner for bacteria control in air conditioning.

Gas and Diesel Engine—Weber

Engine Co., Kansas City, Mo. Bulletin describing its two-cycle vertical and horizontal convertible oil and gas engines.

Foundry Equipment—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin No. 1480, covering foundry screens, shakeouts and other miscellaneous foundry equipment of its manufacture.

Sheet Metal Guide—United States Steel Corp. subsidiaries. Booklet, "A Guide for Sheet Metal Workers," presents sales material and tables, as well as fabricating hints on United States Steel sheet products.

Spray Nozzles—Yarnall-Waring Co., Philadelphia. Bulletin N-615, covering involute spray nozzles for air conditioning systems and general industrial purposes and containing data on the smaller sizes of nozzles.

Strainer—Rife Hydraulic Mfg. Co., 75 West street, New York. Folder describing its square strainers with extended inner tubes; includes specifications and prices.

Electrical Equipment—Appleton Electric Co., 1701-29 Wellington avenue, Chicago. Bulletin No. 1004, 98 pages covering Appleton explosion-proof and dust-tight Unilets for use in hazardous locations.

Transmission Belt—Alexander Brothers Inc., Philadelphia. Catalog No. A-117, describing the Tentacular transmission belt and including numerous tables and data covering belt drives.

Expansion Joint—Foster Wheeler Corp., New York. Bulletin X-37-4, first literature describing new S-type, stainless steel, bellows expansion joint announced last December.

Wet Dust Collectors—C. O. Bartlett & Snow Co., Cleveland. Bulletin No. 79, illustrating and describing oil froth wet dust collectors and installations, with technical data supplement.

Water Power Machinery—S. Morgan Smith Co., York, Pa. Bulletin No. 132, illustrating and describing various types of water power installations, appliances, and containing table showing measurement of water power. Bulletin No. 133, interesting illustrations and dimen-

sions of huge Smith units soon to be installed in the government's Bonneville dam project.

Storage of liquid finishes—Hilo Varnish Corp., Brooklyn, N. Y. Third edition of methods bulletin M-A, constructive information on storing, mixing and reducing of varnish, enamel, japan, lacquer and synthetic.

Refractory Maintenance—Chicago Fire Brick Co., 1467 Elston avenue, Chicago. Bulletin introducing a new method of refractory maintenance, claiming to save time, labor and material and cut heat losses, through use of its super thermo stucco.

Water Systems—Roots-Connersville Blower Corp., Connersville, Ind. Bulletin No. 260-b13b, descriptive of three types of shallow well water systems, unique features of which are internal seals, air volume control, no metal-to-metal contacts and while a balanced impeller is the only moving part.

Air Compressors—Worthington Pump & Machinery Corp., Harrison, N. J. Illustrated eight page bulletin L-621-B5, presenting the Worthington line of vertical single cylinder, single stage, air cooled and water cooled compressors.

Bar Machines—Cone Automatic Machine Co. Inc., Windsor, Vt. Bulletin describing its automatic four-spindle bar machine with bronze tapered adjustable bearings; bulletin describing eight-spindle high-production automatic screw machines.

Friction Clutches—Carlyle Johnson Machine Co., Manchester, Conn. Leaflet describing its friction clutches, listing improvements of the past several years, embracing change of material in several parts to molybdenum and chrome nickel steels.

Pipe Machines—Beaver Pipe Tools Inc., Warren, O. Model-A bulletin, illustrating and describing threading equipment and improved pipe machine, featuring customer's choice of wheel-and-roller cutoff or automatic-knife cutoff.

Instrument Selector—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The "Instrulector," slide rule indicator for use in selecting the proper instruments for any application, shows at a glance what instruments to use, their range, approximate price, size and descriptive literature available.

Construction Activities—Pittsburgh-Des Moines Steel Co., 3456 Neville Island, Pittsburgh. Bulletin No. 602, picturing a few of the company's varied construction activities; describing such construction projects as pipe lines, station piping, equipment installations, water treating plants, irrigation systems and refuse incinerators.

Steel Market Feels Little Effect From Strike

Heavy Demand Near;

Pig Iron Output Up;

Exports at New High

RELATIVELY little effect has been felt in the steel market as a result of strikes against producers in the Middle West. Consumers apparently are well supplied and few have sought further tonnage from mills not affected by labor difficulties.

In fact, except in a few instances, other producers could give little aid, most of them having bookings to occupy their full production for many weeks, in some cases as far as 20 weeks on some products.

Some eastern steelmakers are booking sheet tonnages for fourth quarter delivery at prices prevailing at that time. Others are refusing offers of fourth quarter business, preferring to keep their position liquid. Expectation is growing that fourth quarter will be an unusually active period in steel.

The national steelworks average operating rate last week held at 75 per cent of capacity. Pittsburgh increased one point to 95 per cent, Detroit five points to 100 and Cincinnati six points to 96 per cent. Wheeling at 96 and Birmingham at 83 showed no change. Chicago dropped 12 points to 63 per cent, New England 10 points to 45, Cleveland 19 points to 46, Eastern Pennsylvania 1½ to 71, Youngstown one point to 29, Buffalo three points to 88 and St. Louis three points to 91.

In spite of 20 blast furnaces being banked because of strike conditions in steel plants, pig iron production in May totaled 3,544,162 gross tons, compared with 3,400,636 tons in April, a gain of 4.2 per cent. The average daily rate of production in May was 114,328 tons, compared with 113,354 tons in April, a gain of 0.8 per cent. Both these figures were the largest since October, 1929. Five months' production this year is 51.5 per cent higher than the comparable period of 1936. Active blast furnaces at the end of May were 17 less than at the end of April, but banking came about near the end of the month, at the beginning of the strikes, and thus had little effect.

Railroad and shipbuilding activities are bringing some important steel tonnages close to placement, especially in the East. Two tankers at 5000 tons each are up for bids this week and two battleships requiring 11,000 tons of steel each will be placed shortly, one with a private yard. The Reading Co. has placed some underframe business that will require about 2000

MARKET IN TABLOID

DEMAND Steady; some buying for fourth quarter.

PRICES Strong; third quarter pig iron schedules unchanged.

PRODUCTION . . Operations hold at 75 per cent.

SHIPMENTS At high rate; backlogs continue heavy.

tons and will buy considerable steel for cars to be built in its own shops. Norfolk & Western is about to buy for a program of heavy repairs.

Sale of about 40,000 tons of steel ingots by a Pittsburgh district producer, for export to Japan, at a premium price, indicates strength of world demand for steel. A report to the department of commerce from Tokyo states that Japan so far this year has placed orders in the United States for 420,000 tons of pig iron, 140,000 tons of semifinished steel and 120,000 tons of finished steel. Pig iron sales to Japan this year have been larger than total export sales of pig iron for six years.

April exports of steel, excluding scrap, totaled 243,800 gross tons, the highest since 1921 and believed to be an alltime record for any month since the World War. Scrap exports at 427,886 tons made a new high mark and for four months totaled 1,014,255 tons.

Automobile builders showed the effect of Memorial Day interruption by producing only 110,619 cars last week, a drop of nearly 21,000 from the preceding week. General Motors made 43,412 units, about 10,000 less than the week before, Ford 29,240, about steady and Chrysler 23,000, about 5000 less.

In consonance with expectations pig iron producers have opened books for third quarter delivery at unchanged prices, carrying second quarter schedules forward another three months.

Decline of scrap prices has almost stopped, due to lack of transactions, prices being largely nominal. The steelworks scrap composite declined 10 cents to \$17.50, the smallest downward movement for many weeks. The iron and steel composite is three cents lower, at \$39.86, and the finished steel composite is unchanged, at \$61.70.

COMPOSITE MARKET AVERAGES

	June 5	May 29	May 22	One Month Ago May, 1937	Three Months Ago Mar., 1937	One Year Ago June, 1936	Five Years Ago June, 1932
Iron and Steel	\$39.86	\$39.89	\$39.97	\$40.06	\$39.92	\$32.79	\$29.09
Finished Steel	61.70	61.70	61.70	61.70	60.70	52.20	47.64
Steelworks Scrap . . .	17.50	17.60	17.87	18.49	20.95	12.55	6.62

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	June 5,	May	March	June	Pig Iron	June 5,	May	March	June
	1937	1937	1937	1936		1937	1937	1936	1936
Steel bars, Pittsburgh	2.45c	2.45c	2.40c	1.85c	Bessemer, del. Pittsburgh	\$25.26	\$25.26	\$24.85	\$20.81
Steel bars, Chicago	2.50	2.50	2.45	1.90	Basic, Valley	23.50	23.50	23.10	19.00
Steel bars, Philadelphia	2.74	2.74	2.74	2.16	Basic, eastern del. East Pa.	25.26	25.26	24.76	20.81
Iron bars, Terre Haute, Ind.	2.35	2.35	2.25	1.75	No. 2 fdy., del. Pittsburgh	25.21	25.21	24.80	20.31
Shapes, Pittsburgh	2.25	2.25	2.20	1.80	No. 2 fdy., Chicago	24.00	24.00	23.20	19.50
Shapes, Philadelphia	2.45 ½	2.45 ½	2.45 ½	2.01 ½	Southern No. 2, Birmingham	20.38	20.38	19.88	15.50
Shapes, Chicago	2.30	2.30	2.25	1.85	Southern No. 2, del. Cincinnati	23.69	23.69	23.19	20.2007
Tank plates, Pittsburgh	2.25	2.25	2.20	1.80	No. 2X eastern, del. Phila.	26.135	26.135	25.635	21.68
Tank plates, Philadelphia	2.43 ½	2.43 ½	2.43 ½	1.99	Malleable, Valley	24.00	24.00	23.60	19.50
Tank plates, Chicago	2.30	2.30	2.25	1.85	Malleable, Chicago	24.00	24.00	23.20	19.50
Sheets, No. 10, hot rolled, Pitts.	2.40	2.40	2.35	1.85	Lake Sup., charcoal, del. Chicago	30.04	30.04	28.95	25.2528
Sheets, No. 24, hot ann., Pitts.	3.15	3.15	3.10	2.40	Gray forge, del. Pittsburgh	24.17	24.17	23.75	19.67
Sheets, No. 24, galv., Pitts.	3.80	3.80	3.70	3.10	Ferromanganese, del. Pittsburgh	107.29	107.29	90.80	80.13
Sheets, No. 10, hot rolled, Gary.	2.50	2.50	2.45	1.95					
Sheets, No. 24, hot anneal., Gary.	3.25	3.25	3.20	2.50	Scrap				
Sheets, No. 24, galvan., Gary.	3.90	3.90	3.85	3.20	Heavy melting steel, Pittsburgh	\$18.75	\$19.55	\$22.40	\$13.80
Plain wire, Pittsburgh	2.90	2.90	2.85	2.40	Heavy melt. steel, No. 2, East Pa.	15.25	18.85	18.75	10.81
Tin plate, per base box, Pitts.	\$5.35	5.35	4.85	5.25	Heavy melting steel, Chicago.	16.75	17.55	20.90	12.75
Wire nails, Pittsburgh	2.75	2.75	2.70	2.10	Rail for rolling, Chicago	20.25	21.45	22.25	14.00
					Railroad steel specialties, Chicago	20.25	21.35	22.35	14.40
Semifinished Material					Coke				
Sheet bars, open-hearth, Youngs.	\$37.00	\$37.00	\$36.40	\$28.00	Connellsville, furnace, ovens.	\$4.65	\$4.85	\$4.05	\$3.50
Sheet bars, open-hearth, Pitts.	37.00	37.00	36.40	28.00	Connellsville, foundry, ovens	5.30	5.30	4.25	4.25
Billets, open-hearth, Pittsburgh	37.00	37.00	36.40	28.00	Chicago, by-product foundry, del.	11.00	11.00	10.25	9.75
Wire rods, No. 5 to 3/8-inch, Pitts.	47.00	47.00	46.20	38.80					

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel	Tin Mill Black No. 28	Corrosion and Heat-Resistant Alloys	Structural Shapes
Prices Subject to Quantity Extras and Deductions (Except Galvanized)	Pittsburgh 3.30c	Pittsburgh base, cents per lb.	Pittsburgh 2.25c
Hot Rolled No. 10, 24-48 in.	Gary 3.40c	Chrome-Nickel	Philadelphia, del. 2.45 ½ c
Pittsburgh 2.40c	St. Louis, delivered 3.53c	No. 302 No. 304	New York, del. 2.50 ¼ c
Gary 2.50c	Granite City, Ill. 3.50c	24.00 25.00	Boston, delivered 2.63 ½ c
Chicago, delivered 2.53c	Cold Rolled No. 10	Plates 27.90 29.00	Bethlehem 2.35c
Detroit, del. 2.60c	Pittsburgh 3.10c	Sheets 34.00 36.00	Chicago Chicago 2.30c
New York, del. 2.73c	Gary 3.20c	Hot strip 21.50 23.50	Cleveland, del. 2.45c
Philadelphia, del. 2.69c	Detroit, delivered 3.30c	Cold strip 28.00 30.00	Buffalo 2.35c
Birmingham 2.55c	Philadelphia, del. 3.39c		Gulf Ports 2.65c
St. Louis, del. 2.63c	New York, del. 3.43c	Straight Chromes	Birmingham 2.40c
Granite City, Ill. 2.60c	St. Louis, del. 3.33c	No. No. No.	Pacific ports, f.o.b. cars, dock 2.80c
Pacific ports, f.o.b. dock 2.95c	Granite City, Ill. 3.30c	410 430 442 446	St. Louis, del. 2.52c
Hot Rolled Annealed No. 24	Pacific ports, f.o.b. dock 3.70c	Bars 18.50 19.00 22.50 27.50	Bars
Pittsburgh 3.15c	Cold Rolled No. 20	Plates 21.50 22.00 25.50 30.50	Soft Steel
Gary 3.25c	Pittsburgh 3.55c	Sheets 26.50 29.00 32.50 36.50	(Base, 3 to 25 tons)
Chicago, delivered 3.28c	Gary 3.65c	Hot strip 17.00 17.50 23.00 28.00	Pittsburgh 2.45c
Detroit, delivered 3.35c	Detroit, delivered 3.75c	Cold stp. 22.00 22.50 28.50 36.50	Chicago or Gary 2.50c
New York, del. 3.48c	Philadelphia, del. 3.84c		Duluth 2.60c
Philadelphia, del. 3.44c	New York, del. 3.88c	Steel Plate	Birmingham 2.60c
Birmingham 3.30c	St. Louis 3.78c	Pittsburgh 2.25c	Cleveland 2.50c
St. Louis, del. 3.38c	Granite City, Ill. 3.75c	New York, del. 2.53c	Buffalo 2.55c
Granite City, Ill. 3.35c	Enameling Sheets	Philadelphia, del. 2.43 ½ c	Detroit, delivered 2.60c
Pacific ports, f.o.b. dock 3.80c	Pittsburgh, No. 10 2.90c	Boston, delivered 2.65c	Pacific ports, f.o.b. cars, dock 3.00c
Galvanized No. 24	Pittsburgh, No. 20 3.50c	Buffalo, delivered 2.50c	Philadelphia, del. 2.74c
Pittsburgh 3.80c	Gary, No. 10 3.00c	Chicago or Gary 2.30c	Boston, delivered 2.85c
Gary 3.90c	St. Louis, No. 10 3.13c	Cleveland, del. 2.44 ½ c	New York, del. 2.78c
Chicago, delivered 3.93c	St. Louis, No. 20 3.73c	Birmingham 2.40c	Pitts., forg. qual. 2.80c
Philadelphia, del. 4.09c	Tin and Terne Plate	Coatesville, base 2.35c	Rail Steel
New York, delivered 4.13c	Gary base, 10 cents higher.	Sparrows Pt., base 2.35c	To Manufacturing Trade
Birmingham 3.95c	Tin plate, coke, (base box), Pittsburgh \$5.35	Pacific ports, f.o.b. cars, dock 2.80c	Pittsburgh 2.30c
St. Louis, del. 4.03c	Waste-waste, 2.75c; strip 2.50c	St. Louis, delivered 2.52c	Chicago or Gary 2.35c
Granite City, Ill. 4.00c	Long ternes, No. 24, unassorted, Pitts. 4.10c		Moline, Ill. 2.35c
Pacific ports, f.o.b. dock 4.40c			Cleveland 2.35c
			Buffalo 2.40c

Iron

Terre Haute, Ind.	2.35c
Chicago	2.40c
Philadelphia	2.64c
Pittsburgh, refined....	3.50-8.00c

Reinforcing

New billet, straight lengths, quoted by distributors		
Pittsburgh	2.55c	
Chicago, Gary, Buffalo, Cleve., Birm., Young...	2.60c	
Gulf ports	2.65c	
Pacific coast ports, f.o.b. car docks		2.95c
Philadelphia, del.	2.84c	
Rail steel, straight lengths, quoted by distributors		
Pittsburgh	2.40c	
Chicago, Buffalo, Cleveland, Birm., Young....	2.45c	
Gulf ports	2.88c	

Wire Products

Prices apply to straight or mixed carloads; less carloads \$5 higher; less carloads fencing \$5 over base column.

Base Pitts.-Cleve. 100 lb. keg.	
Standard wire nails	\$2.75
Cement coated nails	\$2.75
(Per pound)	
Polished staples	3.45c
Galv. fence staples	3.70c
Barbed wire, galv.	3.40c
Annealed fence wire	3.20c
Galv. fence wire	3.60c
Woven wire fencing (base column, c. 1.)... \$74.00	
Single loop bale ties, (base column, c. 1.)... \$63.00	

To Manufacturing Trade

Plain wire, 6-9 ga.	2.90c
Anderson, Ind. (merchant products only) and Chicago up \$1; Duluth and Worcester up \$2; Birmingham up \$3.	
Spring wire, Pitts. or Cleveland	3.50c
Do., Chicago up \$1, Worc. \$2.	

Cold-Finished Carbon Bars and Shafting

Pittsburgh	2.90c
Chicago	2.95c
Gary, Ind.	2.95c
Detroit	2.95c
Cleveland	2.95c
Buffalo	3.00c

Subject to quantity deductions and extras. List dated Aug. 26, 1935; revised Oct. 1, 1936.

Alloy Steel Bars (Hot)

(Base, 3 to 25 tons)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	3.00c	
Alloy		
S.A.E. Diff. S.A.E. Diff.		
2000	0.35 3100	0.70
2100	0.75 3200	1.35
2300	1.55 3300	3.80
2500	2.25 3400	3.20
4100 0.15 to 0.25 Mo.		0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.		1.10
5100 0.80-1.10 Cr.		0.45
5100 Cr. spring		0.15
6100 bars		1.20
6100 spring		0.85
Cr. N., Van		1.50
Carbon Van.		0.85
9200 spring flats		0.15
9200 spring rounds, squares		0.40

Piling

Pittsburgh	2.60c
Chicago, Buffalo	2.70c

Strip and Hoops

(Base, hot rolled, 25-1ton)	
(Base, cold-rolled, 25-3 tons)	
Hot strip to 23½-in.	
Pittsburgh	2.40c
Chicago or Gary	2.50c
Birmingham base	2.55c
Detroit, del.	2.60c
Philadelphia, del.	2.69c
New York, del.	2.73c
Cooperage hoop,	
Pittsburgh	2.50c
Chicago	2.60c
Cold strip, 0.25 carbon and under, Pittsburgh,	
Cleveland	3.20c
Detroit, del.	3.40c
Worcester, Mass.	3.40c
Cleve. Worces- ter, Mass.	
Carbon 0.26-0.50... 3.20c	3.40c
0.51-0.75... 4.45c	4.65c
0.76-1.00... 6.30c	6.50c
Over 1.00... 8.50c	8.70c

Rails, Track Material

(Gross Tons)		
Standard rails, mill	\$42.50	
Relay rails, Pittsburgh, 20-100 lbs.	32.50-35.50	
Light rails, billet qual.,		
Pittsburgh, Chicago....	\$43.00	
Do., rerolling quality..	42.00	
Angle bars, billet, Gary,		
Pittsburgh, So. Chicago	2.80c	
Do., axle steel	3.35c	
Spikes, R. R. base	3.15c	
Track bolts, base	4.35c	
Tie plates, base		\$46.00
Base, light rails 25 to 60 lbs.; 20 lbs. up \$2; 16 lbs. up \$4; 12 lbs. up \$8; 8 lbs. up \$10. Base railroad spikes 200 kegs or more; base tie plates 20 tons.		

