

# STEEL

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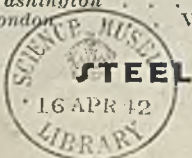
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# No. 602 CHISEL STEEL

## A Ludlum Product

This Blue Sheet contains brief but detailed information concerning the physical characteristics of No. 602 Chisel Steel as disclosed by a series of tests conducted in the laboratories of the Ludlum Steel Company. For those who wish to follow each test in detail, we have tabulated and charted the results on Pages 2 and 3. A brief summary of these tests with certain observations and suggestions for use are given in the following paragraphs:

### Grade 602 — A Tough Tool Steel

Grade 602 is a manganese, silico-molybdenum type, shock resisting steel intended for tools where extreme toughness is the main requirement, along with all the hardness and wear resistance possible. It is primarily a water hardening steel, has a wider hardening range than most carbon tool steels and will show much better performance on severe jobs. Although this grade is a comparatively recent development, it has shown exceptionally good results on a variety of applications where breakage in service has been the problem.

### Forging

Grade 602 should be heated uniformly to 1700° to 1900° F. for forging, depending on the size and amount of reduction. Avoid unduly long soaking at the forging heat, as this will result in excessive decarburization, grain growth and tendency toward brittleness. This grade forges about like 1.00% carbon tool steel and can be worked with heavier blows at first, finishing with light rapid blows at a dull red heat. Do not work below approximately 1400° F.

### Hardening

The best hardening range for Grade 602 is from 1550° to 1650° F. when quenching in water or from 1600° to 1700° F. when quenching in oil. It is desirable to avoid soaking at the hardening temperature, so as to reduce surface decarburization as much as possible. For this reason it is preferable to preheat to about 1200° F., then bring up rapidly to the hardening temperature. When uniformly at temperature, quench in water or oil — the former medium is generally applicable, although for tools of intricate section or with fine edges, oil quenching is recommended.

Many pneumatic tools such as chisel blanks are machined from annealed bar stock, so it is necessary to harden the striking end. As a shank treatment it is recommended that the tools be heated to 1550° to 1600° F., quench all over in oil and draw back at 900° F. This will result in a hardness of about Rockwell C 45 to 50.

To harden the points of chisels and other tools of this nature, heat to 1550° to 1650° F., and quench in water for a short distance up the shank. Allow the residual heat in the shank to draw the point to a pale straw color, or, after quenching the point, the shank may be cooled more slowly and the tool drawn all over at about 400° F. In some cases the design of the tools may be such that no draw is necessary.

### Tempering

Punches and cutting tools of Grade 602 should be given a low temperature draw, usually at 350° to 450° F. to relieve hardening strains, particularly after water quenching. Heavy duty punches, drift pins, and parts requiring a spring temper will require higher draws at 500° to 1000° F. Reference to the drawing series and table of tensile strengths will be helpful in determining the drawing temperature required.

### Annealing

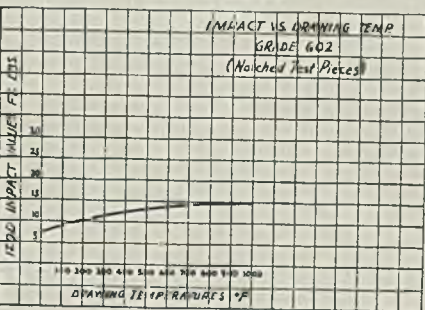
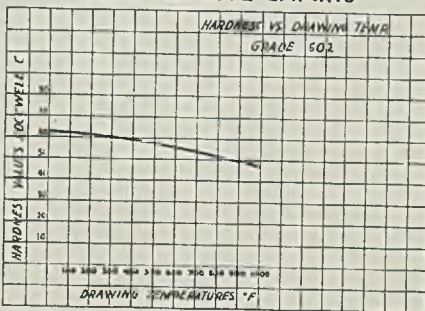
To anneal Grade 602 bring up slowly to 1400° to 1450° F., and when the charge is heated through, cool slowly in the furnace. The tools or parts should be packed in a sealed container when necessary to hold scaling and decarburization to a minimum. When fully annealed Grade 602 will show approximately Brinell 207-217.

### Applications

Among the more common applications of Grade 602 are the following:

- Chisels — Hand and Pneumatic
- Rivet Busters and Boiler Makers' Tools
- Cold Sets, Swages, Track Chisels
- Heavy Duty Punches
- Pipe Cutter Wheels
- Drift Pins
- Shear Blades
- Spring Collets and Fingers
- Nail Sets
- Machine Parts subject to shock

### COMPARATIVE CHARTS



### PHYSICAL TESTS On Grade 602 Chisel Steel

Bars for these tests were taken from 3/8" oct. and 3/8" oct. from heat 6876-11.

Analysis	Heat	Bar Check
Carbon . . . . .	.52	.53
Manganese . . . . .	.69	.70
Silicon . . . . .	1.62	1.61
Vanadium . . . . .	.17	.14
Molybdenum . . . . .	.43	.41

### Hardening and Drawing Tests

Test pieces were cut 2 1/2" long after machining 1/8" from two opposite faces of 3/8" oct. bar stock. One set was hardened from a series of temperatures, quenching in water and another in oil. Results were as follows:

### WATER HARDENING SERIES

Test No.	Temperature	Rockwell C	Brinell	Fracture
1	1400° F.	19 -20	223	Annealed appearance
2	1450°	41.5-46	418	Semi-refined
3	1500°	58 -60	555	Quite refined
4	1550°	61 -62	600	Almost refined
5	1600°	62 -63	627	Refined (best)
6	1650°	62 -63	627	Refined
7	1700°	60 -60.5	627	Slightly coarse

Note: Range 1550° to 1650° F., quenching in water.

### OIL HARDENING SERIES

Test No.	Temperature	Rockwell C	Brinell	Fracture
8	1450° F.	39 -42	364	Semi-refined
9	1500°	49 -50	444	Quite refined
10	1550°	51 -56	512	Almost refined
11	1600°	59 -60	600	Refined (best)
12	1650°	58.5-59	600	Refined
13	1700°	57.5-58.5	578	Refined
14	1750°	57 -58	578	Somewhat coarse
15	1800°	56 -57	578	Quite coarse

Note: Range 1600° to 1700° F., quenching in oil.

### DRAWING SERIES

Similar test pieces were brought up to 1600° F., quenched in water and drawn at the indicated temperatures for 1 hour. Results were as follows:

Test No.	Drawing Temperature	Rockwell C	Brinell
16	None	62 -63	652
17	400° F.	58.5-59	600
18	500°	57.5-58	578
19	600°	56 -57	578
20	700°	54 -56	555
21	800°	52 -53	512
22	900°	49 -49.5	460
23	1000°	46 -47	444

### IMPACT TESTS

Test pieces were machined from 3/8" oct. bar stock to standard notched .394" square. All pieces were hardened by bringing up to 1600° F., quenched in oil and drawn at the indicated temperatures for 1/2 hour at heat. Results were as follows — the average of values from four test pieces:

Drawing Temperature	Rockwell C	Fl. Lb. Absorbed
As quenched	61 -61.5	7.3
400° F.	59 -59.5	13.3
500°	57.5-58.5	14.0
600°	57 -57.5	14.0
800°	52 -52.5	14.8
1000°	47 -47.5	15.0

### TENSILE TESTS

Test pieces from 3/8" oct. cut 12" long were turned to standard .505 diameter in middle. One set was pulled in the annealed condition. The others were heat treated by bringing up to 1600° F., quenched in water and drawn at the indicated temperatures for 2 hours. Results were as follows — average of 2 test pieces:

Heat Treatment	El. Limit Lbs. Sq. In.	Ult. Strength Lbs. Sq. In.	Per Cent Elong. in 2 Inches	Per Cent Red. Area	Brinell
Annealed 1600° —					
water-draw	79,500	103,750	31.	59.6	207
500° F.	267,500	333,500	9.8	30.0	578
600°	262,500	330,875	9.0	30.0	555
800°	232,500	260,625	12.3	42.4	477
1000°	170,000	220,750	14.5	39.9	418

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## As the Editor Views the News

IN ISSUING its 360-word statement of policy in regard to the attempt of CIO to unionize its employes, the steel industry has committed itself to an extensive employe and public relations campaign. If steel executives are to capitalize fully upon the initial effect of the news release of last Monday and the full-page newspaper advertisements of Wednesday, they must follow through systematically and effectively. This means that the open shop side of the labor question must be set forth clearly, with frequent reiteration of important points and in sufficient detail to register convincingly in the court of public opinion.