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade as per Dec. 1, 1932, lists:	
Carriage and Machine	
½ x 6 and smaller	65-5 off
Do, larger	60-10 off
Tire bolts	50 off
Plow Bolts	
All sizes	65-5 off
Stove Bolts	

In packages with nuts attached 72½ off; in packages with nuts separate 72½-5 off; in bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

Step bolts	60 off
Elevator bolts	50-10-5 off

Nuts

S. A. E. semifinished hex.:	
½ to ⅝-inch	60-10 off
Do., ½ to 1-inch	60-5 off
Do., over 1-inch	60 off

Hexagon Cap Screws

Milled	50-10 off
Upset, 1-in., smaller	60 off
Square Head Set Screws	
Upset, 1-in., smaller	75 off
Headless set screws	75 off

Rivets, Wrought Washers

Structural, Pittsburgh,	
Cleveland	3.60c
Structural, Chicago	3.70c
⅝-inch and smaller,	
Pitts., Chi., Cleve.	65-5 off
Wrought washers, Pitts.,	
Chi., Phila. to jobbers and large nut, bolt mfrs.	\$5.75 off

Cut Nails

Cut nails, C. L., Pitts. (10% disc. on all extras)	\$3.60
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Do., less carloads, 5 kegs or more, no discount on any extras... \$3.90
Do., under 5 kegs no disc. on any extras... \$4.05

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ less. Wrought pipe, Pittsburgh.

Butt Weld Steel		
In.	Blk.	Galv.
½	59½	49
¾	62½	53
1-3	64½	55½
Iron		
¾	26	8
1-1¼	30	14
1½	34	16½
2	33½	16

Lap Weld Steel		
2	57	47½
2½-3	60	50½
3½-6	62	52½
7 and 8	61	50½
9 and 10	60½	50
Iron		
2	26½	10
2½-3½	27½	12½
4	29½	16
4½-8	28½	15
9-12	24½	10

Line Pipe Steel		
1 to 3, butt weld	63½	
2, lap weld	56	
2½ to 3, lap weld	59	
3½ to 6, lap weld	61	
7 and 8, lap weld	60	
10-inch, lap weld	59½	
12-inch, lap weld	58½	

Butt Weld Iron		
¾	25	7
1 and 1¼	29	13
1½	33	15½
2	32½	15
Lap Weld		
1½	23½	7
2	25½	9
2½ to 3½	26½	11½
4	28½	15
4½ to 8	27½	14
9 to 12	23½	9

Boiler Tubes		
Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet, f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.		
Lap Weld		
Sizes	Steel	Charcoal Iron
1½" OD x 13 Ga.	\$10.45	\$23.71
1¾" OD x 13 Ga.	11.89	22.93
2" OD x 13 Ga.	13.31	19.35
2" OD x 11 Ga.	15.49	23.36
2¼" OD x 13 Ga.	14.82	21.68
2½" OD x 11 Ga.	17.38	26.02
2¾" OD x 12 Ga.	17.82	26.57
3" OD x 12 Ga.	18.86	29.00
3" OD x 12 Ga.	19.73	31.36
3½" OD x 11 Ga.	24.89	39.81
4" OD x 10 Ga.	30.81	49.90
5" OD x 9 Ga.	47.57	73.93
6" OD x 7 Ga.	73.25	

Seamless		
Hot Rolled		
1" OD x 13 Ga.	\$ 8.41	\$ 9.46
1¼" OD x 13 Ga.	9.96	11.21
1½" OD x 13 Ga.	11.00	12.38
1¾" OD x 13 Ga.	12.51	14.09
2" OD x 13 Ga.	14.02	15.78
2¼" OD x 13 Ga.	15.63	17.60

2¼" OD x 12 Ga.	17.21	19.37
2½" OD x 12 Ga.	18.85	21.22
2¾" OD x 12 Ga.	19.98	22.49
3" OD x 12 Ga.	20.97	23.60
3½" OD x 10 Ga.	40.15	45.19
3½" OD x 11 Ga.	26.47	29.79
4" OD x 10 Ga.	32.85	36.96
5" OD x 9 Ga.	50.38	56.71
6" OD x 7 Ga.	77.35	87.07

Cast Iron Water Pipe

Class B Pipe—Per Net Ton	
6-in. & over, Birm.	\$46.00-47.00
4-in., Birmingham ..	49.00-50.00
4-in., Chicago	57.00-58.00
6 to 24-in., Chicago.	54.00-55.00
6-in. & over, east fdy.	50.00
Do., 4-in.	53.00
Class A Pipe \$3 over Class B	
Std. fittings, Birm., base	\$100.00

Semifinished Steel

Billets and Blooms	
4 x 4-inch base; gross ton	
Pitts., Chi., Cleve., Buffalo and Young.	\$37.00
Philadelphia	42.30
Duluth	39.00

Forging Billets	
6 x 6 to 9 x 9-in. base	
Pitts., Chicago, Buffalo ..	43.00
Forging, Duluth	45.00

Sheet Bars	
Pitts., Cleve., Young., Sparrows Point	37.00

Slabs	
Pitts., Chicago, Cleveland, Youngstown	37.00

Wire Rods		
Pitts., Cleve., No. 5 to ¾-inch incl.		47.00
Do., over ¾ to 1¼-inch incl.		52.00
Chicago up \$1; Worcester up \$2.		

Skelp	
Pitts., Chi., Young, Buff., Coatesville, Sparrows Pt.	2.10c

Coke

Price Per Net Ton	
Beehive Ovens	
Connellsville, fur.	\$4.50- 4.75
Connellsville, fdry.	5.25- 5.50
Connell. prem. fdry.	6.00- 6.50
New River fdry.	6.50- 6.75
Wise county fdry.	5.75- 6.00
Wise county fur.	4.75- 5.00

By-Product Foundry	
Newark, N. J., del.	10.85-11.30
Chi., ov., outside del.	10.25
Chicago, del.	11.00
Milwaukee, ovens.	11.00
New England, del.	12.50
St. Louis, del.	11.00-11.50
Birmingham, ovens.	7.25
Indianapolis, del.	10.50
Cincinnati, del.	10.50
Cleveland, del.	11.00
Buffalo, del.	10.50
Detroit, del.	11.10
Philadelphia, del.	10.60

Coke By-Products

Spot, gal. Producers' Plants	
Pure and 90% benzol.	16.00c
Toluol	30.00c
Solvent naphtha	30.00c
Industrial xylol	30.00c
Per lb. f.o.b. Frankford and St. Louis	
Phenol (200 lb. drums) ..	14.75c
do. (450 lbs.)	14.00c
Eastern Plants, per lb.	
Naphthalene flakes and balls, in bbls. to jobbers	7.25c
Per ton, bulk, f.o.b. oven or port	
Sulphate of ammonia ..	\$28.50

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:

	No. 2 Malle-Fdry.	able	Basic	Besse-mer
Bethlehem, Pa.	\$25.00	\$25.50	\$23.50	\$26.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Birmingham, Ala.	20.38	19.38	24.50	24.50
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	25.00	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.75	26.25	25.25	26.75
Hamilton, O.	24.00	24.00	23.50	24.50
Jackson, O.	24.00	24.00	23.50	24.50
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	22.00	21.50	22.50
Sharpsville, Pa.	24.00	24.00	23.50	24.50
Sparrows Point, Md.	25.00	25.00	24.50	25.50
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00	24.00	23.50	24.50

†Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:

	25.26	25.26	24.76	25.76
Akron, O., from Cleveland	25.26	25.26	24.76	25.76
Baltimore from Birmingham	25.58	25.58	24.46	25.46
Boston from Birmingham	26.37	26.37	25.87	26.87
Boston from Everett, Mass.	26.25	26.75	25.75	27.25
Boston from Buffalo	26.25	26.75	25.75	27.25
Brooklyn, N. Y., from Bethlehem	27.27	27.77	26.77	27.77
Brooklyn, N. Y., from Brmghm.	27.05	27.05	26.55	27.55
Canton, O., from Cleveland	25.26	25.26	24.76	25.76
Chicago from Birmingham	24.22	24.22	23.72	24.72
Cincinnati from Hamilton, O.	24.07	25.01	24.51	25.51
Cincinnati from Birmingham	23.69	23.69	23.19	24.19
Cleveland from Birmingham	24.12	24.12	23.62	24.62
Mansfield, O., from Toledo, O.	25.76	25.76	25.26	26.26
Milwaukee from Chicago	25.00	25.00	24.50	25.50
Muskegon, Mich., from Chicago, Toledo or Detroit	26.90	26.90	26.40	27.40
Newark, N. J., from Birmingham	26.01	26.01	25.51	26.51
Newark, N. J., from Bethlehem	26.39	26.89	25.89	26.89
Philadelphia from Birmingham	25.38	25.38	24.88	25.88
Philadelphia from Swedeland, Pa.	25.76	26.26	25.26	26.26
Pittsburgh district from Neville Island	Neville, base plus 63c, 76c, and \$1.13 switch'g charges			
Saginaw, Mich., from Detroit	26.25	26.25	25.75	26.75
St. Louis, northern	24.50	24.50	24.00	25.00

	No. 2 Malle-Fdry.	able	Basic	Besse-mer
St. Louis from Birmingham	\$24.12	23.82	23.82	26.44
St. Paul from Duluth	25.94	25.94	25.94	26.44

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., \$28.50, Phila. base, standard and copper bearing, \$29.63.

Gray Forge

	Valley furnace	Charcoal
Valley furnace	\$23.50	Lake Superior fur. \$27.00
Pitts. dist. fur.	23.50	do., del. Chicago 30.04
		Lyles, Tenn. 26.50

Silvery†

Jackson county, O., base: 6-6.50 per cent \$28.50; 6.51-7—\$29.00; 7-7.50—\$29.50; 7.51-8—\$30.00; 8-8.50—\$30.50; 8.51-9—\$31.00; 9-9.50—\$31.50; Buffalo \$1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus \$1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, \$1 per ton add. Each unit over 3%, add \$1 per ton.

Refractories

Per 1000 f.o.b. Works

	Price		Price
Fire Clay Brick		Chester, Pa., and Baltimore bases (bags)	\$45.00
Super Quality		Domestic dead-burned grains, net ton f.o.b.	
Pa., Mo., Ky.	\$64.60	Chester, Pa., and Baltimore bases (bags)	43.00
First Quality		Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	25.00
Pa., Ill., Md., Mo., Ky.	51.30		
Alabama, Georgia	51.30		
Second Quality		Base Brick	
Pa., Ill., Ky., Md., Mo.	46.55	Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Georgia, Alabama	41.80	Chrome brick	\$49.00
Ohio		Chem. bonded chrome	49.00
First quality	43.70	Magnesite brick	69.00
Intermediate	39.90	Chem. bonded magnesite	59.00
Second quality	35.15		
Malleable Bung Brick		Fluorspar, 85-5	
All bases	\$59.85	Washed gravel, duty paid, tide, net ton	\$23.50
Silica Brick		Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	\$19.00
Pennsylvania	\$51.30	Do., for barge	\$20.00
Joliet, E. Chicago	59.85		
Birmingham, Ala.	51.30		
Ladle Brick		Ferroalloys	
(Pa., O., W. Va., Mo.)		Dollars, except Ferrochrome	
Dry press	\$30.00	Ferromanganese, 78-82%, tidewater, duty pd.	\$102.50
Wire cut	\$28.00	Do., Baltimore, base	102.50
Magnesite		Do., del. Pittsburgh	107.29
Imported dead-burned grains, net ton f.o.b.		Spiegeleisen, 19-21% dom. Palmerton, Pa., spot	33.00
		Do., New Orleans	33.00
		Do., 26-28%, Palmerton	39.00
		Ferrosilicon, 50% freight allowed, c.i.	69.50
		Do., less carload	77.00
		Do., 75 per cent	126-130.00
		Spot, \$5 a ton higher.	
		Silicomane, 2½ carbon	106.50
		2% carbon	111.50; 1%, 121.50
		Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.50
		Ferrotungsten, stand., lb. con. del. cars	1.80-1.85
		Ferrovandium, 35 to 40% lb., cont.	2.70-2.90
		Ferrotitanium, c. l., prod. plant, frt. all., net ton	142.50
		Spot, carlots	145.00
		Spot, ton lots	150.00
		Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, \$3 unitage	58.50
		Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% \$3 unitage	75.00
		Ferromolybdenum, stand. 55-65%, lb.	0.95
		Molybdate, lb. cont.	0.80
		†Carloads. Quan. diff. apply	

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

Copper				Straits Tin, New York		Lead	Lead	Zinc	Alumi-num	Antimony	Nickel
Elctro, del. Conn.	Lake, del. Midwest	Casting, refinery		Spot	Futures	N. Y.	East St. L.	St. L.	99%	American Spot, N. Y.	Cath-odes
May 29 14.00	14.12½	13.75		55.62½	55.40	6.00	5.85	6.75	20.00	15.00	35.00
May 31—Holiday											
June 1 14.00	14.12½	13.75		55.87½	55.55	6.00	5.85	6.75	20.00	15.00	35.00
June 2 14.00	14.12½	13.75		56.25	55.90	6.00	5.85	6.75	20.00	15.00	35.00
June 3 14.00	14.12½	13.75		55.87½	55.50	6.00	5.85	6.75	20.00	15.00	35.00
June 4 14.00	14.12½	13.75		56.12½	55.75	6.00	5.85	6.75	20.00	14.75	35.00

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 14.00c Conn. copper

Sheets	
Yellow brass (high)	19.75
Copper, hot rolled	21.87½
Lead, cut to jobbers	9.50
*Zinc, 100-lb. base	13.00
Tubes	
High yellow brass	22.50
Seamless copper	22.62½
Rods	
High yellow brass	16.25
Copper, hot rolled	18.62½
Anodes	
Copper, untrimmed	19.12½
Wire	
Yellow brass (high)	20.00

OLD METALS

Nom. Deal. buying prices

No. 1 Composition Red Brass

New York	8.75-9.00
Cleveland	9.00-9.25
Chicago	9.00-9.25
St. Louis	9.00-9.25

Heavy Copper and Wire

New York, No. 1	11.00-11.25
Cleveland, No. 1	11.00-11.25
Chicago, No. 1	11.00-11.25
St. Louis, No. 1	11.00-11.25

Composition Brass Borings

New York	8.25-8.50
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Light Copper

New York	9.00-9.25
Cleveland	9.00-9.25
Chicago	9.00-9.25
St. Louis	9.00-9.25

Light Brass

Chicago	6.00-6.25
Cleveland	5.25-5.50
*St. Louis	5.50-5.75

Lead

New York	4.75
Cleveland	4.75-5.00
Chicago	4.75-5.00
St. Louis	4.50-4.75

Zinc

New York	3.25-3.50
Cleveland	3.00-3.25
St. Louis	3.00-3.50

Aluminum

Borings, Cleveland	10.00-10.50
Mixed, cast, Cleve.	13.25-13.50
Clips, soft, Cleve.	15.00-15.50
Mixed, cast, St. L.	12.50-13.00

SECONDARY METALS

Brass, ingot 85-5-5-5, 1cl, 14.00	
Stand. No. 12 alum.	19.00-19.50

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore	4.00c
Boston††	4.05c
Buffalo	3.10c
Chattanooga	3.96c
Chicago (j)	3.85c
Cincinnati	4.05c
Cleveland	3.75c
Detroit	3.93½c
Houston	3.10c
Los Angeles	4.30c
Milwaukee	3.96c-4.11c
New Orleans	4.20c
New York† (d)	4.12c
Pitts. (h)	3.80c
Philadelphia	4.00c
Portland	4.45c
San Francisco	4.20c
Seattle	4.45c
St. Louis	4.09c
St. Paul	4.10c-4.25c
Tulsa	3.35c

IRON BARS

Portland	3.50c
Chattanooga	3.96c
Baltimore*	3.25c
Cincinnati	4.05c
New York† (d)	3.65c
Philadelphia	4.00c
St. Louis	4.09c
Tulsa	3.35c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.96c
Cleveland (c)	2.55c
Cincinnati	3.75c
Houston	3.25c
Los Angeles, c.l.	2.45c
New Orleans*	3.24c
Pitts., plain (h)	2.55c
Pitts., twisted squares (h)	3.95c
San Francisco	2.97½c
Seattle, under 1 ton	4.22½c
St. Louis	3.99c
Tulsa	3.25c
Young	2.30c-2.60c

SHAPES

Baltimore	3.90c
Boston††	3.92c
Buffalo	3.35c
Chattanooga	4.01c
Chicago	3.75c
Cincinnati	3.95c
Cleveland	3.86c
Detroit	3.95c
Houston	3.10c
Los Angeles	4.30c
Milwaukee	3.86c
New Orleans	4.10c
New York† (d)	3.97c
Philadelphia	3.90c
Pittsburgh (h)	3.70c
Portland (i)	4.45c
San Francisco	4.05c
Seattle (l)	4.45c
St. Louis	3.99c
St. Paul	4.00c
Tulsa	3.60c

PLATES

Baltimore	3.90c
Boston††	3.93c
Buffalo	3.47c
Chattanooga	4.01c
Chicago	3.75c
Cincinnati	3.95c
Cleveland, ¼-in. and over	3.86c
Detroit	3.95c
Detroit, ⅝-in.	4.15c
Houston	3.10c
Los Angeles	4.30c
Milwaukee	3.86c
New Orleans	4.10c
New York† (d)	4.00c
Philadelphia	3.90c

Phila. floor	4.95c
Pittsburgh (h)	3.70c
Portland	4.25c
San Francisco	4.05c
Seattle	4.25c
St. Louis	3.99c
St. Paul	4.00c
Tulsa	3.60c

NO. 10 BLUE

Baltimore	3.95c
Boston (g)	4.00c
Buffalo	3.72c
Chattanooga	3.91c
Chicago	3.85c
Cincinnati	4.00c
Cleveland	3.91c
Det. 8-10 ga.	3.93½c
Houston	3.45c
Los Angeles	4.50c
Milwaukee	3.96c
New Orleans	4.35c
New York† (d)	4.07c
Portland	4.50c
Philadelphia	4.00c
Pittsburgh (h)	3.75c
San Francisco	4.30c
Seattle	4.50c
St. Louis	4.39c
St. Paul	4.10c
Tulsa	3.80c

NO. 24 BLACK

Baltimore*†	4.50c
Boston (g)	4.75c
Buffalo	3.35c
Chattanooga*	4.06c
Chicago	4.45c-5.10c
Cincinnati	4.75c
Cleveland	4.66c
Detroit	4.68½c
Los Angeles	5.05c
Milwaukee	4.56c-5.21c
New York† (d)	4.82c
Philadelphia	4.65c
Pitts.** (h)	4.75c
Portland	5.35c
Seattle	5.35c
San Francisco	5.15c
St. Louis	4.84c
St. Paul	4.75c
Tulsa	4.85c

NO. 24 GALV. SHEETS

Baltimore*†	4.70c
Buffalo	4.10c
Boston (g)	5.30c
Chattanooga*	4.76c
Chicago (h)	5.10c-5.75c
Cincinnati	5.40c
Cleveland	5.31c
Detroit	5.40c
Houston	4.50c
Los Angeles	5.55c
Milwaukee	5.21c-5.86c
New Orleans*	5.75c
New York† (d)	5.47c
Philadelphia	5.30c
Pitts.** (h)	5.40c
Portland	5.90c
San Francisco	5.85c
Seattle	5.90c
St. Louis	5.49c
St. Paul	5.40c
Tulsa	5.20c

BANDS

Baltimore	4.20c
Boston††	4.25c
Buffalo	3.52c
Chattanooga	4.16c
Cincinnati	4.25c
Cleveland	4.16c
Chicago	4.10c
Detroit, ⅝-in. and lighter	4.185c
Houston	3.35c
Los Angeles	4.50c
Milwaukee	4.21c
New Orleans	4.75c
New York† (d)	4.32c

Philadelphia	4.10c
Pittsburgh (h)	4.00c
Portland	4.95c
San Francisco	4.50c
Seattle	4.95c
St. Louis	4.34c
St. Paul	4.35c
Tulsa	3.55c

HOOPS

Baltimore	4.45c
Boston††	5.25c
Buffalo	3.52c
Chicago	4.10c
Cincinnati	4.25c
Detroit, No. 14 and lighter	4.185c
Los Angeles	6.55c
Milwaukee	4.21c
New York† (d)	4.32c
Philadelphia	4.35c
Pittsburgh (h)	4.50c
Portland	6.30c
San Francisco	6.50c
Seattle	6.30c
St. Louis	4.34c
St. Paul	4.35c

COLD FIN. STEEL

Baltimore (c)	4.50c
Boston*	4.65c
Buffalo (h)	3.70c
Chattanooga*	4.86c
Chicago (h)	4.30c
Cincinnati	4.50c
Cleveland (h)	4.30c
Detroit	4.30c
Los Ang. (f) (d)	6.85c
Milwaukee	4.41c
New Orleans	5.10c

New York† (d)	4.57c
Philadelphia	4.53c
Pittsburgh	4.15c
Portland (f) (d)	5.85c
San Fran. (f) (d)	6.80c
Seattle (f) (d)	5.85c
St. Louis	4.54c
St. Paul	4.77c
Tulsa	4.80c

COLD ROLLED STRIP

Boston	3.845c
Buffalo	3.39c
Chicago	3.87c
Cincinnati	3.82c
Cleveland (b)	3.60c
Detroit	3.43c
New York† (d)	3.92c
St. Louis	4.54c

TOOL STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up.)