• • •

The industry's maiden effort at publicity in this campaign aroused a curious mixture of reactions among industrialists and publicists.

### Steel—Defender or Aggressor?

Some employers feel that it was too restrained in tone. Already several steel companies are issuing individual statements (p. 18) that are more drastic than that put out through the institute. Yet some astute newspapermen think the initial statement was too cold and hard-boiled. They believe that more emphasis should be placed upon the defensive position of employers—that they are forced to defend the rights of their employes. Their point is that the public usually sympathizes with the under-dog, seldom with the aggressor.

• • •

The under-dog in this situation is the employe who does not care to join a professional union. Unfortunately the public does not know this.

### Issue Not Clear To Laymen

Talk to your grocer, newsboy, elevator man, dentist or caddy master and you will find that the propaganda of new dealers and union leaders has given the layman the idea that most employes desire to join a professional union but are prevented from doing so by coercion by employers. Industry's primary job in winning the favorable attention of the public is to show the true state

of affairs in regard to the employes' desire, or lack of it, to join an outside union. Prove that the industry is defending the rights of its employes and is really upholding the right of collective bargaining, and the public will begin to view the steel industry in a more favorable light.

• • •

Expansion of manufacturing facilities ranks high in the week's news. Pittsburgh Crucible Steel Co., subsidiary of Crucible Steel Corp. of America, is introducing an electroplating unit for tin plate at Midland, Pa. (p. 22), the details of which hint at radical departures from conventional practice.

### Expansion Is Order of Day

Concurrently Bethlehem Steel was host to newspaper, magazine and business paper editors at the formal opening (p. 21) of its Lackawanna continuous strip-sheet and light plate mill. This unit (p. 44) has an annual capacity of 600,000 tons of hot-rolled material, of which 360,000 tons can be converted into cold-rolled, full-finished products. The educational value of inviting the public press to view the achievements of steel companies cannot be overestimated. Bethlehem handled this affair superbly.

• • •

The Chicago district also is in the midst of an expansion program. Recently announced additions (p. 19) lift the investment in new steel projects under construction or contemplated in that territory to \$60,000,000. . . .

### Progress—Past and Future

What is the future of bessemer steel? Is direct reduction of iron ore feasible on a commercial basis? Dr. Albert Sauveur answers these questions in an article (p. 38) in which he not only reminisces interestingly on past progress in ferrous metallurgy, but also ventures personal opinions as to the direction of future developments. He believes bessemer steel will be produced in larger proportions in the future. He is not very enthusiastic about the commercial success of direct reduction. He thinks industry has broad opportunities in the further development of alloy steels. It is a stimulating resume of progress.

*E. L. Shaner*



# Steelmakers Confident, Urge Employees To Stand Firm

**P**REDOMINANT opinion among steelworks operating executives, as expressed last week, is that a general strike will not develop in the industry.

It is expected strikes will be called, and plants picketed, and that efforts to organize the industry will continue throughout the summer. A campaign to harass the industry is anticipated, regardless of the politi-

000 members of the representation groups—who voted in the June elections, and who the companies appear convinced will remain loyal—the unionized element is extremely limited.

Further, factionalism between the ten unions represented in the CIO and the A.F.L., as indicated in the latter's "citation" of the CIO for setting up a rival organization is considered important. The CIO has a fight of its own against the federation.

Politically, the leaders of the communist party have endorsed the CIO,

Steel institute's statement, she said: "I hope they will not do anything foolish, and against the public interest and themselves."

The labor department, she disclosed, has observers out to keep in touch with the drive.

Aroused more by the CIO's propaganda, than by any evidence that it has made much progress in recruiting steelworkers, the industry is preparing a counter campaign of education.

Individual companies are following the lead taken last week by the American Iron and Steel institute in setting the facts squarely before employees.

Most pointed of the letters steel companies addressed to their employees last week was that signed by T. M. Girdler, president, Republic Steel Corp., and other officials of Republic and Truscon Steel Co.

"The leader of this drive is John L. Lewis, head of the Coal Miners' union," it stated. "He is not connected with the steel industry. He has enlisted the help of other organizations not connected with the steel industry. Associated with him in this drive are professional organizers from the Coal Miners, the Ladies Garment Workers, the Amalgamated Clothing Workers and other outsiders. The Amalgamated Association of Iron, Steel and Tin Workers has been pressed into this movement. The Amalgamated has only about 1½ per cent of the steel workers in its membership.

"Representatives of radical and communistic groups are helping in this movement. William Z. Foster, chairman of the communist party, has announced his support.

## WHAT DO THEY WANT?

"John Lewis and his organization want more workers to pay them more dues. Lewis has announced they will spend \$500,000 on this unionization drive. Where did they get this money? They got most of it from the coal miners. They say they are spending it to try and organize the steel workers. If they could organize the steel workers they hope to collect \$5,000,000 a year from them. Republic employees alone would pay over half a million dollars a year. Furthermore, they could place dues and assessments at any figure they liked and steel workers would have to pay them.

"The real aim of the present organization drive is to establish a 'closed shop.' They want to force you into the union and make you pay for the right to work. Under a 'closed shop' every man has to pay dues to the union whether he wants to or not. If he gets behind in his dues they can throw him out of the union. By this threat they can keep the dues rolling in.

"One of the announced purposes of this drive is to throw out your employe representatives whom you have elected for collective bargaining with the management. The union wants to destroy all employe

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## Roots of Strife in New Federal "Laws"

**G**ROUNDWORK for the current drive to unionize the steel industry was laid in 1934 when the Wagner bill to create a permanent national labor board encouraged demands upon steel producers. Threats of government officials to "crack down" on industry and on "company unions" spurred the movement.

Then, as now, the drive by the Amalgamated Association of Iron, Steel and Tin Workers began when activity in the industry was near a peak in the recovery period.

In the middle of March, 1934, the American Iron and Steel institute denounced the Wagner bill. Its claims since have been substantiated in various court decisions. On Monday, April 2, 1934, the industry's 410,000 workers were given a 10 per cent wage increase, returning them to the scale prevailing from August, 1923, to October, 1931, although prices remained 13 per cent behind the 1929 level.

Early in May, 1934, the Amalgamated decided its 225 lodges would make formal demands for recognition and give steel producers until June 20 to reply. After that a nation-wide strike was threatened. Dues in the union were slashed to attract new members.

On the eve of the threatened strike, June 16, the lodges were suddenly instructed not to act. Talk of a strike then faded, following the creation of the labor relations board June 28.

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cal and practical considerations involved.

Factors standing in the way of a general strike, however, are declared to be:

The industry's employe representation organizations are infinitely stronger, in number and morale, than the Amalgamated Association of Iron, Steel and Tin Workers. Sentiment in these employe organizations is against a strike.

Though the CIO has 200 paid organizers at work, in addition to political allies, the Amalgamated, it is reported, has not gained over 10,000 members in the several weeks the drive has been on. It started with a membership of about 7000.

This gain when expressed in percentage appears remarkable. But, when contrasted with more than 250,-

and last week Norman Thomas, socialist candidate for President, telegraphed the committee best wishes for "speed and success . . . against the robber barons."

Against these questionable degrees of support, however, there is the risk for the Amalgamated-Lewis group of losing not only a general strike—if one is attempted—but a national election, the outcome of which is far more important to them than a strike.

To steelmakers, accustomed to viewing pro-union activities at Washington, comment made last week by Labor Secretary Perkins appeared somewhat ironical. She reassured the industry, warning it not to be panicky about the union drive.

"It is not necessary to have a strike to unionize, and this is not a strike," she stated. Regarding the Iron and



representation plans in the steel industry. Your employe representation plan is not run by outsiders. It works. . . .

"Republic stands for the 'open shop' principle. No employe has to join any organization to get or hold a job. Advancement depends upon individual merit and effort. Republic will not permit any activities within its plants which will: (1) Interfere with the orderly conduct of its operations. (2) Stir up strife or discontent. (3) Threaten the peace and comfort of its workers and their families.

"Every Republic employe owes a duty of loyalty to the company so that its best interests may be served. Conduct detrimental to the interest of the company and which may disrupt the satisfactory relations between employes and management will not be tolerated."

#### To Maintain Open Shop

A letter was addressed to all employes of Carnegie-Illinois Steel Corp. by B. F. Fairless, president, reading as follows:

"During the next few weeks or months you may expect to be approached by organizers, appointed and paid by 'outside' unions, who have no real interest in you or in the steel industry, and urged to join an industrial union. Mass meetings are already being held and every possible means employed to stampede you into joining the union.