Base	
High speed	69c
High carbon, Cr.	45c
Oil hardening	26c
Special tool	24c
Extra tool	20c
Regular tool	16c
Water hardening 12½c	
Uniform extras apply.	
BOLTS AND NUTS	
(100 pounds or over)	
Discount	
Chicago (a)	.55 to 60
Cleveland	60-5-5
Detroit	70-10
Milwaukee	.60 to 65

New Orleans	65
Pittsburgh	65-5

(a) Under 100 lbs., 50 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Quantity base; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 in.; (j) Shapes other than rounds, flats, fillet angles, 0.15c higher.

On plates, shapes, bars, hot strip and blue annealed quantity extras and discounts as follows: Under 100 lbs., add \$1.50; 100 to 399 lbs., add 50c; 400 to 3999 lbs., base; 4000 to 9999 lbs., deduct 10c; over 10,000 lbs., deduct 15c. At Cleveland, under 400 lbs., add 50c, with \$1 minimum invoice.

†Domestic steel; *Plus quantity extras; **One to 9 bundles; †† 50 or more bundles; †New extras apply; ††Base 10,000 lbs., extras on less.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, June 3

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons U. K. ports £ s d	Channel or North Sea ports, metric tons Quoted in dollars at current value	Continental **Quoted in gold pounds sterling £ s d	
PIG IRON				
Foundry, 2.50-3.00 Silicon	\$29.58 6 0 0	\$32.60	4 1 0	
Basic bessemer	19.39 3 18 6*	30.99	3 17 0	
Hematite, Phos. .03-.05	21.61 4 7 6			
SEMIFINISHED STEEL				
Billets	\$38.90 7 17 6	\$35.27	4 7 6	
Wire rods, No. 5 gage	53.48 10 16 6	56.42	7 0 0	
FINISHED STEEL				
Standard rails	\$44.46 9 0 0	\$48.36	6 0 0	
Merchant bars	2.43c 11 0 0	1.82c	5 0 0	
Structural shapes	2.35c 10 12 6	1.77c	4 17 6	
Plates, ¼ in. or 5 mm.	2.55c 11 11 3	2.24c	6 2 6	
Sheets, black, 24 gage or 0.5 mm.	3 31c 15 0 0	3 09c	8 10 0††	
Sheets, gal., 24 gage, corr.	4 14c 18 15 0	4 37c	12 0 0	
Bands and strips	2.21c 10 0 0	2 37c	6 10 0	
Plain wire, base	2.43c 11 0 0	2 73c	7 10 0	
Galvanized wire, base	3 20c 14 10 0	2 91c	8 0 0	
Wire nails, base	3 09c 14 0 0	3 09c	8 10 0	
Tin plate, box 108 lbs.	\$ 6.05 1 4 6			

British ferromanganese \$95 delivered Atlantic seaboard, duty-paid.

	£ s d	French Francs	Belgian Francs	Reich Marks
Fdy. pig iron, Si. 2.5	\$20.50 4 3 0(a)	\$18.91 425	\$27.80 825	\$25.24 63
Basic bessemer pig iron	24.70 5 0 0(a)	12.24 275	14.66 435	27.86 (b) 69.50
Furnace coke	8.03 1 12 6	6.59 148	6.23 185	7 62 19
Billets	38.82 7 17 6	29.15 655	28.14 835	38.68 96.50
Standard rails	2 24c 10 2 6	1.95c 975	1.80c 1,200	2 38c 132
Merchant bars	2 53c 11 9 0	1.77c 885	1.46c 975	1 98c 110
Structural shapes	2 44c 11 0 6	1.72c 860	1.46c 975	1 93c 107
Plates, ¼-in. or 5 mm.	2 57c 11 13 0	2 21c 1,105	1 87c 1,245	2 29c 127
Sheets, black	3 48c 15 15 0‡	2 80c 1,400‡	2 19c 1,460‡	2 59c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	4 31c 19 10 0	4 30c 2,150	2 85c 1,900	6 66c 370
Plain wire	2 60c 11 15 0	2 72c 1,360	2 48c 1,650	3 11c 173
Bands and strips	2 70c 12 4 0	2 00c 1,000	2 02c 1,350	2 29c 127

Domestic Prices at Works or Furnace—Last Reported

	£ s d	French Francs	Belgian Francs	Reich Marks
Fdy. pig iron, Si. 2.5	\$20.50 4 3 0(a)	\$18.91 425	\$27.80 825	\$25.24 63
Basic bessemer pig iron	24.70 5 0 0(a)	12.24 275	14.66 435	27.86 (b) 69.50
Furnace coke	8.03 1 12 6	6.59 148	6.23 185	7 62 19
Billets	38.82 7 17 6	29.15 655	28.14 835	38.68 96.50
Standard rails	2 24c 10 2 6	1.95c 975	1.80c 1,200	2 38c 132
Merchant bars	2 53c 11 9 0	1.77c 885	1.46c 975	1 98c 110
Structural shapes	2 44c 11 0 6	1.72c 860	1.46c 975	1 93c 107
Plates, ¼-in. or 5 mm.	2 57c 11 13 0	2 21c 1,105	1 87c 1,245	2 29c 127
Sheets, black	3 48c 15 15 0‡	2 80c 1,400‡	2 19c 1,460‡	2 59c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	4 31c 19 10 0	4 30c 2,150	2 85c 1,900	6 66c 370
Plain wire	2 60c 11 15 0	2 72c 1,360	2 48c 1,650	3 11c 173
Bands and strips	2 70c 12 4 0	2 00c 1,000	2 02c 1,350	2 29c 127

*Basic. †British ship-plates. Continental, bridge plates. \$24 ga. † 1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. a del. Middlesbrough. b hematite. ††Close annealed. **Gold pound sterling carries a premium of 65.30 per cent over paper sterling.

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; † indicates brokers prices

HEAVY MELTING STEEL	
Birmingham†	11.50-12.50
Bos. dock No. 1, exp.	16.00
N. Eng. del. No. 1	15.00
Buffalo, No. 1	18.00-19.00
Buffalo, No. 2	16.00-17.00
Chicago, No. 1	16.50-17.00
Cleveland, No. 1	17.50-18.00
Cleveland, No. 2	16.00-16.50
Detroit, No. 1	14.50-15.00
Eastern Pa., No. 1	16.50-17.50
Eastern Pa., No. 2	15.00-15.50
Federal, Ill.	13.50-14.00
Granite City, R. R.	15.50-16.00
Granite City, No. 2	13.50-14.00
New York, No. 1	†13.00-13.50
N.Y. dock, No. 1 exp.	14.50-15.00
Pitts., No. 1 (R. R.)	20.00-20.50
Pitts., No. 1 (dir.)	18.50-19.00
Pittsburgh, No. 2	16.50-17.00
St. Louis, R. R.	16.00-16.50
St. Louis, No. 2	13.50-14.00
Toronto, Mrs. No. 1	11.00-12.00
Toronto, No. 2	10.00-11.00
Valleys, No. 1	19.00-19.50
COMPRESSED SHEETS	
Buffalo, dealers	16.00-17.00
Chicago, factory	16.00-16.50
Chicago, dealer	15.50-16.00
Cleveland	17.00-17.50
Detroit	15.25-15.75
E. Pa., new mat.	17.50-18.00
E. Pa., old mat.	15.00-15.50
Pittsburgh	18.50-19.00
St. Louis	11.00-11.50
Valleys	18.50-19.00
BUNDLED SHEETS	
Buffalo	13.00-13.50
Cincinnati, del.	13.00-13.50
Cleveland	13.50-14.00
Pittsburgh	17.25-17.75
St. Louis	9.50-10.00
Toronto, dealers	8.00
SHEET CLIPPINGS, LOOSE	
Chicago	11.50-12.00
Cincinnati	11.00-11.50
Detroit	10.50-11.00
St. Louis	9.00-9.50
STEEL RAILS, SHORT	
Birmingham	15.50-17.50
Buffalo	23.50-24.00
Chicago (3 ft.)	20.50-21.00
Chicago (2 ft.)	21.50-22.00
Cincinnati, del.	20.00-20.50
Detroit	18.50-19.00
Pitts., 3 ft. and less	24.50-25.00
St. Louis, 2 ft. & less	18.50-19.00
STEEL RAILS, SCRAP	
Boston district	†14.00-14.25
Buffalo	19.50-20.00
Chicago	16.50-17.00
Cleveland	23.00-23.50
Pittsburgh	20.50-21.00
St. Louis	17.00-17.50
STOVE PLATE	
Birmingham	9.50-10.50
Boston district	†10.50-10.75
Buffalo	14.50-15.00
Chicago	11.50-12.00
Cincinnati, dealers	10.00-10.50
Detroit, net	11.25-11.75
Eastern Pa.	14.00
New York, fdry.	†9.50-10.00
St. Louis	11.25-11.75
Toronto, deal'rs, net	9.50-10.00

SPRINGS	
Buffalo	22.00-22.50
Chicago, leaf	21.00-21.50
Chicago, coil	22.00-22.50
Eastern Pa.	24.00-24.50
Pittsburgh	24.50-25.00
St. Louis	19.00-19.50
ANGLE BARS—STEEL	
Chicago	20.00-20.50
St. Louis	17.00-17.50
RAILROAD SPECIALTIES	
Chicago	20.00-20.50
LOW PHOSPHORUS	
Buffalo, billet and bloom crops	22.00-23.00
Cleveland, billet, bloom crops	24.00-24.50
Eastern Pa., crops	23.00
Pittsburgh, billet, bloom crops	25.00-25.50
Pittsburgh, sheet bar crops	24.50-25.00
FROGS, SWITCHES	
Chicago	16.50-17.00
St. Louis, cut	17.00-17.50
SHOVELING STEEL	
Chicago	16.50-17.00
Federal, Ill.	13.50-14.00
Granite City, Ill.	13.50-14.00
Toronto, dealers	9.00-9.50
RAILROAD WROUGHT	
Birmingham	12.00-13.00
Boston district	†10.00-10.25
Buffalo, No. 1	16.00-17.00
Buffalo, No. 2	18.00-19.00
Chicago, No. 1 net	15.00-15.50
Chicago, No. 2	16.50-17.00
Cincinnati, No. 2	14.25-14.75
Eastern Pa.	18.50
St. Louis, No. 1	13.00-13.50
St. Louis, No. 2	16.00-16.50
Toronto, No. 1 dir.	15.00
SPECIFICATION PIPE	
Eastern Pa.	17.00
New York	†12.50-13.00
BUSHELING	
Buffalo, No. 1	16.00-17.00
Chicago, No. 1	15.50-16.00
Cincin., No. 1, deal.	14.50-15.00
Cincinnati, No. 2	8.50-9.00
Cleveland, No. 2	12.50-13.00
Detroit, No. 1 new	14.50-15.00
Valleys, new, No. 1	17.00-17.50
Toronto, dealers	9.00
MACHINE TURNINGS	
Birmingham	7.00-7.50
Buffalo	11.00-11.50
Chicago	10.00-10.50
Cincinnati, dealers	9.00-9.50
Cleveland	12.50-13.00
Detroit	9.50-10.00
Eastern Pa.	13.00
New York	†8.50-9.00
Pittsburgh	14.50-15.00
St. Louis	8.00-8.50
Toronto, dealers	8.00-8.50
Valleys	13.00-13.50
BORINGS AND TURNINGS	
For Blast Furnace Use	
Boston district	†7.75-8.25

Buffalo	12.50-13.00
Cincinnati, dealers	8.50-9.00
Cleveland	12.50-13.00
Detroit	10.25-10.75
Eastern Pa.	12.00
New York	†8.00-8.50
Pittsburgh	14.00-14.50
Toronto, dealers	8.00-8.50
CAST IRON BORINGS	
Birmingham	7.00-7.50
Boston dist. chem.	†10.00-10.25
Boston dist. for mills	†9.00
Buffalo	12.50-13.00
Chicago	9.50-10.00
Cincinnati, dealers	8.50-9.00
Cleveland	12.50-13.00
Detroit	10.25-10.75
E. Pa., chemical	14.50-15.00
New York	†8.00-8.50
St. Louis	8.00-8.50
Toronto, dealers	9.00
PIPE AND FLUES	
Cincinnati, dealers	11.50-12.00
Chicago, net	13.00-13.50
RAILROAD GRATE BARS	
Buffalo	14.00-14.50
Chicago, net	12.50-13.00
Cincinnati	10.50-11.00
Eastern Pa.	14.00
New York	†9.50-10.00
St. Louis	11.50-12.00
FORGE FLASHINGS	
Boston district	†11.25-11.50
Buffalo	16.00-17.00
Cleveland	17.00-17.50
Detroit	13.25-13.75
Pittsburgh	17.25-17.75
FORGE SCRAP	
Boston district	†6.50-7.00
Chicago, heavy	21.50-22.00
Eastern Pa.	15.50
ARCH BARS, TRANSOMS	
St. Louis	18.00-18.50
AXLE TURNINGS	
Boston district	†11.00-11.50
Buffalo	16.00-16.50
Chicago, elec. fur.	18.50-19.00
Eastern Pa.	16.00-16.50
St. Louis	12.00-12.50
Toronto	9.50
STEEL CAR AXLES	
Birmingham	18.00-20.00
Buffalo	22.00-22.50
Boston district	†20.00
Chicago, net	22.50-23.00
Eastern Pa.	25.00-26.00
St. Louis	24.00-24.50
SHAFTING	
Boston district	†18.50-19.00
New York	†20.00-20.50
Eastern Pa.	24.00
St. Louis	14.00-14.50
CAR WHEELS	
Birmingham	16.50-17.50
Boston dist., iron	†15.00-15.25
Buffalo, iron	18.50-19.50
Buffalo, steel	22.50-23.00
Chicago, iron	19.50-20.00
Chicago, rolled steel	20.50-21.00

Cincinnati, iron	18.00-18.50
Eastern Pa., iron	19.00-19.50
Eastern Pa., steel	23.00
Pittsburgh, iron	20.00-20.50
Pittsburgh, steel	24.50-25.00
St. Louis, iron	18.50-19.00
St. Louis, steel	18.50-19.00
NO. 1 CAST SCRAP	
Birmingham	12.00-13.00
Boston, No. 1 mach.	†14.50-14.75
N. Eng. del. No. 2	16.50
N. Eng. del. textile	18.50
Buffalo, cupola	17.50-18.00
Buffalo, mach.	18.50-19.00
Chicago, agri. net.	13.00-13.50
Chicago, auto	14.00-14.50
Chicago, mach. net.	15.00-15.50
Chicago, rail'd net.	14.50-15.00
Cincin., mach. cup.	15.00-15.50
Cleveland, mach.	20.00-20.50
Eastern Pa., cupola	19.00
E. Pa., mixed yard	17.00-17.50
Pittsburgh, cupola	18.75-19.25
San Francisco, del.	13.50-14.00
Seattle	12.00-13.00
St. Louis, No. 1	14.50-15.00
St. L., No. 1, mach.	14.00-14.50
Toronto, No. 1, mach., net	16.00-17.00
HEAVY CAST	
Boston dist. break.	†13.00-13.25
N. Eng. del.	15.00-15.25
Buffalo, break.	15.00-15.50
Cleveland, break.	14.00-15.00
Detroit, break.	13.50-14.00
Detroit, auto net.	14.50-15.00
Eastern Pa.	17.50
New York, break.	†13.50-14.00
Pittsburgh	15.50-16.00
MALLEABLE	
Birmingham, R. R.	12.50-13.50
New England, del.	20.00
Buffalo	20.00-21.00
Chicago, R. R.	19.50-20.00
Cincin., agri. del.	15.00-15.50
Cleveland, rail	20.50-21.00
Detroit, auto, net.	15.00-15.50
Eastern Pa., R. R.	19.00-20.00
Pittsburgh, rail	20.50-21.00
St. Louis, R. R.	18.00-18.50
RAILS FOR ROLLING	
5 feet and over	
Birmingham	16.00-18.00
Boston	†17.50-18.00
Buffalo	19.50-20.00
Chicago	20.00-20.50
Eastern Pa., R. R.	21.00-21.50
New York	†17.00-17.50
St. Louis	18.00-18.50
LOCOMOTIVE TIRES	
Chicago (cut)	21.50-22.00
St. Louis, No. 1	18.00-18.50
LOW PHOS. PUNCHINGS	
Buffalo	22.00-22.50
Chicago	20.50-21.00
Eastern Pa.	24.00-24.50
Pittsburgh (heavy)	24.00-24.50
Pittsburgh (light)	23.00-23.50

Iron Ore

Lake Superior Ore	
Gross ton, 51 1/2%	
Lower Lake Ports	
Old range bessemer	\$5.25
Mesabi nonbess.	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbess.	5.10

Eastern Local Ore	
Cents, unit, del. E. Pa.	
Foundry and basic	9.00-10.00
56.63% con.	9.00-10.00
Cop.-free low phos.	58-60% nominal
Foreign Ore	
Cents per unit, f.a.s. Atlantic ports	
Foreign manganiferous ore, 45.55%	

iron, 6-10% man.	*17.00
No. A.F. low phos.	17.50
Swedish low phos.	nominal
Spanish No. Africa	
basic, 50 to 60%	*16.00
Tungsten, spot sh.	
ton, unit, duty pd.	\$22.00-22.50
N. F., fdy., 55%	7.00
Chrome ore, 48%	
gross ton, c.i.f.	\$24.50-25.00
*Nominal asking price for spot.	

Manganese Ore

(Nominal)	
Prices not including duty, cents per unit cargo lots.	
Caucasian, 50-52%	44.00-45.00
So. African, 50-52%	Nominal
Indian, 50-52%	Nominal

Sheets

Sheet Prices, Page 100

New York—Some diversion of sheet business is beginning to be seen here as result of Mid-West strikes. So far this tonnage has not been heavy. General business is still far from dull with some producers adding to fourth quarter backlogs by accepting tonnage subject to prices prevailing at time of delivery. Interestingly, certain other producers are refusing to book any fourth quarter tonnage. These companies apparently are anticipating heavy fourth quarter demands and prefer for the present to keep their positions as liquid as possible for that period. Further indication of the trade's strong belief in a highly active fourth period is the policy of some consumers of keeping a substantial tonnage in stock. This is difficult in sheets but is more noticeable in certain other lines, such as plates, where delivery situation has been less tight. One large buyer has arranged for a backlog of three months on plates and certain types of bars and is hoping to get himself in similar position on sheets before summer ends.