"You will decide whether your best interests lie in joining the union, paying dues and imposing upon yourself the 'closed shop' and the necessity of asking the union for permission to work, or whether you will be loyal to the employe representation plan, which affords an ideal method of collective co-operation, and has proved of real benefit to you and your fellow-workmen during the past three years.

"Your company assures you that it intends to maintain the 'open shop' wherein all employes will have a fair chance to work and gain deserved promotion, and your company will do everything in its power to protect you and to maintain our existing friendly relations.

"The next number of the *U. S. Steel News* will carry a statement by President Irvin of the United States Steel Corp. It deserves your most careful attention. Read it, and think it over."

Ninety-two per cent of employes in the steel industry participated in recent elections held under representation plans in 30 major steel plants throughout the country, according to a compilation of returns by American Iron and Steel institute.

A total of 275,674 employes of the 30 companies were eligible to vote and 254,029 cast secret ballots. Election of 1898 representatives indicates an average of one spokesman for each 145 employes.

The high percentage of participation indicates increasing interest by employes in the representation plan.

Competition among the employes for election as representatives was keen, the names of 4498 candidates appearing on ballots.

# Chicago Steel Modernization Stepped Up to \$60,000,000

**C**HICAGO district steel mills, operating at the best rate since pre-depression days, are comparably busy in rounding out an extensive plant modernization program which, when completed, will represent an expenditure of about \$60,000,000.

Recent announcements by the United States Steel Corp. and International Harvester Co. of authorization of additional mill installations at Gary, Ind., and South Chicago, Ill., respectively, call attention to the tremendous investment which the industry has been making in the Chicago area in the past year and a half. At least the remainder of 1936 will be required to complete the installations either newly approved or already in the process of being carried out.

Practically all of the leading interests are represented in this work. Chief, of course, is the United States Steel Corp.'s subsidiary, Carnegie-Illinois Steel Corp., and more particularly the latter's American Sheet & Tin Plate division. Another corporation unit, American Steel & Wire Co., is spending several millions on a new mill, while Inland Steel Co., Republic Steel Corp. and Wisconsin Steel Works have important projects under way.

#### Has Small Effect on Capacity

It is interesting to note that this huge program is having but small effect on the district's steel ingot capacity since, with the exception of the four open-hearth furnaces being built by Inland, the construction concerns the rolling divisions of the various plants. Furthermore, the mill installations in several instances represent a replacement of equipment which has been made obsolete by developments of recent years, rather than the addition of more finished steel capacity. The program for the district as a whole involves open-hearth furnaces, blooming and billet mills, and rod and wire mills, as well as sheet and strip producing units.

To a large degree the burst of activity in the building of new rolling mills since 1934 reflects the postponement of such work during the depression, as well as the improvements which have been made in designs of equipment, particularly for the manufacture of flat-rolled steel.

Late in 1934 the Steel corporation

approved the spending of about \$40,000,000 by the American Sheet & Tin Plate Co. and the then Illinois Steel Co., largely at Gary. This included installation by the former of a continuous 80-inch 4-high hot strip mill, two 4-high cold strip mills and a five-stand tandem cold strip mill. The last named is the unit which is to be duplicated by the second tandem unit recently authorized. Reflecting the need for equipment to meet the heavy demand for cold reduction tin plate, the new mill will replace some of the single and double hot mills of the conventional type.

#### Improving Mill Facilities

Building of the first tandem mill was started in March and at that time was scheduled to be ready for operation in about five months. Construction of the 3-stand tandem 4-high cold reduction mill at the Gary sheet works is well along and is expected to be completed within several weeks. Principal installation at Carnegie-Illinois' Gary plant involved the conversion of a 28-inch 2-high strip mill into a 38-inch unit. In addition to these various mills, other auxiliary equipment has been involved in the improvement programs, including annealing, pickling, shearing and shipping facilities.

At its Joliet, Ill., works, American Steel & Wire Co. is spending about \$3,000,000 on two continuous type rod mills, each of 220,000 tons capacity. The installation is to be completed late this year.

International Harvester Co., a few days ago, placed orders for a new blooming mill and a billet mill to be built at the South Chicago plant of its Wisconsin Steel Works subsidiary. About \$4,000,000 will be spent on improvements at this plant in addition to the more than \$2,000,000 spent last year on modernization work, including construction of a new merchant mill.