Pittsburgh—Indications of an upturn in volume of sheet specifications were apparent last week, following the slight shrinkage late in May. Increased buying from the automotive industry and heavy inquiries from consumers affected by strikes in other districts were two major factors. Hot-rolled and galvanized deliveries continue to range around 23 weeks, while cold-reduced sheets can be secured in about seven weeks.

Cleveland—Mills not affected by strikes continue close to capacity operations by virtue of backlogs extending into fourth quarter, particularly in hot-rolled annealed and galvanized material. However, the expected seasonal decline in specifications is felt from some sources.

Recent buying is confined to fill-in lots as consumers find they have underestimated their needs. Some orders have already been placed by automotive manufacturers for 1938 models, although this tonnage is not large.

Chicago—A further decline in sheet bookings has been without effect on shipments, as backlogs remain substantial. Output has been curtailed sharply by strikes but no acute shortage of material has developed to date. Automotive interests are restricting purchases in view of the start of a recession in operations but the farm implement industry is holding schedules near capacity.

Philadelphia—Steel strikes in the Middle West have not as yet resulted in sheet inquiries in this district, so far as can be learned. General sheet buying here is easier, although if it were not for comparison with the particularly heavy sales of a few weeks ago, sellers would be inclined to regard present volume as especially satisfactory for this season of the year.

Northeastern penitentiary, Lewisburg, Pa., will open bids June 14 on about 130 tons of sheets and strip.

Cincinnati—Sheet mills are keep-

ing production schedules at actual, above theoretical, capacity in efforts to meet increasing delivery pressure. New ordering was heavier last week. Little or no new business can be traced to strike conditions in other districts, because books already were filled. Specifications of automobile manufacturers have slackened.

St. Louis—Demand for sheets continues active, though new business booked in May was reported below that of April. Deliveries growing easier from week to week, but

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Ordinary oil has a tendency to leak from motor bearings, this is aggravated by vibration on motors of steel mill machinery.

Then the oil is either thrown out of one end of the motor bearing, going to waste, or works through to the windings—causing short circuits which result in burnouts.

This evil is corrected by NON-FLUID OIL, which does not creep or throw, but stays in bearings until entirely consumed—avoiding further loss caused by oil getting on materials.

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many important users are in bad need of supplies, and are pressing for shipments. Considerable tonnage has been booked for third quarter. The leading producer is operating at close to capacity.

Strip

Strip Prices, Page 101

Pittsburgh — New business in hot and cold-rolled strip during the past week has been better than the previ-

ous period. Inquiries diverted here by strikes in mid-western steel production centers have been comparatively light so far. Buying by automotive and agricultural equipment makers has shown some improvement recently. Miscellaneous consumers are active, including manufacturers of electrical equipment and small tools. Deliveries on hot strip range around three weeks at present and on cold strip around five weeks. Hot strip is 2.40c, Pittsburgh, and cold strip, 0.25 carbon and under, 3.20c, Pittsburgh.

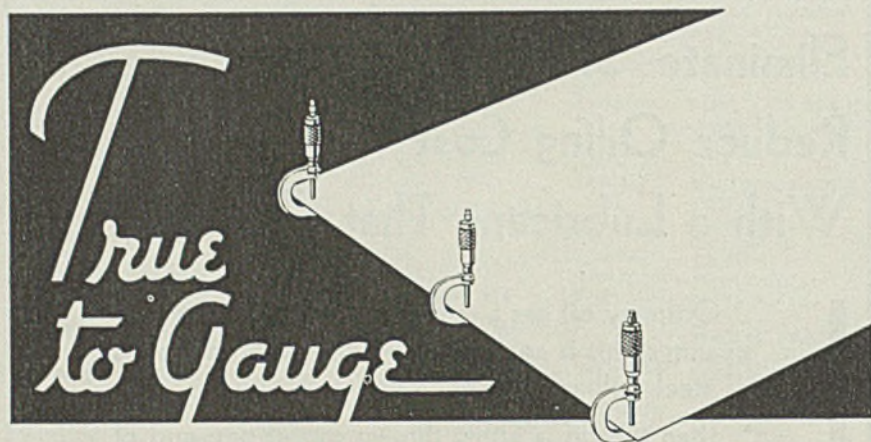
Cleveland—New business in hot and cold-rolled strip continues to decline, but mills have enough bookings to keep operating close to capacity through this quarter and on some grades well into August. Consumption is well sustained although normal seasonal decline in some instances is apparent.

Chicago — Strip shipments continue in excess of new business but backlogs are supporting good schedules at mills still in operation here. Automotive orders are receding and some other users are restricting purchases pending the consumption of tonnage previously ordered. Sustained production is in prospect through the balance of this month.

Boston—Buying of narrow cold strip is down slightly. A considerable number of current orders is for third quarter delivery, but assurance of unchanged prices for that period has operated against heavy covering. Deliveries are at four to six weeks, depending on specifications, with finishing operations high. There is less pressure on mills and rolling schedules are more elastic.

New York—Cold strip demand is steady with some spotty improvement. Mills affected by strikes are advising customers of uncertainty of early shipments. For early delivery some buyers, in a few isolated instances, are reported to have attempted to shift some volume, but most producers are not able to promise early delivery of cold-rolled on such business. Mill operations are high, prices firm and backlogs sufficient for near-capacity production for several weeks. Consumption of cold strip continues high. Hot-rolled deliveries have improved materially, several mills now making shipment in two to three weeks.

Philadelphia—Narrow strip sales remain light with deliveries on hot-rolled easily available within two weeks and on cold-rolled three to four weeks. Most local consumers have requirements under contract, against which specifications are being issued.



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This strip is produced on Cold Metal 4-High Single Stand Reversing Mills providing smooth bright finish, in addition to size accuracy. Grain structure is such that unusual drawing and forming operations can be accomplished. Gauges down to .001" are available in extra heavy coils to save interruptions in your output.

Specify the analysis and temper that best suit your needs. We will meet all your specifications.

The Cold Metal Process Co.

Youngstown, Ohio



Ferroalloys

Ferroalloy Prices, Page 102

New York—Within a week prices are expected to be announced on ferromanganese for third quarter, with the trade generally looking for an increase, particularly in view of the sharp rises in manganese ore prices since the first of the year. Not only do some expect contract prices to take the increase of \$7.50 put into effect on spot tonnage at the beginning of last month, but look for still higher prices on both spot and contract tonnage. The

current price on spot tonnage is \$102.50, duty paid.

Plates

Plate Prices, Page 100

Philadelphia—Railroad and ship work are assuming more prominence in the plate market, with the Reading tonnage being distributed and the Norfolk & Western beginning to figure on steel for its car program, and with bids being opened June 10 on two tankers for the Sinclair Navigation Co., on which local district yards are figuring.

In addition there is substantial navy work for the following week, with bids opening June 17 on one battleship to be built in private yards and four submarines. Another battleship is to be built in a navy yard. Each battleship will require 8350 tons of plates, including a small tonnage of special steel. Total plain steel requirements for each battleship amounts to 11,000 tons, incidentally.

Miscellaneous plate demand is somewhat more spotty, with deliveries showing moderate improvement. One eastern mill is able to offer deliveries on universal plates at around three to four weeks and sheared plates at around four to five weeks. Most other producers are able to do little under eight weeks and in some instances schedules appear to be well booked ahead for a period of 12 to 14 weeks.

Pittsburgh—Plate deliveries are well extended, and the volume of new business is more active than generally expected. It is apparent operations will be highly satisfactory through June and July. Tank fabricators are busy and railroad equipment makers have large order backlogs. New business in barges, however, has been lighter than usual at this time of year.

Cleveland—Plate requirements have held steady at the active rate during May, as demand from miscellaneous manufacturing consumers and small structural projects show no signs of declining. Little headway has been made against backlogs as most mills report average deliveries range from 10 to 12 weeks. Freight car and locomotive buying is quiet but some expect renewed buying activity around mid-year.

Chicago—Plate bookings lately have been aided by orders for railroad equipment but only small tonnages are pending for this purpose. Shipments to freight car builders and tank fabricators are well sustained though total deliveries have been reduced by a strike at the

plant of one local producer. Structural fabricators account for only relatively small plate tonnages. Material for Mississippi river dam No. 25 has been placed, with some additional plate business in prospect for river work.

Boston—New plate buying is less active, although there has been no sharp slump. A fairly sustained demand for miscellaneous work and mounting bridge and shipyard needs are encouraging factors. Chicago Bridge & Iron Works has booked an elevated tank, veterans' hospital, White River Jct., Vt. Plates are un-

changed at 2.65c, Boston, and 2.64c, Worcester.

New York—Recession of plate demand is more pronounced and shortly should be reflected in a decided easing of deliveries. Outstanding among the larger proposals are two tankers for Sinclair Navigation Co., requiring 5000 tons each, on which bids are to be opened June 10.

In officially announcing that all bids had been rejected on the proposed steamer for the United States Lines, the Maritime commission said in Washington last week that new bids will be sought at the "earliest



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practicable date." This confirms the understanding current in the trade in recent weeks and leaves the trade still in suspense as to the actual time for new bids. Newport News Shipbuilding & Dry Dock Co., Newport News, Va., and the New York Shipbuilding Corp., Camden, N. J., were the only bidders at the last opening, with the former the low bidder on the types said to be under closest consideration.

San Francisco—The largest plate letting in over a month went to

Consolidated Steel Corp., 450 tons for a 30-inch welded steel pipe line for the metropolitan water district, Los Angeles. Interest now centers in the outcome of bids just opened on 1250 tons or more for the Mad River welded steel pipe line at Eureka, Calif. Improvement in demand for carload lots is reported and numerous orders are being booked for delivery some weeks in advance.

Seattle—Tank projects are creating fair demand for plates. A local

marine architect has developed a type of steel barge which can be built almost as cheaply as wood, which has been generally used in this area. Two of these craft have been constructed for unnamed interests, involving 100 tons.

Plate Contracts Placed

450 tons, 30-inch welded steel pipe, metropolitan water district, Los Angeles, specification 216, to Consolidated Steel Corp., Los Angeles.

300 tons, two storage tanks for Pacific Molasses Co., Seattle, to Western Pipe & Steel Co., San Francisco, and Acme Construction Co., Seattle.

200 tons, storage tank for Mohawk Oil Co., Tacoma, to Western Pipe & Steel Co., San Francisco, and Acme Construction Co., Seattle.

Unstated tonnage, 20 sections, 32-inch i.d., each 52 feet long, steel pontoon pipe, Tennessee valley authority, Knoxville, Tenn., to Treadwell Construction Co., Midland, Pa. at \$16,900, delivered repair depot, Arkansas, bids May 5.

Unstated tonnage, 100,000-gallon tank, Hickory, N. C., to R. D. Cole Mfg. Co., Newnan, Ga.

Plate Contracts Pending

2275 tons, navy delivery, various yards; bids June 22, Washington.

1250 tons, Mad River pipe line, 18 to 30-inch, Eureka, Calif.; bids opened.

Bars

Bar Prices, Page 100

Pittsburgh—Backlogs continue at four to six weeks and from all indications June will be excellent from the standpoint of production and shipments. Some jobbers are reported to have built stocks up heavily in the last few weeks. Machinery and agricultural implement manufacturers continue active. Some tonnage has been ordered recently by the automotive industry.

Cleveland—Commercial steel bar sellers report a slight decline in specifications. However, a steady rate of operations is assured through this month in plants not affected by strikes, for backlogs in most instances range from four to six weeks. Requirements for alloy bars from auto partsmakers and farm implement sources are well sustained, although in most instances they are confined to small orders.

Chicago—Bar orders are declining though consumption is slow to recede among both larger users and miscellaneous buyers. Farm implement and tractor industries show no slackening in operations though some let-down is expected next month. Automotive interests are retrenching gradually. Production is restricted by strikes but so far this has had little effect on deliveries available from mills still op-

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—The Market Week—

erating. Backlogs generally extend into July.

Boston—Individual orders for steel bars are smaller as consumers work off fairly substantial stocks by continued high operations. Deliveries have improved. Alloy and forging stock continues to move well in the aggregate with buyers usually asking early delivery. Soft steel bars are 2.85c, Boston.

New York—Commercial bar business is still tapering with deliveries averaging three to four weeks. Bolt and nut manufacturers are specifying freely but railroads are taking smaller quantities.

Philadelphia — Commercial steel bar deliveries continue easier as consuming pressure further subsides. Some leading sellers are now offering three to four weeks and in one or two important instances shipments are being offered within a fortnight.

Pipe

Pipe Prices, Page 101

Pittsburgh—A few tonnages have been booked in this district from consumers affected by steelworks labor disputes in other territories, tubular goods being among the first to note the reflection of distressed requirements. Since a large part of the tubular material orders in March has now gone into use, consumers are considered likely to begin restocking this month and the next few weeks will be active for producers. Mechanical tubing business continues good without much change from last week. Some producers have been unable to reduce their backlogs. Boiler tube requirements are lighter. Prices are steady.

Cleveland—Jobbers report active stock turnover with little change in comparison with May. Industrial requirements continue to absorb most tonnage here. J. B. Clow & Sons Co., Cleveland, has booked 190 tons of cast pipe for the water extension project at Sandusky, O.

Chicago — While most orders for cast iron pipe are small, the aggregate is fairly well sustained. Privately financed purchases represent a larger portion of total bookings than a year ago. Chicago has taken bids on 140 tons of 24-inch pipe.

New York—Three foundries have booked 3022 tons of cement-lined cast pipe for New York city borough yard stocks, material included in the opening of May 10. Buying and inquiry in other directions is heavier, utilities having recently more than filled the gap caused by a decline in buying for relief projects.

At least one public utility has also bought considerable steel pipe. For New Rochelle, N. Y., on which various alternates were taken, lock joint pipe will be used, a project which would have taken close to 2000 tons of cast.

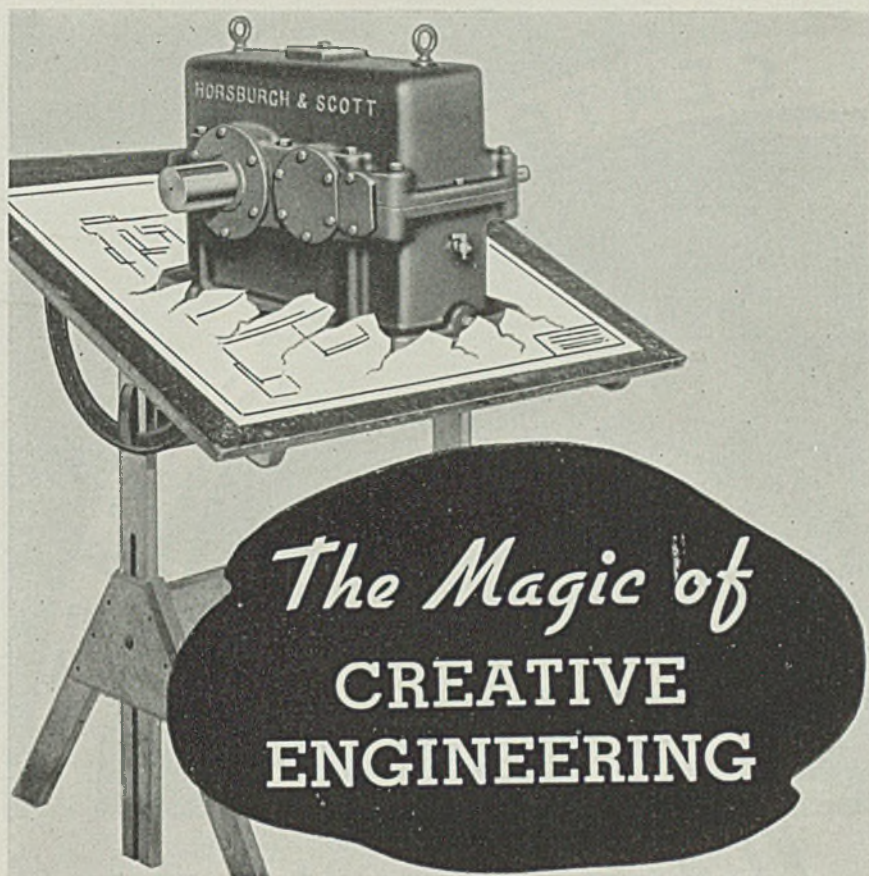
San Francisco — Little improvement in demand for cast iron pipe is noted and awards totaled less than 100 tons. So far this year 16,129 tons have been placed, compared with 12,707 tons for the same period a year ago.

Seattle—Demand for cast iron pipe

is low. No large projects are up and only small tonnages are moving out of stock. Resettlement project, McMinnville, is buying 2000 feet of wrought iron pipe. Corvallis, Oreg., has WPA funds for a \$45,000 water system improvement.

Cast Pipe Placed

3022 tons, 24-inch and under, cement-lined, borough yard stocks, New York, to United States Pipe & Foundry Co., 1405 tons; R. D. Wood & Co., Florence, N. J., 1006 tons, and Donaldson Iron Works, Emaus, Pa., 611 tons; bids May



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5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

10, department of purchase, New York.
140 tons, 24-inch, Chicago, to Lynchburg Foundry Co., Lynchburg, Va.

Cast Pipe Pending

348 tons, 12 and 16-inch, Los Angeles; bids opened.
155 tons, 6-inch, Yerington, Nev., for treasury department; bids opened.
Unstated, 19,000 feet 2 to 8-inch, Circle, Mont.; bids June 11.

Fluorspar

New York—Fluorspar demand is

in excess of importations, with the market higher at \$23.50 to \$24, duty paid, per net ton.

Transportation

Track Material Prices, Page 101

Renewed activity is evident in demand for railroad equipment and steel for railroad shops. Norfolk & Western is about to undertake a program for heavy repairs to 1500 gon-

dolas and will build ten 70-ton all-steel hoppers, 20 all-steel cabooses at its shops at Roanoke, Va. It is planning to build 10 heavy freight locomotives.

Pittsburgh & Lake Erie will open bids June 15 for fabricated car repair parts for 55 and 70-ton gondolas. Reading Co. has placed 700 underframes and its repair program will require about 2000 tons of steel.

Milwaukee Electric Railway & Light Co., Milwaukee, has placed an order for 44 trolley buses with St. Louis Car Co., St. Louis.

The Pennsylvania railroad announces that it will build the largest steam locomotive ever placed in operation. It will weigh 360 tons, against a weight of 315 tons for certain of the largest locomotives now in operation by the Pennsylvania railroad, it is said. Engineers from the Baldwin Locomotive Works, Eddystone, Pa., American Locomotive Co., New York, and the Lima Locomotive Works, Lima, O., are collaborating with the Pennsylvania railroad engineers in the development of the design. The locomotive, it is said, will be capable of hauling a 14-car passenger train at the rate of 100 miles an hour.

Rail Orders Pending

653 tons rails, 220 tons fastenings, bridge, Mississippi river, Baton Rouge, La., contract No. 2, main river bridge superstructure, Bethlehem Steel Co., Bethlehem, Pa., low, 178 tons rails, 60 tons fastenings; contract No. 4, Steel Construction Co., Birmingham, Ala., low, 475 tons rails, 160 tons fastenings; bids May 26.
130 tons, rails, 35 tons, fastenings, Tennessee valley authority, Knoxville, Tenn.; bids June 10.

Car Orders Placed

Chicago, Rock Island Pacific, 10 passenger coaches, to Pullman-Standard Car Mfg. Co., Chicago.
Memphis Street Railway Co., Memphis, Tenn., 30 motor coaches, to American Car & Foundry Co., New York.
Reading Co., underframes for 650 box cars to Bethlehem Steel Co., Bethlehem, Pa.; 50 underframes to American Car & Foundry Co., New York.

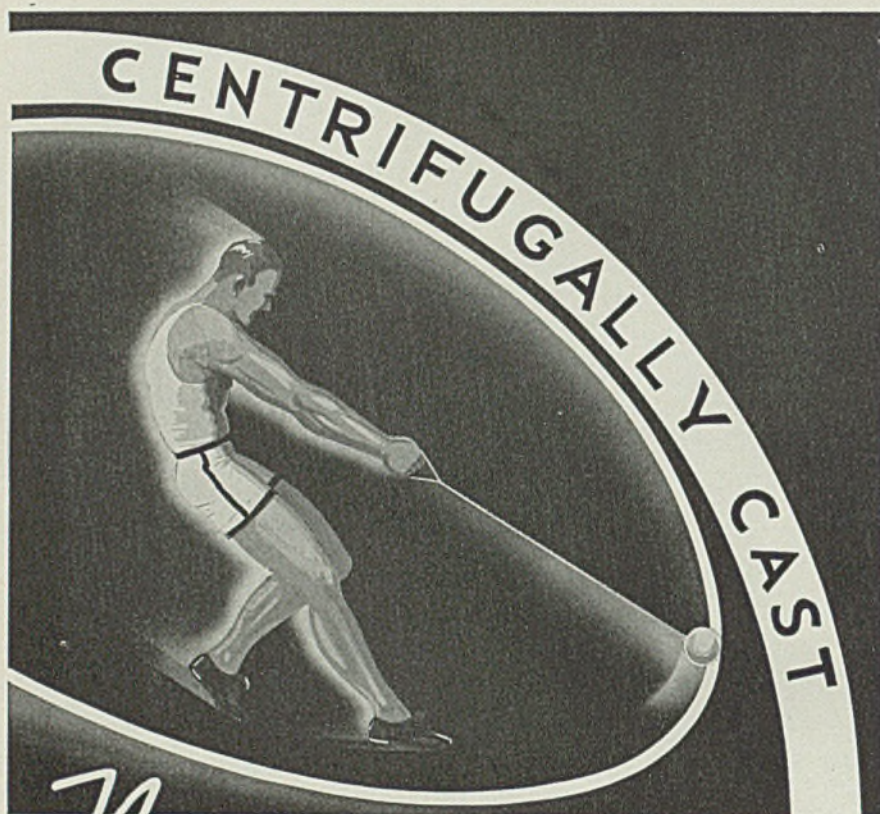
Car Orders Pending

City of Philadelphia, 50 subway cars, Pressed Steel Car Co., McKees Rocks, Pa., low bidder.
Norfolk & Western, 20 all-steel caboose cars and 10 70-ton all-steel covered hopper cars to its own shops, Roanoke, Va.; this work will be in addition to heavy freight car repairs, noted in last week's issue and expected to involve 1500 gondola cars; 10 locomotives also will be built at the Roanoke shops, it is reported.

Cold-Finished

Cold Finished Prices, Page 101

Pittsburgh — Cold-finished sellers entered June with good-sized backlogs, ranging up to six weeks, with some consumers still exerting pres-



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MOLD COMPANY**

Plant, Dover, Ohio

Executive Offices: Oliver Bldg., Pittsburgh

sure for more speedy deliveries, and with demand well sustained from diversified sources. A feature in the early part of last week was the receipt of several tonnages from the automotive industry. So far, only a small amount of material has been sought by consumers affected by the strikes in other districts, although extended labor troubles might result in more inquiries in the near future. From all indications, the current month will be active, with no sharp drop here.

Wire

Wire Prices, Page 101

Pittsburgh—Manufacturers' wire specifications are holding up well and while merchants' products are quieter, mill operations apparently will continue at a high rate through June. Movement out of jobbers' stocks is expected to be brisk. As a result of the steelworks strikes in other districts, some consumers have sought assistance here for carload lots of nails, cold heading wire, and other lines. Prolonged labor trouble in the districts affected undoubtedly will result in considerably increased pressure. Export inquiry is fair. Mill prices are steady.

Cleveland—Inquiries continue to decline, but shipments remain at the high rate reported last month. Consumption is well maintained, particularly among miscellaneous manufacturing concerns. Considerable headway has been made against backlogs although they are still sufficient to maintain high operations through this month, and in some instances well into third quarter of this year.

Chicago—Wire shipments are relatively more active than new buying as producers are working off backlogs and consumers are interested in absorbing material previously ordered before making extensive forward commitments. Wire mills are expected to continue good schedules through June but lighter production is in prospect for next quarter. Favorable farm prospects aid outlook for wire product sales.

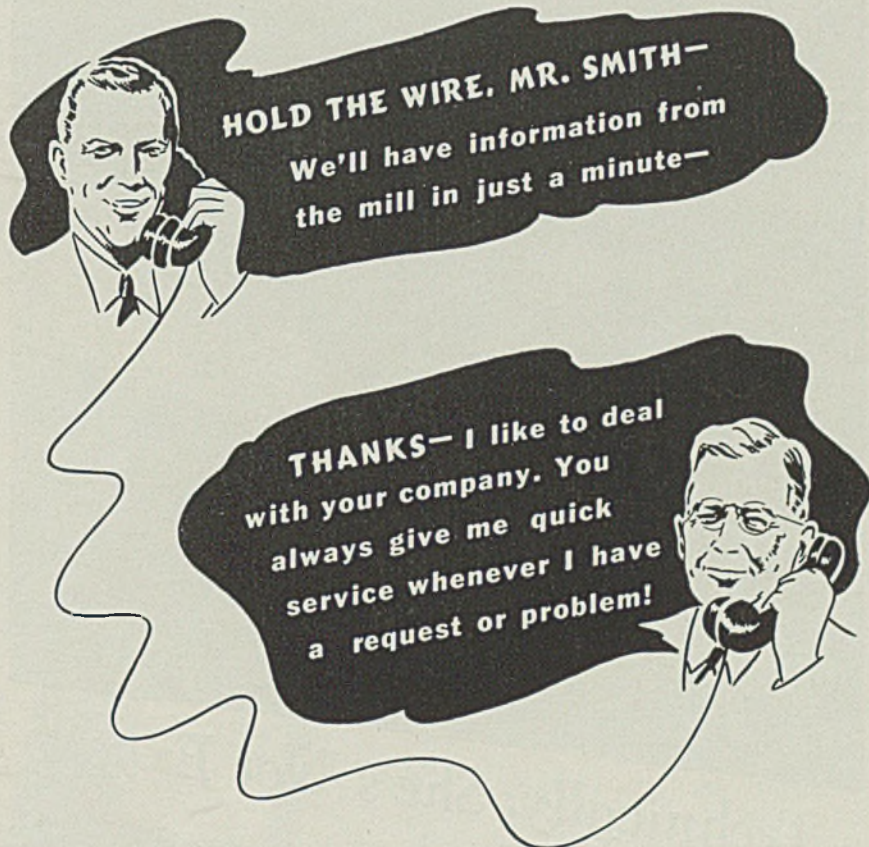
Boston—Buying of wire is at about 60-65 per cent of shipments with backlogs steadily lowered by continued high finishing operations. Some third quarter business is being booked, but the volume is not heavy. Demand is well spread with manufacturers' wire sustained. Indications are that most current purchases are going directly into consumption. Deliveries, except on a few specialties, are materially improved, with prices firm and unchanged.

New York—Having worked off stocks, users of some products, notably manufacturers' wire, are buying slightly heavier. Demand for merchant wire goods has improved slightly, while several specialties are also a trifle more active. Buying of electrical wires, rope, cable and rods holds steady with gains in some lines. While operations continue high, backlogs remain substantial. The New Haven rope producer has booked a large government tonnage. Deliveries on most standard lines improve slowly.

Shapes

Structural Shape Prices, Page 100

New York—While tonnage placed is heavier, new work is coming out in greater volume than current bookings. Outstanding is 6800 tons for the Bronx-Whitestone bridge towers, June 23, with the Triboro bridge authority. The largest contract placed, 3360 tons for the Dyckman street west side elevated highway viaducts,



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Warren, Ohio
SPECIALIZED PRODUCERS OF
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is shared by two fabricators.

Bethlehem Steel Co. is low on the major part of 31,157 tons for a Mississippi river bridge, Baton Rouge, La., the largest structural contract to come out this year.

Boston—With the award of most large tonnage projects, including a court house, Boston, and several Massachusetts bridges still unplaced, pending volume is materially reduced. Most heavy contracts have gone to Pennsylvania fabricators. A considerable num-

ber of smaller lots remain to be placed. District fabricating shops are generally busy, although backlogs are somewhat smaller.

Philadelphia—Considerable work is being figured, including a courthouse requiring 4500 tons and 1500 tons of bars on Market street on which bids will be received June 18 and two local schools. Lit Bros., with a department store at Market and Eighth streets, contemplate the erection of another store at Market and Sixty-ninth streets. Steel re-

quirements are yet to be announced.

Pittsburgh—Awards last week included 2200 tons for the New York Central express highway viaduct in New York City, placed with American Bridge Co., Pittsburgh. Carnegie-Illinois Steel Corp., Pittsburgh, has been awarded 9400 tons of sheet steel piling for the Keystone dam in Nebraska. Inquiries are well maintained, including 10,000 tons for the federal printing office annex building in Washington. Prices are steady.

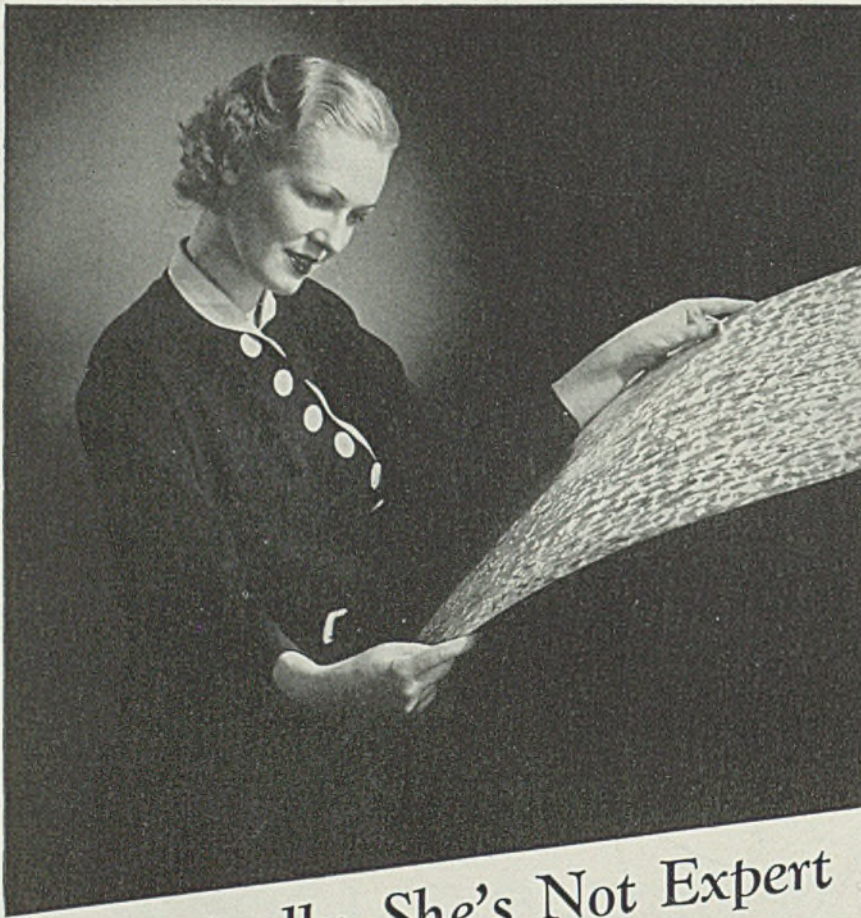
Cleveland—Most fabricating shops are well booked for at least the next 60 days, while others are still further behind in deliveries. Shipments from mills have shown little improvement although some can make deliveries within four weeks. Plans for Industrial Rayon Co.'s plant at Painesville, O., involving 3000 tons, came out last week; bids are due June 17. Recent awards are limited to small jobs well under 100 tons.

Chicago—Pending structural business for private projects is headed by 2500 tons for the Electro-Motive Corp. plant addition at LaGrange, Ill. Plans are due shortly for a large plant at Indianapolis for International Harvester Co. For Mississippi river dam No. 25, 4500 tons have been awarded.

St. Louis—Demand for shapes continues quiet, new lettings being confined to projects less than 100 tons. Fabricating plants have fair backlogs, operating at about 60 per cent of capacity and expect to maintain that pace for the next 60 days.

San Francisco—Although fabricators are figuring on numerous projects calling for less than 100 ton lots, inquiries for large tonnages are slow. Largest new inquiry requires 1830 tons for the Quartz Creek bridge, Clatsop county, Oregon. Awards totaled 2216 tons, bringing the aggregate to date to 98,845 tons, compared with 68,394 tons for the same period last year.

Seattle—Demand is easing with few important projects up for figures. Plants are fairly busy with present commitments. Pacific Car & Foundry Co., Seattle, has taken



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Shape Awards Compared

	Tons
Week ended June 5	32,915
Week ended May 29	15,660
Week ended May 22	22,610
This week, 1936	16,001
Weekly average, 1936	16,332
Weekly average, 1937	26,346
Weekly average, May	19,607
Total to date, 1936	451,414
Total to date, 1937	605,963

Includes awards of 100 tons or more.

250 tons for the Satsop river, Washington state bridge. About 400 tons of shapes and plates, to be purchased by the city, are involved in the foundation for Seattle's proposed Ruby dam, bids in early July.

Shape Contracts Placed

9400 tons, sheet steel piling, Keystone dam, Nebraska, to Carnegie-Illinois Steel Corp., Pittsburgh.

4350 tons, dam 25, Mississippi river, Cap Au Gris, Mo., to American Bridge Co., Pittsburgh.

2400 tons, highway bridge, Cleveland, and McClain counties, Oklahoma, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

2300 tons, press shop and steel storage building, Fisher Body Corp., Flint, Mich., to R. C. Mahon Co., Detroit.

2210 tons, west side elevated express highway viaduct, south of Dyckman street, New York, to American Bridge Co., Pittsburgh; P. T. Cox Contracting Co., New York, general contractor.

1500 tons, girders in press shop unit No. 1, Fisher Body division, General Motors Corp., Flint, Mich., to American Bridge Co., Pittsburgh.

1150 tons, west side elevated express highway viaduct, Dyckman street, New York to Harris Structural Steel Co., New York; P. T. Cox Contracting Co., New York, general contractor.

1100 tons, building, Garrison Radiator division, General Motors Corp., Lockport, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

930 tons, central tower, San Francisco exposition, to Judson-Pacific Co., San Francisco.

850 tons, piling, Miami, Fla., divided 380 tons, to Jones & Laughlin Steel Corp., Pittsburgh, and 470 tons to Bethlehem Steel Co., Bethlehem, Pa.

700 tons, Keystone dam spillway, Keystone, Nebr., Central Nebraska Public Power and Irrigation district, to Omaha Steel Works, Omaha, Nebr.

625 tons, grade elimination bridge WPGM-385, East St. Louis, Ill., to Bethlehem Steel Co., Bethlehem, Pa.

610 tons, steel sheet piling, All-American canal, California, to Bethlehem Steel Co., Bethlehem, Pa.

565 tons, factory building, Diesel engine division, General Motors Corp., Detroit, to R. C. Mahon Co., Detroit.

530 tons, operating bridge, Pleckwick Landing Dam, Tennessee Valley Authority, to Milwaukee Bridge Co., Milwaukee.

400 tons, bridge over Canadian river, FAP-585-A & B, Gluck-Potter counties, Texas, to Bethlehem Steel Corp., Bethlehem, Pa.

400 tons, state bridge over Big Horn river, Manderson, Wyo., to Minneapolis Moline Power Implement Co., Minneapolis.

370 tons, state bridge, Westmoreland-Indiana counties, Pennsylvania, to Jones & Laughlin Steel Corp., Pittsburgh.

335 tons, addition, Eastern high school, Washington, D. C., to Barber & Ross Co., Inc., Washington; Harwood & Nebel Construction Co., Washington, general contractor.

250 tons, state bridge Satsop river, Wash., to Pacific Car & Foundry Co., Seattle.

250 tons, highway bridge, Leary, Ga., for Calhoun county, to Bethlehem Steel Co., Bethlehem, Pa.

235 tons, Drexel building addition, Los Angeles, to Pacific Iron & Steel Co., Los Angeles.

220 tons, Wilson Way crossing, Stockton, Calif., to Minneapolis-Moline

Power Implement Co., Minneapolis.

200 tons, terminal warehouse, Richmond, Va. to Richmond Structural Steel Co., Richmond, Va.

165 tons, highway bridge, Big Horn county, Wyoming, to Midwest Steel & Iron Co., Denver.

160 tons, addition, nurses' home, Johns Hopkins hospital, Baltimore, to Dietrich Bros., Baltimore; 55 tons, reinforcing, to Bethlehem Steel Co., Bethlehem, Pa.; Consolidated Engineering Co., Baltimore, general contractor.

145 tons, state bridge, Huntingdon county, Pennsylvania, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

140 tons, factory addition, City Auto

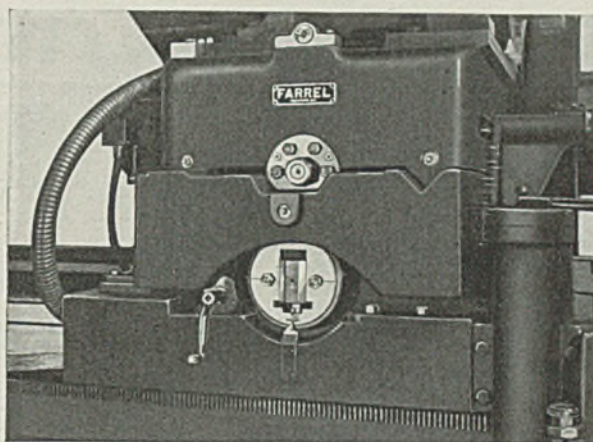
Stamping Co., Toledo, O., to Whitehead & Kales Co., Detroit.

115 tons, state highway bridge, RC-3872, Champlain Village, Clinton county, New York, to Bethlehem Steel Co., Bethlehem, Pa.; Dennie B. Riggs, Troy N. Y., general contractor.

110 tons, assembly building, Wright Aeronautical Corp., Paterson, N. J., to Hudson Structural Iron Works, Inc., Jersey City.

100 tons, factory for California Container Co., Emeryville, Calif., to Herick Iron Works, Oakland, Calif.

100 tons, reclamation bureau bridge, Boise project, Ida., to Virginia Bridge Co., Roanoke, Va.



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The device is the adjustable, single eccentric type, built into the wheel head at the rear of the carriage, the design and construction of the mechanism assuring exact synchronism between the wheel carriage and wheel when crowning or concaving a roll. It is designed for ease and simplicity of setting and to produce the exact curvature required. The eccentric and change gears are readily accessible so that settings for any curve can quickly be made.