Republic Steel Corp. currently is engaged in investing \$1,300,000 at South Chicago in a new wire mill. Part of the equipment has been ordered. After the completion of this work, probably about the end of the year, only manufacturers' wire will be made at Republic's Grand Crossing plant, which at present is the principal source, in the Chicago district, of the company's wire products. Fence and bale ties will be new products to be made at South Chicago, where about 80,000 tons additional finishing capacity will be add-



ed by the program now under way.

Inland Steel Co.'s plant equipment additions, started last year, are intended primarily to provide additional raw steel capacity. Four 150-ton open-hearth furnaces are being built, and a 46-inch blooming mill installed. The latter will supplement the present 36-inch and 40-inch blooming mills, and, with the extra steelmaking facilities, will give a better balance to the company's steel producing and rolling capacities.

The new open-hearths will add about 300,000 tons to the district's annual ingot capacity and raise Inland's figure to 2,300,000 tons. This brings the Chicago area's rating to nearly 20,000,000 tons. Carnegie-Illinois Steel Corp. accounts for 10,434,400 tons, Youngstown Sheet & Tube Co. 960,000 tons, Wisconsin Steel Works 807,000 tons and Republic Steel Corp. 408,000 tons.

Expansion in steelmaking capacity in the Chicago district the past several years has been considerably more rapid than that of the country as a whole, and reflects the westward movement of the geographical center of the industry. In 1929, the Chicago area capacity was rated at 11,666,000 tons of ingots. The increase since that time has been about 25 per cent and will be slightly less than 28 per cent by the end of the year. This compares with an upturn of around 11 per cent for the entire country.

The principal increase in ingot capacity at Chicago has taken place at Carnegie-Illinois plants where there has been a gain of more than 35 per cent since 1929. Youngstown and Wisconsin, in addition to Inland, however, also have built new open-hearths since seven years ago.

#### Plan \$5,000,000 Power Station

As part of its general modernization program, United Engineers & Constructors Inc., have been retained by Carnegie-Illinois to design and supervise construction of the steam power station at South Chicago. The new station is estimated to cost approximately \$5,000,000, and will contain three large boilers, a turbo generator, and three turbo blowers with provision for future additional equipment. It will largely replace existing facilities which have reached the end of their useful life.

### Circuit Court Again Rules Against Labor Board

For the second time within three weeks the authority of the national labor board to regulate relations between employer and employe has been denied by federal circuit courts of appeals.

Similar to the recent ruling of the court at New Orleans in favor of Jones & Laughlin Steel Corp., the

## Completes 61 Years of Service to Saw Company

*RECENTLY, on a trip through the plant, S. Horace Disston, vice president and general manager of Henry Disston & Sons, Inc., Philadelphia, was reminded that the day marked the completion of 61 years continuous service of Charles M. Hoover, who works in the circular saw department.*

*Mr. Disston returned later in the day and presented Mr. Hoover with a box of cigars and a check. Mr. Hoover was born June 16, 1861. He started working in the Disston plant as an apprentice sawmaker when just under 14 years of age. He still is quick and active.*

court at Cincinnati last week held in the case of the Fruehauf Trailer Co., Detroit, that the board is without authority to regulate employer-employe relations, unless they directly affect interstate commerce. Six other test cases are before circuit courts.

## Walsh-Healy Labor Contract Bill Signed

President Roosevelt last week signed the Walsh-Healy government labor contract bill after having held it without signature for almost as much time as the law allows. It is reported the department of labor objected to a number of sections. The bill becomes effective 90 days after signature.

The administration of the bill is in the hands of the secretary of labor, who is authorized to employ a special staff, the members of which may make investigations and hold hearings with respect to complaints.

## Meetings

NATIONAL FOREIGN TRADE COUNCIL will hold its twenty-third annual convention in Chicago, Nov. 18-20, it is announced by James A. Farrell, chairman. The convention was last held in Chicago in 1919 and with an attendance of 2000 was the largest assemblage of foreign traders ever held in the city. Lindsay Crawford, 26 Beaver street, New York, is secretary of the council.