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Company, Inc.
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Shape Contracts Pending

31,157 tons, superstructures and approaches, bridge, Mississippi river, Baton Rouge, La., four contracts, opening May 26, Louisiana highway commission, H. B. Henderlite, chief engineer. Contract 1—substructure—Kansas City Bridge Co., Kansas City, Mo., low, 407 tons structural steel; contract 2—main river bridge superstructure, Bethlehem Steel Co., Bethlehem, Pa., low, 15,750 tons silicon structural steel and 3500 tons, carbon structural steel; contract 3—see reinforcing pending; contract 4—superstructure approaches, Steel Construction Co., Birmingham, Ala., low, 6500

tons, carbon structural steel, 5000 tons, silicon structural steel. Contract 2 also takes 550 tons, steel castings. 10,000 tons, federal printing office annex building, Washington; bids June 29. 6800 tons, towers, Bronx-Whitestone bridge, Triboro Bridge authority, New York; bids June 23, contract WB-3. 3000 tons, plant, Painesville, O., for Industrial Rayon Co., Cleveland; bids June 17. 2950 tons, piling, East river drive, contracts 3 and 4, New York; Frederick Snare Corp., New York, low. Latter contract includes 160 tons of shapes and 170 tons of bars. 2500 tons, plant addition, Electro-Motive

Corp., LaGrange, Ill. 1800 tons, state bridge, Carbon county, Pennsylvania, M. A. Carty Construction Co., Phillipsburg, N. J., low on general contract; 380 tons of reinforcing bars also are involved. 1250 tons, operating bridges spillways, Chickamauga and Guntersville dams, Tennessee Valley authority; bids June 16. 1000 tons, bridge, Shiprock, N. Mex. 870 tons, building, Russel Properties Inc., Riverview, Mich. 840 tons, Rock river bridge, Moline, Ill.; bids June 11. 763 tons, bridge, New Trenton, Ind. 750 tons, federal office building, Houston, Tex. 700 tons, bridge, Chattanooga, Tenn. 600 tons, senior high school, Philadelphia. 600 tons, bridge, Harrison, Ind. 580 tons, municipal auditorium, Burlington, Ia., Henty Daitner, Detroit, low. 500 tons, state highway bridges RC-2457 and RC-3880, Broome and Delaware counties, New York. 400 tons, foundation work, penstocks, etc., for first unit Ruby dam, Seattle light department; bids early July. 400 tons, switch structures, Pickwick Landing dam, Tennessee Valley authority; bids June 17. 400 tons, warehouse addition, Chrysler Corp., Detroit. 360 tons, department store, Montgomery Ward & Co., Lexington, Ky. 300 tons, warehouse, loading dock and bridge, Columbus, O., for Owens-Illinois Glass Co., Toledo, O. 300 tons, foundry addition, Standard Stoker Co., Erie, Pa. 300 tons, state highway bridge, Belton, Mont. 250 tons, service building, for Consumers Power Co., Battle Creek, Mich. 250 tons, boiler framing, Consolidated Edison Co., New York. 242 tons, grade crossing, route 3, over Susquehanna & Western railroad, Paterson, N. J.; bids June 7, state highway department, Trenton, N. J., A. Lee Grover, clerk. 240 tons, state grade crossing, Paterson, N. J., bids June 7. 220 tons, I-beam bridge, Somerset county, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 11. 220 tons, rail supports and sills, gates, Pickwick dam, Tennessee Valley authority; bids June 9. 133 tons, bureau of roads 180-foot span, Lincoln county, Montana; bids at Missoula, June 16-17. 132 tons, sheet piling, bulkhead, Newport Beach, Calif.; bids opened. 120 tons, plate girder and I-beam bridge, Centre county, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 11. Included, 45 tons plain steel bars. 115 tons, bridges, Clear Creek and Chaffee county, Colorado; bids opened. 100 tons, Tongue river storage project, Mont.; bids to state conservation board, Helena, June 12. 100 tons, highway projects, Bloomfield and Wallingford, Vt.; bids June 18. Unstated, bureau of roads 532 foot span, Victor highway, Idaho; W. C. Burns, Idaho Falls, Ida., low. Unstated, \$200,000 state bridge, McMinnville, Oreg.; plans ordered by state highway commission. Unstated state underpass, Mineral county, Montana; Charles Shannon, Butte, low. Unstated tonnage, truck engine manu-

Behind the Scenes with STEEL

Egypt

ON OUR desk the other day appeared a mysterious looking package. Always on the lookout for bombs, we cautiously looked at the label, and found it covered with wiggly characters and Egyptian bricklayers. Boldly we attacked the Thing and found inside a scroll. Holding the rod, we gave the end to an office boy and sent him after a case of beer. In less than five minutes the Thing was unrolled and on the end was a note saying for us not to be afraid, that the wiggly characters were only Egyptian for the number of furnaces built by Ferro Enamel Corp. in the past three years.

Age

CRAWING lustily just two years ago this issue, this department was folsted upon an unsuspecting public in the brilliant light of an almost midsummer gas lamp. While today we were celebrating



and eyeing with greed a luscious 2-burner cake, Cmfswyp, the zinc-line cameraman, got this original shot. Shortly after it was taken we rushed away, knocking down the prop at the left and burying ourselves beneath the scenes.

Queenly

MORGOIL bearings could support five queens, according to an advertisement situated in the select air of pages six and seven of this week's book. In the papers we read that the lovers of Windsor on their honeymoon lugged 226 pieces of luggage including dogs and maids. And she's just a duchess. Horrible indeed would be the upkeep and support of five queens in the style to which they

are accustomed. Our hat, if we had one, would be off to the makers of Morgoil bearings. Their accomplishment is indeed a bit station-house.

Fame

WELL-KNOWN indeed is the Readers Service department of this publication. In the mallbag the other day was a letter addressed simply "Reader Service Dept.," without any notation as to what publication. Prompt delivery was the result, making us wonder in what mysterious ways these postmen move to find their goals.

Historical

DEFINITELY historical is the trend in STEEL for this week. History of stainless steels is well covered by Doc Krivbok of Allegheny in his paper beginning on page 50, while forging machinery is followed through the years by Mac Reed of Erie Foundry, starting on page 46.

War

QUITE militaristic is the atmosphere around these palatial offices. Under our very nose is an encampment of the army, who blow bugles every morning about ten o'clock and raise flags on the grounds of the Great Lakes Exposition at our back door. Sometimes we wish we were in New York where they have an anti-horn blowing ordinance. Sooner or later we are going down to see if the army lads eat from soup kitchens like Gov. Davey of Ohio proposed to use in feeding the unemployed. Sheet metal men lost a glorious opportunity for business when Ohio's legislature killed that plan. Think of the miles of sheet required to build those thousands of kettles!

Allure

LADIES' day for STEEL'S advertiser appears to be in this issue. The pretties are there for you to get allured by on pages 22, 25, and 112 of this issue. And we'll bet they sell a mean bit of steel, too.

—SHRDLU

facturing plant, International Harvester Co., Indianapolis. Unstated, 380 foot state span, Belton, Mont.; W. P. Roscoe, Billings, low.

Reinforcing

Reinforcing Bar Prices, Page 101

Pittsburgh—Recent awards include 800 tons for the Fisher Body press shop at Flint, Mich., placed with Taylor & Gaskin, Detroit. Inquiries include 2000 tons for the Parkside housing project in Detroit, and 750 tons of rail bars for the U. S. veterans' hospital at Dearborn, Mich.

Cleveland—Most reinforcing fabricators continue to operate at the steady rate of last month. Majority have sufficient stocks to take care of active operations through this month. Most recent requirements are for small private jobs well under 100 tons. Pending list includes 300 tons for the Industrial Rayon Co.'s plant at Painesville, O., bids due June 17.

Chicago—Large tonnage is pending, headed by 11,700 for the central Nebraska public power and irrigation project. Shipments against orders remain heavy. Awards include 600 tons for a local viaduct.

Boston—Reinforcing contracts for bridges and highways, notably the latter for Connecticut, are heavier, about 800 tons, a good portion being mesh. Small-lot buying is fairly active. Contractor-buyers still press for lower prices with some success.

New York—Reinforcing tonnage pending is the largest in several years, led by several thousand tons for Queens and Brooklyn sewers, the former closing June 7, taking 2810 tons and the Brooklyn job, June 9. Prices are generally steady, although one tonnage project recently went more than \$5 a ton under the listed market.

Philadelphia—Several sizable reinforcing bar tonnages are active here, including notably the Market street courthouse and superstructures for two schools in this city.

Meanwhile, 700 tons have been placed for the Howard street bridge, Baltimore, through a Philadelphia general contractor. Prices are generally firm. Approximately 50,000 tons of steel, mostly bars and mesh, will be required for a Pennsylvania state toll passenger highway, 164½ miles long, between Harrisburg and Pittsburgh, is now under serious contemplation.

San Francisco—Reinforcing bar market was the most active one on the coast during the week as 2906 tons were booked, bringing the ag-

gregate for the year to 38,253 tons compared with 98,525 tons in 1936. The bureau of reclamation awarded eight projects located in California, Arizona, Idaho, Montana and Wyoming, calling for 1864 tons and have taken bids on 475 tons for delivery at Calexico, Calif.

Seattle—Backlogs continue to occupy local mills to capacity, but unless more new business develops, operations will be curtailed by July 1. No important projects are up for figures. The week's awards included 300 tons for foundations,

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Concrete Awards Compared

	Tons
Week ended June 5	7,493
Week ended May 29	3,394
Week ended May 22	4,178
This week, 1936	4,315
Weekly average, 1936	6,005
Weekly average, 1937	4,930
Weekly average, May	7,773
Total to date, 1936	156,593
Total to date, 1937	114,399
Includes awards of 100 tons or more.	

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for Seattle light department's transmission towers to Northwest Steel Rolling Mills, Seattle, and 156 tons for the Satsop river, Washington state bridge, to Bethlehem Steel Co., Seattle.

Reinforcing Steel Awards

- 800 tons, press shop, Fisher Body Corp., Flint, Mich., to Taylor & Gaskin, Detroit.
- 700 tons, Howard street bridge, Baltimore, awarded through the Kaufmann Construction Co., Philadelphia, to the American Steel Engineering Co., Philadelphia. Mistakenly announced before as awarded to Truscon Steel Co., Youngstown, O.
- 600 tons, 103rd street viaduct, Chicago, to Material Service Corp., Chicago.
- 550 tons, warehouse, J. L. Hudson Co., Detroit, to Bethlehem Steel Co., Bethlehem, Pa.
- 487 tons, bureau of reclamation, invitation 42,689-A, Phoenix, Ariz., to unnamed interest.
- 475 tons, addition, Eastern States Milling Co., Tonawanda, N. Y., to Truscon Steel Co., Youngstown, O.
- 400 tons, state highway project RC-3869, Monroe county, New York, to Bethlehem Steel Co., Bethlehem, Pa.
- 400 tons, bureau of reclamation, Pot-holes, Calif., to unnamed interests.
- 395 tons, bureau of reclamation, Invitation A-42,230-A, Calexico, Calif., to unnamed interest.

- 317 tons, crossing Pocatello, Idaho, to unnamed interest.
- 300 tons, additional buildings, veterans hospital, White river junction, Vt., to Concrete Steel Co., New York; Virginia Engineering Co., Newport News, Va., general contractor.
- 300 tons, high school, Wellesley, Mass., to Bethlehem Steel Co., Bethlehem, Pa., through M. Spinelli & Sons Co., Boston, general contractor.
- 300 tons, Seattle light department's bases for transmission towers, to Northwest Steel Rolling Mills, Seattle.
- 290 tons, senior high school, Wellesley, Mass., to Bethlehem Steel Co., Bethlehem, Pa.
- 228 tons, factory building, William Powell Co., brass founders, Cincinnati, to Truscon Steel Co., Youngstown, O.
- 200 tons, building, Loekke Insulator Corp., Baltimore, to Maryland Steel Products Co., Baltimore.
- 175 tons, bridge substructure, Marshall county, Illinois, to Kalman Steel Corp., Bethlehem, Pa.
- 160 tons, addition, Paraffine Companies, Emeryville, Calif., to unnamed interest.
- 156 tons, Satsop river state bridge, Washington state, to Bethlehem Steel Co., Seattle.
- 155 tons, state highway projects 37-1 and 3, New York, to Joseph T. Ryerson & Sons Co., Chicago.
- 140 tons, bureau of reclamation, invitation 21,041-A, Fall Siding, Idaho, to Inland Steel Co.
- 130 tons, bureau of reclamation, invitation 27,037-A, Fresno, Mont., to Sheffield Steel Corp.
- 119 tons, bureau of reclamation, invitation A-22,013-A, Casper, Wyo., to

- Sheffield Steel Corp.
- 115 tons, highway work Big Horn and Larimer county, Wyoming, to unnamed interest.
- 101 tons, bureau of reclamation, invitation 48,058-A, Cody, Wyo., to unnamed interest.
- 100 tons, bridge, New York Central railroad, Jordan, N. Y., to Joseph T. Ryerson & Son Inc., New York; Bates & Rodgers Co., New York, general contractor.
- 100 tons, laboratory, Bryn Mawr college, Bryn Mawr, Pa., to the American Steel Engineering Co., Philadelphia.

Reinforcing Steel Pending

- 2810 tons, sewer, contract 1, project 2, Queens, New York; bids June 7, president, borough of Queens.
- 2743 tons, substructure and approaches, bridge, Mississippi river, Baton Rouge, La., four contracts opening May 26, Louisiana highway commission, H. B. Henderlite, chief engineer. Contract 1, substructure, Kansas City Bridge Co., Kansas City, Mo., low, 1745 tons; contract 2, main river bridge superstructure, Bethlehem Steel Co., Bethlehem, Pa., low, 418 tons; contract 3, substructure approaches, Uvalde Construction Co., Dallas, Tex., low, 250 tons; contract 4, superstructure approaches, Steel Construction Co., Birmingham, Ala., low, 475 tons.
- 2000 tons, Parkside housing project, Detroit; bids soon.
- 1750 tons, school superstructure, Sixty-seventh and Elmwood, Philadelphia; bids opened June 4.
- 1200 tons, Market street courthouse, Philadelphia, bids being figured; also approximately 4500 tons of shapes.
- 1100 tons, Chicago sanitary district; Jacobson Bros. Co., Chicago, low on general contract.
- 915 tons, Pilot Knob check and wastewater, specification 737, All American canal project, California; bids June 28.
- 615 tons, sludge disposal building and sludge digestion tanks, Buffalo Sewer authority, Buffalo; bids June 22. Also 225 tons, steel sheet piling.
- 500 tons, Illinois state bridge; bids June 11.
- 475 tons, bureau of reclamation, invitation A-42,256-A, Calexico, Calif.; bids opened.
- 428 tons, spillway, San Gabriel dam No. 1, Los Angeles; bids June 15.
- 400 tons, Ruby dam project, city of Seattle, bids expected early July.
- 400 tons, cell block, Attica, N. Y.
- 272 tons, fender block, Bonneville dam, Oregon; bids opened.
- 235 tons, Tongue river storage project; bids to State Conservation board, Helena, Mont., June 12.
- 200 tons, building, Standard Brands Inc., Pekin, Ill.
- 196 tons, bureau of reclamation, invitation 42,715-A, Phoenix, Ariz.; bids opened.
- 150 tons, for two buildings at Berea college, Berea, Ky.; bids soon.
- 143 tons, highway work in Tulare, Glen and Alameda county, California; bids June 16.
- 115 tons, Nichols Canyon debris dam, Los Angeles county, California; bids June 16.
- 102 tons, highway work in Jefferson, Clear Creek and Chaffee counties, Colorado; bids opened.
- 100 tons, hospital addition, Cook county, Illinois.
- 75 tons, Panama Canal work, schedule

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3262, class 27; rebid of previous lot. Bids June 11.
Unstated tonnage, truck engine manufacturing plant, International Harvester Co., Indianapolis.
Unstated, state underpass, McGulres, Idaho; Sather & Son, Seattle, low.

Pig Iron

Pig Iron Prices, Page 102

Pittsburgh—Labor situation has not affected pig iron to any great extent yet. Spot business continues light and opening of third quarter books has not resulted in any undue excitement on the part of buyers. Export inquiries have been fair recently. Pig iron prices are unchanged for third quarter. Reaffirmation of the present quotations for third quarter had been taken for granted during the last month by most consumers.

Cleveland—As expected, pig iron sellers opened books last week for third quarter at second quarter prices. However, this failed to stimulate the dull market of the last few weeks. Most foundries are apparently well stocked or have considerable tonnage still to be shipped this quarter and so feel there is no need of contracting for additional tonnage. Shipments are steady, reflecting continued good schedules.

Chicago—Pig iron producers have opened third quarter books, extending the current market. While strikes are restricting production, many consumers are protected by ample stocks and no acute shortage is in early prospect. Foundry operations reflect some seasonal slackening in castings consumption. Automotive interests are curtailing output but farm implement manufacturers hold schedules to near capacity levels. New business is heavier with the opening of books for the next period but fairly large tonnages remain to be shipped against old contracts.

Boston—Pig iron buying is light. Prices are unchanged for third quarter and most sellers are booked several months ahead. Practically all second quarter contracts will be shipped in full. While foundry melt continues high, some decline is probable during the third quarter from rate attained during first six months. About 795 tons of Indian iron arrived against old orders recently. At least two boats will load for Japan with Mystic iron during June.

New York—Pig iron consumers are contracting slowly for third quarter as the price is settled. Specifications against existing contracts are holding up well, however. Considerable miscellaneous export inquiry is

current but no large purchases have been noted recently.

Philadelphia—With books opened for third quarter at unchanged prices, the market's even tempo continues. Routine contracting, however, may be expected as the new period approaches. The Pencoyd, Pa., consumer of basic iron was reported in the market for a substantial tonnage, but this met with official denial. This consumer early in April entered the market for 12,000 tons for delivery over April, May and June, but it was eventually

reported, was later able to obtain requirements through affiliated furnaces in the Pittsburgh district.

St. Louis—Books for third quarter pig iron have been opened with prices unchanged. This verified expectations of buyers. The St. Louis delivered price for Northern No. 2 foundry is \$24.50 per ton and Southern No. 2 foundry, \$24.12 per ton. Sellers report only a moderate volume of inquiry and orders. Most melters are well supplied, and with the old price reaffirmed, there is no incentive for buying for stock. Melt

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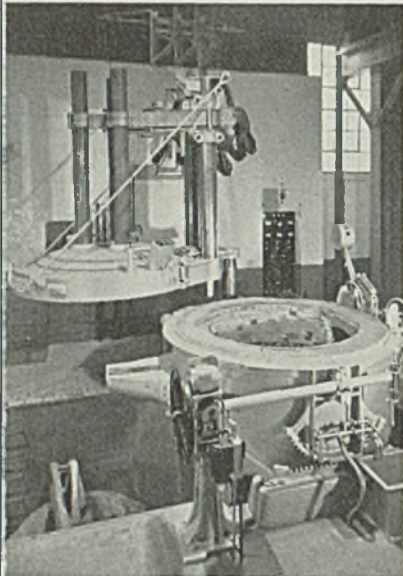


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is holding up well, the hot weather of the past week having failed to affect operations. Closed periods for vacations, repairs, inventory, etc., are expected to be shorter this year than in a number of seasons. Certain mills and specialty shops will carry on through the summer with practically no interruption.

Cincinnati—Prices of pig iron, both Northern and Southern, are reaffirmed for third quarter, differentials being unchanged. Northern iron remains at \$24 for No. 2 foundry, base Hamilton, O., and Southern is quoted for delivery in Cincinnati at \$23.69. Melters show no haste in covering requirements and, without price incentive, the market continues quiet. Foundries are near peak operations on backlogs but complain of slackening in new business.

Toronto, Ont.—New business continues in good volume. Scarcity of iron scrap is stimulating sales. Melters are placing orders regularly with awards ranging from a car to 400 tons and total sales for the week around 1500 tons. Melters covered by contract are taking schedule delivery and the movement of iron between producers and melters is practically at year's peak. Indications are that shipments will continue at high level. April production at 68,138 long tons compares with 70,989 tons a year ago. Imports continue light. Prices are firm and unchanged.

Scrap

Scrap Prices, Page 104

Philadelphia—While the tone of the market continues easy, few changes in scrap prices were noted over the past week. Steel shafting is off 50 cents, heavy breakable cast similarly and machinery cast off 25 to 50 cents a ton. No. 1 heavy melting steel and No. 2 steel are off slightly, although there has been little substantial buying to afford a test. As a matter of fact, the situation in steel is decidedly mixed, with some strengthening indications offset by further declines at certain consuming points on relatively small tonnages. Reports current in the early part of the week that as high as \$18 was being paid for export in this district appeared erroneous; such prices were paid a fortnight or so ago but are no longer being offered. At the moment no export offerings were noted here.

Pittsburgh—No. 1 heavy melting steel remains at \$18.50 to \$19 per ton here in the absence of mill buying, while dealers and purchasing executives alike are closely watching for effects of strikes in other

steel producing areas. So far, apparently, the labor situation has not made material any freer here. Closing of railroad lists resulted in the Pennsylvania steel bringing about \$20.25, while that of the Pittsburgh & Lake Erie about \$20.50. Railroad specialties are understood to have commanded about \$24 per ton.

Cleveland—Nominal quotations rule in the scrap market in the absence of sales. Surprisingly, no distress scrap has appeared as a result of strikes here and in the Valley. General scarcity of tonnage keeps dealers busy seeking to fill orders and shipments have been light. Results of railroad lists sales will aid in clarifying the situation.

Chicago—Consumers' prices on scrap are almost entirely nominal, due to absence of buying occasioned by local strikes. Distress lots have accumulated and such tonnages are going at prices well below figures prevailing on last mill purchases. Dealers and brokers are inactive in buying old material pending clarification of the market.

Boston—Several grades of scrap for domestic shipment display further weakness, despite lack of buying. For export, while heavy melting steel is unchanged, several other grades are easier, including machinery and heavy breakable cast. An extremely dull domestic demand continues, most activity being for export. Scrap rails, rails for rolling and machine shop turnings are weaker.

New York—While prices are mostly nominal, due to lack of buying, several grades of scrap for domestic shipment continue to sag, including No. 1 machinery cast, grate bars, rails for rolling stove plate and machine shop turnings. Most grades for dock delivery are unchanged, dealers paying \$15 as the top for No. 1 heavy melting steel, with most activity confined to buying against orders.

Detroit—Scrap prices are lower, with almost complete absence of interest. Labor troubles of independent steel producers have added another bearish factor locally, mills here being unwilling to make commitments while faced with the possibility of being forced to shut down open hearths. A quick turn upward in price is not far off, in the opinion of dealers, who see a sharp rise once current pent-up demand is released.

Washington—The Maritime commission has announced it will receive bids July 8 for scrapping 28 obsolete cargo vessels, on which bids were opened May 28 and rejected as being too low. New terms permit foreign dealers to bid. Four ships are located at Staten Island, 17 at Norfolk, Va., and seven at New Orleans. Maritime Navigation Co. Ltd., Liver-

—The Market Week—

pool, N. S., is said to have made an offer of a higher price than domestic bidders, at about \$5 per deadweight ton, compared with an average of \$2.07 per ton by American dealers.

Cincinnati—Quotations on iron and steel scrap tend downward as mills continue refusal to buy for future needs. The weakness is accentuated by strikes in other districts. Brokers with old contracts are deliberate in covering, and dealers indisposed toward speculation. Consumer interest is low and prices are considered nominal.

St. Louis—Dullness accompanied by a weak tone features the market for scrap iron and steel. Mills are purchasing practically nothing, most being well supplied. There were further markdowns, among the grades affected being iron car wheels, brake shoes, heavy melting steel, railroad malleable, sheets, stove plate and No. 1 and 2 railroad wrought.

Seattle—Exporters take a pessimistic view of the Japanese market. Reports are that government steel works, the largest buyer, is stocked to the end of the year. Some orders have been canceled due to inability of foreign buyers to furnish letters of credit. The export price has declined to about \$12. Local mills have large supplies and are buying only occasionally. Tidewater warehouses and yards are stocked to capacity and dealers suppliers to delay shipments.

Toronto, Ont.—Trading in iron and steel scrap for the past week was sustained although dealers experience more difficulty in procuring iron grades. Shipments of heavy melting steel, turnings and other steel grades to mills at Hamilton and Montreal are in good volume. Supplies, however, are diminishing under heavy shipments and new supplies are less than demand requirements. Iron scrap also is scarce but there is a persistent call for all the machinery cast available and dealers are obtaining limited supplies.

Tin Plate

Tin Plate Prices, Page 100

Pittsburgh — Pressure for tin plate deliveries remains unusually strong and mills are operating well over 100 per cent. Because of the seasonal necessity for material, a flurry of inquiries is more likely to be encountered in tin plate than in any other product as a result of the strikes in other districts. Capacity here, however, is well sold out until Sept. 30. With unusually favorable weather in most parts of the country, the vegetable and fruit pack this season will be heavy. Shipments to packers have been gaining

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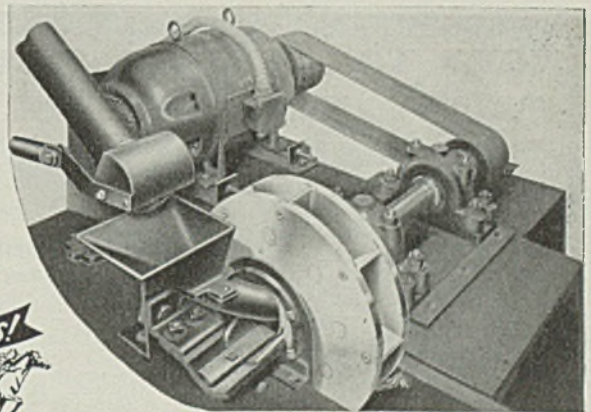
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during the past month and they are pressing for all the material they can obtain. Beer cans are well ahead of last year and oil packaging is also showing a gain.

Warehouse

Warehouse Prices, Page 103

Pittsburgh — Warehouses have noted an upturn in buying recently, after slump encountered late in May. In many quarters it is believed consumers' stocks are becoming low and that a steadier movement may be expected. Sheets, plates and structurals continue in active demand. Prices are steady.

Cleveland — Warehouse distributors report order volume and aggregate tonnage continues to decline moderately for all products. However, sheets, strip, and plates remain fairly active. Most jobbers are well stocked. Some look for a steady volume of business over the remainder of this quarter, despite the fact that the trend has continued downward since the middle of May.

New York—Until 10 days ago warehouse demand held to the peak rate of recent weeks. Of late, however, tonnage per order has tended

lower with demand as to products well balanced, sheet buying holding well. Cold-finished is also active. Some jobbers report deliveries of blue annealed sheets more delayed than galvanized. Prices are firm.

Philadelphia—Warehouse inquiry continues varied. Orders are smaller but still numerous. As summer approaches, however, continued shrinkage in volume is expected. Last month business was down about 10 per cent from April for some leading distributors, and a further reduction of at least this amount is considered likely for June. Prices are steady.

Cincinnati—Volume of warehouses is holding because of extraordinary demand for sheets and plates. Sales have been consistently above corresponding period of 1936.

St. Louis — Warehouses report May business slightly below April, but best for any May since 1929. A slight decrease is expected in June, but will be smaller than usual as building and manufacturing are taking substantial tonnages. Barge and boat builders are purchasing plates and other supplies liberally. Purchasing of sheets is outstanding. Reflecting greater drilling activities in the Oklahoma and Arkansas fields, sales of oil country goods are heavy.

Prices hold firm throughout the list.

Seattle—The jobbing trade is fair, although spotty. Goods are moving in small lots, the month's volume being about equal to that of May. Sheets are probably in best demand.

Iron Ore

Iron Ore Prices, Page 104

Cleveland—For the second consecutive month all prior records of iron ore shipments from the upper lakes were broken, when 10,043,856 tons were brought down during May. Previous to this the largest tonnage shipped during May was in 1929 when 9,549,273 tons were brought down.

Shipments last month almost doubled the 5,049,744 tons in May, 1936. They exceeded April, 1937, shipments by over 6,000,000 tons.

Shipments from upper lake ports for the season to June 1 follow:

Port	To June 1, 1936	To June 1, 1937
Escanaba	291,865	858,238
Marquette	493,531	1,211,323
Ashland	483,838	1,087,482
Superior	1,795,561	4,376,485
Duluth	1,346,950	3,776,857
Two Harbors	657,445	2,304,026
Total	5,069,190	13,814,411

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Steel In Europe

Foreign Steel Prices, Page 103

London—(By Cable)—Price of foundry pig iron has been increased £1 in Great Britain and some business has been transacted at the new price, for delivery not before three months. Semifinished steel from the Continent is arriving more freely but still is insufficient for needs. All classes of steel consumers are fully occupied by demand for their goods. Some export trade is being done.

The Continent reports new export business is slightly easier, enabling works to catch up on backlogs. The domestic markets are active.

Semifinished

Semifinished Prices, Page 101

Pittsburgh—Sustained heavy demand for sheet bars and billets confronts semifinished producers and there is little likelihood of any sharp drop for some time in the high rate of operations. One of the largest tonnages for export in some time has been booked at a highly advantageous price. It involves around 40,000 tons of ingots for Japan. Other foreign inquiries

—The Market Week—

are numerous. Some mills here are still encountering difficulty satisfying demand of their own finishing departments and are receiving numerous requests from outsiders desirous of securing more than they can obtain at present. Forging shops are busy. Sheet bars, billets, slabs and blooms are quoted \$37 per gross ton, Pittsburgh; forging billets, \$43; wire rods, \$47 and \$52, and skelp 2.10c.

Nonferrous Metals

Nonferrous Metal Prices, Page 102

New York — Major nonferrous metals held steady here last week despite unsettlement of the foreign markets due to international political complications, spread of labor trouble in this country and renewed rumors that the United States may lower its buying price of gold. Consumers bought lightly in view of the uncertainties.

Copper—Export copper sagged to around the 14-cent level by the end of the week after selling earlier at 14.47½c, c.i.f. Electrolytic copper held at 14.00c, Connecticut, on only a fair volume of business.

Lead—Statistical position of the lead market strengthened further as heavy shipments continued to exceed production. Consumers bought actively for June and July delivery at 5.85c, East St. Louis, and 6.00c, New York.

Zinc—Shipments were well maintained despite a decline in galvanizing operations. The market was supported in the absence of any substantial new business on tightness of nearby supplies. Prime western held firm at 6.75c, East St. Louis.

Tin—Straits tin held fairly steady here despite rapid and wide price fluctuations in London. Trading was generally dull with new buying hindered by labor difficulty in this country. Straits spot closed around 56.12½c.

Antimony—Prices held unchanged until Friday when American metal declined ¼-cent to the basis of 14.75c, New York, for spot. Chinese spot also eased ¼-cent to 14.00c duty paid New York, but futures held at 13.00c, c.i.f. in bond.

Metallurgical Coke

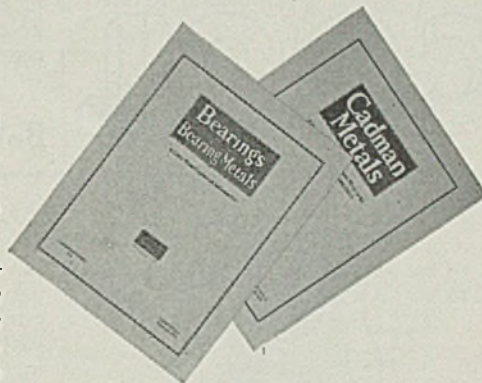
Coke Prices, Page 101

With demand for Connellsville beehive coke considerably lighter recently, several hundred ovens have been blown out or will be blown out soon. Despite the general slackening in demand, considerable coke is still moving, however. Effects of the steelworks strikes at Youngs-

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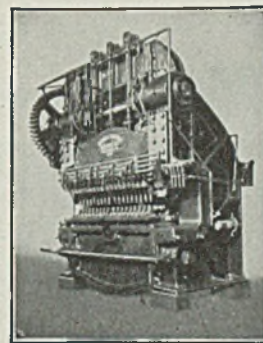
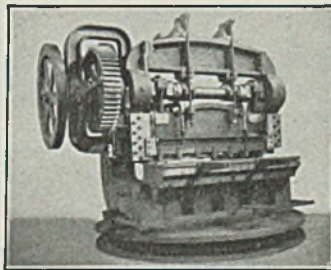


Plate Shears

Another Thomas fabricating tool that has built a reputation for Thomas design!



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SPACING MACHINE CO.

PITTSBURGH, PA.

FABRICATING MACHINERY

PRESSES • DIES • METAL-FORMING MACHINERY

BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS

Mirrors of Motordom

(Continued from Page 38)

letter published last week in one of the local papers. In part, it read:

"I'm only sorry I wasn't at the Ford plant when it began raining union organizers all over Miller road. That must have been quite jolly.

"I'm a Chrysler man. Yes, I belong to the union—now. Either belong or else—! I can remember those turbulent days. We went to see Prosecutor McCrea, and asked him to do something about the trouble, but he seemed rather evasive, and it was quite apparent we couldn't get to first base with him.

"Now the prosecutor is quite eager to investigate the Ford riot. Well, as one union man to another non-union man, I say, here's to the Ford Motor Co. and long may it continue to give the union organizers muscle man for muscle man. I look on my union card as only another drain on my pocketbook."

AUBURN is announcing its entry into the air conditioning equipment field, having concluded negotiations with Russell Electric Co. of Chicago for manufacture of air conditioning apparatus under that company's patents. Auburn is now making refrigerator cabinets, refreshment coolers and similar products at its Connersville, Ind., plant . . . Automobile output in Canada for April totaled 17,081 units, compared with 24,901 in March, reflecting labor difficulties in plants there. Production in the first four months of the year totaled 81,272 . . . W. A. MacDonald who began with Hupp 23 years ago and for a number of years was personal representative for W. C. Durant, is now vice president and director of sales for Hupp . . . Deliveries of White trucks for the first four months of the year hit 4219 units, a new high for the past 11 years. The company is now operating three shifts, has added 600 employees since the first of the year, bringing working force to 3500 . . . Graham supercharged models have accounted for 44.5 per cent of the company's business in the first seven months of the present model year . . . Plymouth is now offering special "economy equipment" optional on present models. It includes such items as special carburetor, special intake manifold, changed rear axle gear ratio, hardened steel throttle stop and manifold heat shields. Fuel economy up to 30 per cent is claimed.

15,000 cfm will keep that hot job

COOL



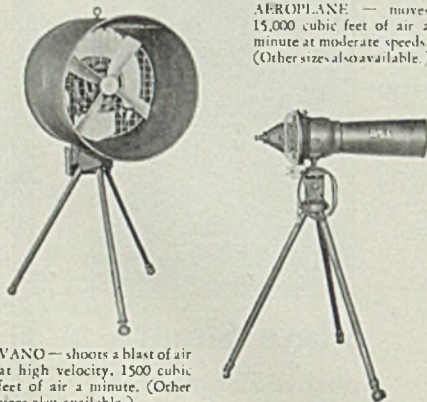
The Coppus Aeroplane Type Heat Killer furnishes large volumes of moving air to jobs that are too hot for comfort . . . and efficiency.

Workers are only 1/10 as efficient at 110° F. . . get them up to normal by bringing the temperature down to normal with fresh air.

With a Coppus Heat Killer, there's no recirculation of stale air — and the cool air is aimed on the job.

Vano type: Air at high velocity. Heat Killers are portable — and can be used for cooling, driving out foul air, etc. Write for Bulletin 160-4.

AEROPLANE — moves 15,000 cubic feet of air a minute at moderate speeds. (Other sizes also available.)



VANO — shoots a blast of air at high velocity. 1500 cubic feet of air a minute. (Other sizes also available.)

FRESH AIR FOR MEN AND MACHINES COPPUS

COPPUS ENGINEERING CORPORATION, 359 Park Avenue, Worcester, Mass. Sales offices and distributors listed in Thomas' Register.

In Sweet's — Steam Turbines, Air Filters, Blowers, Heat Killers

town and other centers have been felt throughout the region, particularly in the coal mines of the affected companies. One steel producer is reported freely selling to other sources its coal on track in the Great Lakes region. Some slowing up has been noted from foundries. Beehive coke prices have held fairly steady considering all circumstances.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 101

Leading sellers have reaffirmed bolt prices for third quarter, but have announced an increase of 5 per cent on hot pressed and cold punched nuts and semifinished nuts with advance to become effective immediately on spot tonnage. Business of the industry was off about 25 per cent in May with a further decline expected this month, although contract customers will probably specify more liberally on nuts in view of the increase which will affect them July 1.

Equipment

Pittsburgh—Demand for machine tools and other equipment continues active, although under March and April volume. Compared to last year, order backlogs are somewhat better. Electrical equipment manufacturers are busy, while the requirements from other sources are fairly steady.

New York—Machinery orders and inquiries are maintained. Demand covers a wide range. Large lists such as recent bulk purchases for eastern plants by General Motors Corp. and American Locomotive Co. are absent. Deliveries are further extended on most lines. Shortage of skilled mechanics and a general uncertainty as to the labor situation are bearish factors.

Boston—Although some decline in buying of grinding machinery is evident, most builders of industrial plant tools note but slight, if any, drop in new business. The mild slack in domestic orders for grinders has been largely taken up by considerable export volume placed by Japan and Russia in the Worcester district. These machines are for delivery in five to six months. Practically all shops have heavy backlogs. Shipments are as heavy as production permits. A substantial volume of wire mill and wire fabricating machinery is being placed while heavy electrical equipment shops have large order books.

Construction and Enterprise

Ohio

BLUFFTON, O. — Central Ohio Light & Power Co., Arch Robinson vice president and general manager, Findlay, O., is having plans prepared by Sargent & Lundy, Chicago, engineers, for construction of a 10,000-kilowatt steam generating plant, costing \$1,200,000. Bids on building and equipment will be taken soon.

CLEVELAND—Municipal light and power department, city hall is considering new steam-electric municipal generating station in connection with Nottingham water filtration plant project, on which work is now under way. Proposed power plant will be equipped for initial capacity of 50,000 kilowatts. Estimated cost \$15,000,000.

CLEVELAND — Department of public utilities, city hall, plans to install boiler control equipment on all boilers at the East Fifty-third street plant.

COLUMBUS GROVE, O. — Village plans electric light plant expansion. Burns & McDonnell Engineering Co., 307 East Fourth street, Cincinnati, is making survey to equip plant for increased power. W. B. Lafferty is village clerk.

DAYTON, O.—Pittsburgh Plate Glass Co., paint division, Grant building, Pittsburgh, plans installation of electric power equipment in new addition to plant of Thresher Varnish Co., Dayton, recently acquired and to be operated as a subsidiary. Cost \$400,000.

JAMESTOWN, O. — Village, B. Elden Bailey mayor, will be ready for bids soon for construction of sewage disposal plant and sanitary sewers. PWA grant of \$17,191 has been approved and \$30,000 in bonds will be issued.

LAKEWOOD, O.—City plans complete waterworks system, costing approximately \$1,500,000. PWA grant has been applied for. E. A. Fisher is city engineer.

MANSFIELD, O.—City is considering waterworks improvements, including installation of booster station or elevated tank. Estimated cost \$150,000 to \$200,000. A. Mock is city design engineer.

NORTH BALTIMORE, O. — Village plans improvements to water supply system and constructing water softener facilities, at a total cost of \$69,167. Project has been approved by PWA. D. B. Bushey, mayor, is in charge.

POMEROY, O.—City plans municipal waterworks system and plant, costing \$125,000. Mayor C. J. Hess in charge of plans.

SIDNEY, O.—Monark Machine Co. Inc., W. E. Whlpp, general manager, plans to construct an addition to its plant and purchase machinery and equipment at a cost of about \$50,000.

Connecticut

STAMFORD, CONN. — Pitney-Bowes Postage Meter Co., Pacific street, plans installation of electric power equipment in new eight-story addition to its plant. Entire cost \$100,000. Howard Chapman is architect.

WEST HARTFORD, CONN.—Hartford Electric Light Co., 266 Pearl street, Hartford, plans constructing one-story, 25 x 30-foot power substation. Cost to exceed \$40,000.

Massachusetts

BOSTON—Edison Electric Illuminating Co., 182 Tremont street, has plans maturing for new addition to steam-electric power plant. Additional equipment will be installed. Estimated cost \$1,000,000. Jackson & Moreland, 31 St. James avenue, consulting engineers.

LEOMINSTER, MASS.—Cluett Peabody & Co. Inc., First street, receives bids this month for five-story, 120 x 125-foot factory, costing approximately \$200,000. Plans prepared by C. T. Main Inc., 201 Devonshire street, Boston.

PEABODY, MASS.—A. C. Lawrence Leather Co., W. D. Allen, manager, will soon let contract for one-story, 70 x 420-foot steel manufacturing building, estimated to cost \$100,000 with equipment.

Rhode Island

PROVIDENCE, R. I.—Narragansett Electric Co., 49 Westminster street, has had plans prepared by United Engineers & Contractors Inc., 1401 Arch street, Philadelphia, for constructing a

HEADING SPECIALISTS

Special screws of great variety made to order

Quality rivets and studs from all grades of materials to order only for other manufacturers. Progressive Manufactured Products are made on both a quality and price basis, their uniformity of construction insures you against slowing down in your assembly operation. Manufacturers learn to admire business concerns for what they are and what they do, a great many parts now made on screw machines lend themselves to heading which results in great savings and improved service. Have our specialists consult with you, our service is free and we might suggest something that may prove of considerable importance to you.

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TORRINGTON, CONN., U. S. A.