#### MINING CONVENTION SEPT. 28

Stanly A. Easton, president, Bunker Hill & Sullivan Mining & Concentrating Co., Kellogg, Idaho, has been named chairman of the program

committee of the annual Metal Mining convention and exposition to be held in Denver Sept. 28-Oct. 2. Julian D. Conover, secretary American Mining congress, Washington, announced that a committee is being formed to assist Mr. Easton. Economic, legislative, operating, and tax problems are to be discussed.

## Financial

Corporate security flotations during the first five months of 1936 were higher than for any comparable period since 1931, according to the National Industrial Conference board, New York. Refunding issues continued as the dominant factor, comprising 85 per cent of the total financing in these five months, compared to 80 per cent in the same period last year, 17 per cent in 1929 and 35 per cent in 1928.

#### Two U. S. Steel Units Report

Statements filed with the Securities and Exchange commission show that the Illinois Steel Co., now part of Carnegie-Illinois Steel Corp., had a net loss of \$1,380,125 in 1935, whereas the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., another United States Steel Corp. subsidiary, had a net profit of \$1,495,614.

#### Westinghouse Electric Expands

Sales of the Relay Motors Co., Lima, O., to the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for \$100,000 has been authorized by federal court. The plant will be used to make electric motors.

## Bar Iron Mill Wage Rates Are Unchanged

Wage rates in bar iron mills having contracts with the Amalgamated Association of Iron, Steel and Tin Workers will remain unchanged for July and August, since the average sales price during May and June continued steady. The card rate for July and August on boiling bar and 12-inch mills is 2.00c, and 2.10c on guide and 10-inch mills.

## Steel Corporation Officials Inspect Plants, Properties

Officials of the United States Steel Corp. and subsidiaries last week completed a plant and property inspection trip, which took them from New York to the head of the Great Lakes, and return, part way, by iron ore freighter.

Headed by E. H. Stettinius Jr., chairman of the corporation's finance committee, the New York group was joined by subsidiary officials at various points enroute west and north.



After visiting the iron ore properties they boarded the MYRON C. TAYLOR and proceeded to Rogers City, Mich., disembarking and visiting the limestone properties at nearby Calcite. They were accompanied by Leroy Salsich, president, Oliver Iron Mining Co., and A. F. Harvey, president, Pittsburgh Steamship Co. From Rogers City they returned East by train.

## Sharon Steel Corp. Holders Approve Refinancing Plan

Sharon Steel Corp., Sharon, Pa., meeting for the first time under the new name at Sharon, June 30, re-elected all present directors of the company and ratified actions taken by the board on refinancing, acquisition of Pittsburgh Steel Co. stock and ore contracts.

Directors re-elected are: Henry A. Roemer, George L. Collord, J. H. Hillman Jr., A. W. Howe, Severn P. Ker, B. E. Kibee, W. J. Kans, L. F. Rains, O. W. Renkert, W. R. Scott and G. W. Short.

# Bethlehem Dedicates Strip-Sheet Mill at Lackawanna

ON TUESDAY, June 30, sixty editors of leading newspapers, general magazines and business papers were guests of the Bethlehem Steel Corp. at the formal opening of its new continuous strip-sheet mill at Lackawanna, N. Y.

A delegation of 80 from New York and eastern points, including a number of Bethlehem executives, arriving at Lackawanna by special train from New York, were joined there by approximately 20 guests and Bethlehem officials from other points.

Boarding a special observation train, the party inspected the No. 1 open-hearth department where 13 of 14 furnaces were in operation; No. 2 structural mill where wide flanged beams were being rolled; the by-product coke plant and the new 79-inch continuous mill for sheets, strip

and light plates. This new mill, a description of which appears on page 44, this issue, is equipped to produce 600,000 tons of hot rolled material annually, of which 360,000 tons can be converted into cold rolled, full finished products. The mill represents an investment of \$20,000,000.

Following the inspection trip the party lunched at the Wanakah Country club where E. G. Grace, president of the Bethlehem Steel Corp., in a brief greeting to the visitors, discussed the significance of the new enterprise.

He declared that the decision to build the continuous mill was suggested by the changing trend in the demand for steel. He pointed out that from 1926 to 1936 the ratio of sheet and strip production to the total steel production in the United States has more than doubled.

"The automobile is, of course, responsible for a considerable portion of this increase," he said, "but in addition to the use of strip and sheets for that purpose there has been a corresponding enlargement of the field for ducts, containers, siding, roofing, furniture, and formed and stamped products. Their possible application in many new forms leads us to the opinion that the flat-rolled products are destined to more extensive use.