In Stock At All Times—

Standard Machine Screws—Machine Screw Nuts — Interchangeable bolts and nuts made strictly to A.S.M.E. tolerances

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THE HANNA FURNACE CORPORATION

MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION

Buffalo
Detroit
New York
Philadelphia
Boston

—Construction and Enterprise—

steam generating electric power plant. Cost to be about \$2,000,000.

New Jersey

ELIZABETH, N. J.—Gar Wood Industries Inc., Detroit, will install electric power equipment in new branch plant here for manufacture of oil burners and air conditioning equipment. Estimated cost \$100,000.

HILLSIDE, N. J.—Newark Mfg. & Engineering Co. has acquired a large tract and plans to erect a one-story plant. Cost approximately \$40,000 with equipment.

JERSEY CITY, N. J.—Metro Glass Bottle Co., Westside avenue, plans plant

improvements. Cost to exceed \$40,000 with equipment.

New York

DRESDEN, N. Y.—New York State Electric & Gas Corp., Ithaca, N. Y., is completing plans for new steam-operated electric power plant here. A power substation and switching station will be built. Fund of \$2,300,000 is being arranged for.

SYRACUSE, N. Y.—L. C. Smith & Corona Typewriters Inc., 701 East Washington street, plans installation of electric power equipment in six-story top addition to its present two-story structure. Cost in excess of \$100,000.

Pennsylvania

READING, PA.—Metropolitan Edison Co. is considering addition to electric power plant at a cost of \$3,000,000.

READING, PA.—Parish Pressed Steel Co. will build a \$75,000 addition to its plant at Weiser and Robeson streets. The building will be one-story, 70 x 642 feet. Machinery and equipment will be purchased.

Michigan

DETROIT—General Body Corp. has been organized by H. Jay Hayes, former president of H. Jay Hayes Industries, to manufacture steel welded house trailer bodies. The firm is capitalized at \$225,000.

JACKSON, MICH.—Reynolds Spring Co. Inc., C. G. Munn, general manager, plans to build a plant addition and purchase machinery and equipment. Cost about \$70,000.

RIVERVIEW, MICH.—Firestone Tire & Rubber Co., Akron, O., plans installation of electric power equipment in new mill here. Cost about \$350,000.

Illinois

CHICAGO—Chicago Metals Corp., 1662 North Elston avenue, will build a plant on North Branch canal. Estimated cost \$100,000.

CHICAGO—Cook County hospital, care of board of commissioners, Cook county, Wood and Harrison streets, receives bids this month for constructing laundry building, including installation of four 750-horsepower boilers in power house. Entire cost \$700,000.

Indiana

HUNTINGTON, IND.—National Tractor Co. plans to remodel the Erie railroad shops into a tractor factory. Cost \$40,000 or more with equipment.

INDIANAPOLIS—International Harvester Co., Chicago, plans to construct a large engine manufacturing plant here, consisting of a one-story main building, a modern foundry and heating plant with electric power substation. Overhead conveyor system will be installed. Cost is estimated in excess of \$4,000,000.

KOKOMO, IND.—Haynes Stellite Co., a subsidiary of Union Carbide & Carbon Corp., New York, has plans for erecting two new buildings, to relieve crowded conditions at the plant.

VEVAY, IND.—Town council is considering early rebuilding of municipal electric power plant damaged by recent flood. New equipment will be installed.

District of Columbia

WASHINGTON—Treasury department, procurement division, branch of supply, Seventh and D streets, will take bids until June 9 for two cranes, motor truck mounted, gasoline engine powered, full revolving complete with 25-foot extensible boom. Invitation 222-3592-A-6-9.

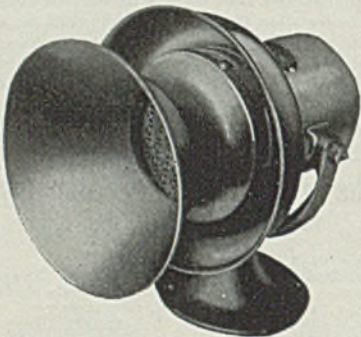
Maryland

BALTIMORE—Seaboard Steel & Iron Co., 1201 South Paca street, has plans for construction of a one-story brick and steel addition to its plant. The proposed building, 102 x 155 feet, will cost approximately \$25,000.

BALTIMORE—Engineering Contracting

New FEDERAL INDUSTRIAL SIRENS

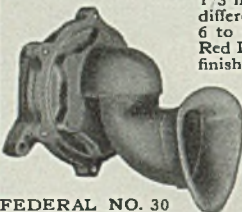
Designed for many purposes, for Industrial Plants, Foundries, Mills, Shops, Factories, Cranes, Yards, Railroad Crossings. Used as "START and STOP" work—Signal—Calling busy executives and foremen and relieving held up telephone lines. A warning for fire or theft. **PROTECTS LIVES, PROPERTY, SAVES TIME, MONEY.**



FEDERAL TYPE "D" SIREN

Weatherproof housing. Heard at great distances. Grease sealed ball bearing motor, 1/3 h.p. Thousands of different uses. Voltages 6 to 250 A.C. or D.C. Red Duco or aluminum finish.

No vibrating contacts used.



FEDERAL NO. 30

NEW FEDERAL NO. 30 HORN WITH DIRECTIONAL PROJECTOR—

Used in various dept's. In large plants, yards. Sound projected in different directions for calling busy people. Voltage 6 to 250 A.C. only—Type 40 for D.C. Rugged in construction—Built for a lifetime. Used in shops and plants everywhere.



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FEDERAL No. 30a WITH GRILLE FRONT—

Same as No. 30 except for grille front. Diaphragm is of special steel.

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OUR AIM is to render service. A little more complete... more hospitable... more pleasing... than even the most exacting guest expects.

CHAS. H. LOTT
Manager

Every Room Outside
with Private Bath
Single from \$2.50
Double from \$4.00

**DETROIT
LELAND
HOTEL**

CASS AT BAGLEY AVE.
GARAGE IN CONNECTION

—Construction and Enterprise—

Corp., North and Linden avenues, is low bidder for erection of electrical substation and cold mill building as well as foundation for new 12-inch mill for Rustless Iron & Steel Corp., 3400 East Chase street.

Florida

OCALA, FLA.—C. Carmichael, owner and manager of Silver Springs Court, plans to rebuild burned power plant.

ORLANDO, FLA.—Orlando Utilities commission, M. W. Brown, general manager, will take bids June 21 for 10,000-kilowatt turbogenerator and all necessary auxiliaries; 1500-horsepower boiler; 175-foot stack. Estimated cost \$650,000. Robert & Co., Atlanta, Ga., engineers.

Georgia

ATLANTA, GA.—J. M. Tull Metal & Supply Co. is erecting a plant adjoining its present building, to cost approximately \$80,000.

Kentucky

LOUISVILLE, KY.—Seagram Distillers Corp., 405 Lexington avenue, New York, plans installation of electric power equipment in new addition to its distillery here at a cost of \$1,000,000.

OWENTON, KY.—Owen County Rural Electrification, J. A. Satterwhite, chairman of committee, is completing engineering plans for electrification project. REA has approved partial allotment of \$130,000.

PARIS, KY.—Bourbon Distilling Co., incorporated with capital of \$25,000 by Dan E. Fowler, 408 Citizens Bank building, Lexington, Ky., and J. P. Carter, 40 Wall street, New York, has acquired site on Ford Mill pike for erection of distillery, work to begin soon.

Mississippi

CARTHAGE, MISS.—Central Power association has been allotted \$115,000 by REA for constructing 121 miles of rural power lines.

PASCAGOULA, MISS.—Board of supervisors of Jackson county receives bids June 14 for one-story steel frame, iron clad building to cost \$10,000 for proposed plywood plant. L. C. Winterton, consulting engineer.

Louisiana

MOBILE, LA.—Ozark Corp., Helena, Ark., plans installation of electric power equipment in new plywood mill at Navco station here. Plant will comprise several one-story units and also a boiler house. Total cost \$200,000.

NEW ORLEANS—New Orleans Public Service Inc. has started preliminary work toward construction of \$2,800,000 improvement and enlargement of Market street steam electric generating plant. A 37,500-kilowatt turbine and boiler will be installed.

NEW ORLEANS—Board of commissioners, East Jefferson waterworks district No. 1, has plans for constructing waterworks improvements in Jefferson parish. PWA project. Estimated cost \$30,000. Scott & Bies, 311 Maritime building, engineers.

Tennessee

ELIZABETHTON, TENN.—North American Rayon Corp. has approved plans for new additions to power house at local mill, including installation of

equipment for increased capacity. Main offices of company are at 261 Fifth avenue, New York.

MEMPHIS, TENN.—City light and water commission will take bids June 28 for machinery and electrical equipment costing \$200,000 in connection with construction of gateway substation for TVA power at southern city limits.

NASHVILLE, TENN.—Tennessee Electric Power Co., Chattanooga, Tenn., has approved plans for extensions and improvements in power substations on Fourteenth and Wedgewood avenues, Nashville. Cost \$80,000, with equipment.

ROCKWOOD, TENN.—G. W. Coleman

Co., Jackson, Tenn., is constructing a plant for the manufacture of barrel heads.

Virginia

RADFORD, VA.—Burlington Mills Corp., Greensboro, N. C., plans installation of electric power equipment in new silk mill here. A boiler house will be built. Cost estimated at \$100,000. (Noted May 17.)

West Virginia

WHEELING, W. VA.—Bloch Bros., tobacco firm, plans to build a \$200,000 office building and warehouse here.

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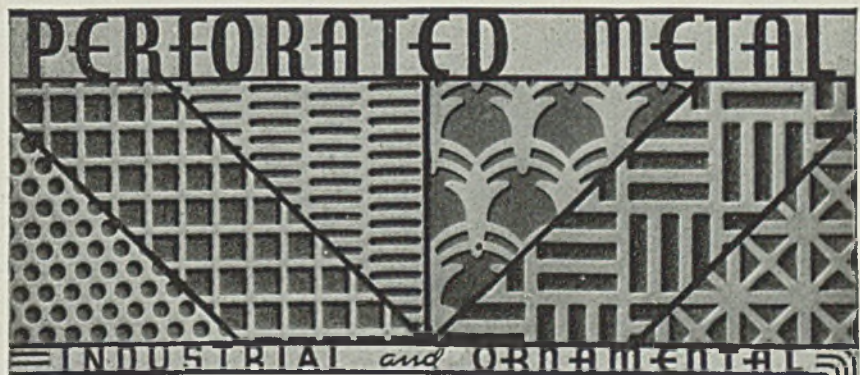
INVESTORS who have the responsibility for the management of investment funds of \$100,000 and over are invited to write for this 50-page brochure which discusses the problem of capital growth as it pertains to capital conservation.

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—Construction and Enterprise—

Arkansas

LITTLE ROCK, ARK.—Board of public affairs will receive bids June 16 for \$200,000 filtration plant. Project includes enlargement of present plant and installation of new equipment. Cost to be \$200,000.

Missouri

KANSAS CITY, MO.—General Box Co., 1600 West Eighth street, plans installation of power equipment in one-story addition to corrugated box manufacturing plant, 110 x 200 feet, at a cost of \$85,000. Work will begin soon.

ST. LOUIS—Fleishman's Pickel's Inc., H. S. Schucart, manager, 525 North Sec-

ond street, plans to establish a plant at 1411-31 North Eleventh street. Will install new machinery and equipment at a cost of about \$5000.

ST. LOUIS — American Iron-Steel Mfg. Co. has purchased a building at Norton and Minerva avenues, Wellston, Mo., and will occupy as soon as alterations are made.

Oklahoma

GUYMAN, OKLA.—General Atlas Carbon Co., 60 Wall street, New York, plans erection of power house, a compressor station and other mechanical operating units in new carbon black manufacturing plant near here. Cost over \$100,000. Application has been made for permission to erect plant.

Wisconsin

JANESVILLE, WIS.—Krause Bros., manufacturers of livestock and poultry feeds, will build a two-story mill addition, 60 x 120 feet, at 232 Shirland avenue.

JEFFERSON, WIS.—County highway committee will soon be ready for bids for building new machinery storage and repair shop, 80 x 160 feet, costing about \$45,000 with equipment. Elton G. Rice is county clerk.

MILWAUKEE—Milwaukee Flush Valve Co., 301 East Reservoir avenue, manufacturer of plumbing goods, has contracted with S. M. Siesel Co., 514 East Ogden avenue, for erection of two-story and basement plant addition, 50 x 60 feet, to replace unit recently destroyed by fire. Investment will be about \$40,000.

MILWAUKEE—Perfex Radiator Co., 415 West Oklahoma avenue, maker of gasoline and diesel engine cooling systems, space heaters, etc., will build a one-story factory extension, 40 x 140 feet.

Kansas

LYONS, KANS.—S. Ainsworth, city engineer, will take bids soon for enlargement of present ejector station to double capacity, including new compressor, ejectors, and miscellaneous equipment. Charles A. Haskins & Co., 517 Finance building, Kansas City, Mo., consulting engineer.

Wyoming

LARAMIE, WYO. — Western Public Service Co., Scottsbluff, Nebr., is considering expansion and improvements in steam-electric generating plant here, including installation of new 1500-kilowatt generating unit and auxiliary equipment.

Idaho

CLEARWATER, IDAHO—T. C. Smith, Seattle, engineer, has been retained to prepare plans for proposed 300-mile power line for Clearwater Valley Light & Power association, for which an REA grant of \$400,000 is available, also \$75,000 for construction of an 800-kilowatt generating plant.

Minnesota

ST. JAMES, MINN.—South Central Electric association, P. J. E. Peterson, secretary, receives bids early in June for primary and secondary lines for rural electrification system, totaling about 210 miles, with outdoor power substations and service facilities. Fund

of \$210,000 has been secured through federal aid.

Montana

GREAT FALLS, MONT.—Cascade Co. plans water system improvements for irrigation and other purposes, including installation of pumping unit. Total cost about \$30,000.

Iowa

GARRISON, IOWA—O. N. Heldebrant, city clerk, will hold special election June 14 on a \$17,000 bond issue to finance construction of waterworks system.

LINDEN, IOWA—City, John Harden,



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BUSINESS MEN**

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—Construction and Enterprise—

city clerk, will hold special election June 10 on a \$10,600 bond issue to finance construction of waterworks system.

PRIMGHAR, IOWA—City, J. M. Metcalf, clerk, has voted in favor of constructing a municipal light and power plant, costing more than \$125,000. (Noted May 31.)

Texas

HOUSTON, TEX.—Bryon Jackson Co., Los Angeles, has purchased a six-acre site here for erection of \$500,000 oil tool manufacturing plant. Sam D. Cook, Second National Bank building, Berkeley, Calif., will be in charge of construction.

HOUSTON, TEX.—Pittsburgh Valve & Fitting Co., Chenevert and Commerce streets, will soon take bids for one-story, corrugated iron additions to its plant. Estimated cost \$10,000. Joseph Finger Inc., National Standard building, architect.

HOUSTON, TEX.—Champion Paper & Fibre Co., Reuben E. Robertson, executive vice president, Houston, is reported enlarging its plant at Pasadena by additional unit to cost \$1,500,000. The company is also planning erection of a finishing mill.

HOUSTON, TEX.—Electric Alloy Foundry Co. of Houston has been incorporated with \$10,000 capital stock by George T. Swail, J. V. Reich and C. D. Swail.

REFUGIO, TEX.—Refugio Refining Co. has purchased a tract in Lablanca township for erection of \$40,000 refinery, including skimming plant. Work to begin soon.

Nebraska

AURORA, NEBR.—State Engineer A. C. Tilley, Lincoln, Nebr., has approved plans for Hamilton County Rural Public Power district for construction of 319 miles of rural electrification lines. Application for funds is pending with REA. H. H. Henningsen Engineering Co., 326 Union State Bank building, Omaha, Nebr., consulting engineer.

ELMWOOD, NEBR.—Permission has been granted by A. C. Tilley, state engineer, Lincoln, Nebr., to Nebraska Power Co., Clarence Minard, company engineer, Seventeenth and Harney streets, Omaha, Nebr., for construction of approximately 30 miles of transmission lines, costing \$20,000.

HASTINGS, NEBR.—Southern Nebraska Rural Power district is asking bids to June 17 for construction of 430 miles of transmission lines, costing \$475,000. O. R. Toman, 510 Barkley building, Lincoln, Nebr., is consulting engineer.

LINCOLN, NEBR.—Eastern Nebraska Public Power district, A. P. Fitzsimmons, president; George W. Kilne, secretary, 204 South Eleventh street, is taking bids until June 16 for construction of 420 miles of rural electric lines in Saunders, Cass and Otoe counties, costing about \$425,000. H. H. Henningsen Engineering Co., 326 Union State Bank building, Omaha, Nebr., is consulting engineer.

Pacific Coast

PORT TOWNSEND, WASH.—National Paper Products Co. has awarded contract to Olymple Piledriving Co., Port Townsend, for construction of additions to dock and warehouse, 90 x 420 feet and 60 x 400 feet, respectively.

PULLMAN, WASH.—Regents of Washington State college will open bids June 25 for No. 2 heating and power unit, including 500-horsepower water tube

boiler, water cooled furnace, pump and mechanical equipment.

SEATTLE—Service Tool Corp., has been organized by W. R. Smith and associates, 719 Second avenue, to manufacture lubricating devices.

SEATTLE—General Construction Co. will build a \$250,000 stock warehouse at First avenue, South, and Hudson street, 288 x 528 feet, for the Union Pacific railway. Mill and brick construction with sprinkler system is specified.

SPOKANE—Beryl Metals Co., P. H. Briscoe, president, has purchased a site here and plans construction of a reduction plant, 54 x 70 feet, for installation of furnaces and equipment.

CORVALLIS, OREG.—WPA has approved city's application for a \$45,000 intake city water system, city to purchase materials and equipment to cost \$9600.

McMINNVILLE, OREG.—Resettlement project has opened bids for 2000 feet of 2½-inch wrought iron pipe, a 75-foot beacon steel tower and various types of well pumps.

LOS ANGELES—Construction has been started on a \$500,000 factory building for Pacific Wire Products Co., Los Angeles, on a seven-acre site in the 1300 block on Alameda street. The plant will be equipped for fabrication of screen wire.

Special Carbon and Alloy Spring Wire



The demand for SENECA Quality Special Spring Wire is increasing rapidly.

We are prepared to meet all demands.

We can supply practically all grades in rounds and

SHAPES and sizes from ½" to .004.

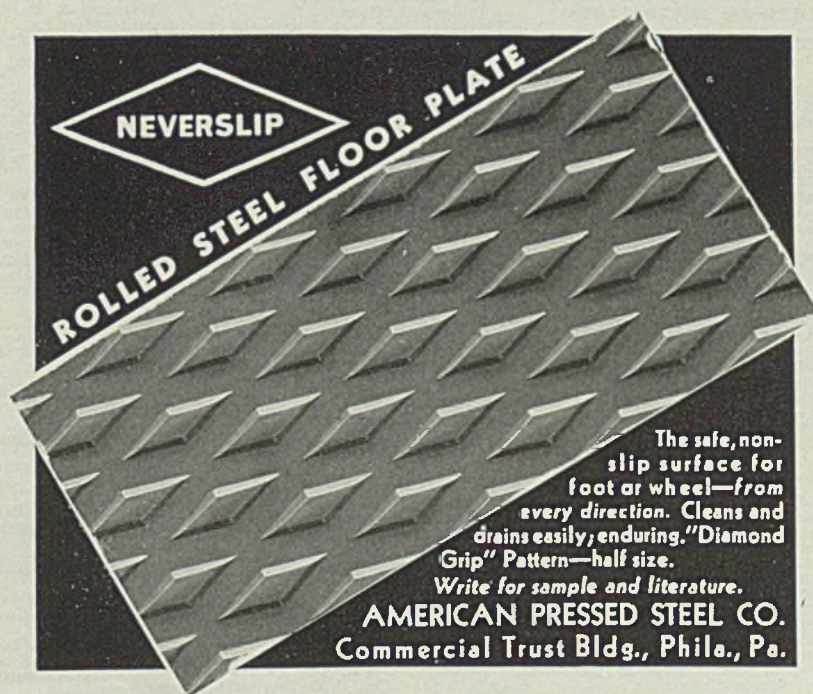
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