### New Mill Increases Employment

"The adoption of rolling both hot and cold rolled sheets by the continuous method has produced quality, accuracy, and economy, which are daily opening new markets and replacing the old hand hot mill process."

Mr. Grace commented upon the effect of the new mill upon employment in Lackawanna. He stated that with the opening of the continuous mill, the Lackawanna plant now employs 2000 more men than the high average payroll force in 1929.

Charles M. Schwab, chairman of the board of Bethlehem, commented upon the marked progress made in the steel industry during the period he has been actively identified with it. He compared the circumstances under which he obtained \$500,000 from Andrew Carnegie to build a mill 40 years ago with the conditions under which Bethlehem invested \$20,000,000 in the Lackawanna continuous mill.

John H. VanDeventer, editor of *Iron Age*, spoke briefly on behalf of the visiting journalists.

## A Great Team, A Great Day



**A**MONG the most interested of the many spectators who had a close-up view of Bethlehem Steel Corp.'s new strip-sheet mill at Lackawanna, N. Y., last week was Charles M. Schwab, Bethlehem's chairman. At 74, Mr. Schwab was as enthusiastic over this enterprise as was Eugene G. Grace, Bethlehem president



# Mill To Tin Plate By Electroplating

**A** RADICAL departure from the conventional process of manufacture of tin plate has been announced by the Crucible Steel Co. of America. The first commercial unit for this process is now being installed at the Midland, Pa., works of the Pittsburgh Crucible Steel Co., a subsidiary, under the supervision of J. S. Nachtman, electrochemist, who developed the process.

The usual method of applying tin by hot dipping will be abandoned in favor of an electroplating process, which, it is claimed, will produce a tinned sheet free from mottles, porosity and irregularity of thickness. It is said that a lustrous, deep-drawing plate will be produced at a cost which will not be out of line with the product made by hot dipping.

Preliminary production is scheduled to begin in July, and peak production about a month later. This first unit is laid out so that it can be expanded in accordance with future demand.

The company is erecting a building 900 x 100 feet to house the unit which will consist of one 4-high reversing cold rolling mill, a vertical annealing furnace, a skin-pass mill and the various tanks required for cleaning and electroplating. Hot-rolled strip will be passed through the cold rolling mill after which it will be cleaned in an electro-cleaner. The cleaned strip will then be annealed and passed through the skin-pass mill, after which the tin will be applied electrolytically.

## Tin Strip in Coils

Tinned strip will be produced in widths up to 20 inches, and in coils up to 5000 pounds. Tin plate also will be supplied in the conventional size box.

Barton R. Shover, Oliver building, Pittsburgh, is consulting engineer for the entire project. The normalizing furnace to be used will be a Shover-Townsend type, made by the General Electric Co. Mr. Shover, incidentally, was consulting engineer for one of the first continuous sheet mills to be built, at Butler, Pa., in 1926, for the Columbia Steel Co., now subsidiary of the American Rolling Mill Co., Middletown, O.

Mr. Nachtman, who has been appointed superintendent of the company's electro tin plate and electro chemical division, holds various patents on the electro-tinning process. He will have charge of the new mill.



J. S. Nachtman

In charge of Pittsburgh Crucible Steel Co.'s new electro tin plate and electro chemical division

He is well known in technical steel circles and has held various positions with other steel companies, the most recent of which was superintendent of the electro and research division of Thomas Steel Co., Warren, O. Mr. Nachtman is a graduate of the Colorado School of Mines. He will make his headquarters at Midland.

## Celebrates 60th Anniversary With Expansion Program

During celebration of its sixtieth anniversary last week, Cleveland Twist Drill Co. opened another era with announcement that it soon would start a building project, which will be one of the largest industrial expansions in the Cleveland district in recent years.

A five-story, \$400,000 plant with an area of 106,000 square feet will be erected. Equipment cost for the new structure is estimated at \$100,000.

When the company was organized in 1876 by J. D. Cox and C. C. Newton it had only one lathe and one milling machine and employed one man. By 1879, however, a general line of milling machines and planers, twist drills and reamers were being manufactured.

In 1915 the company inaugurated a plan whereby every employe shares in the annual profits in proportion to his annual salary or wage. It also established a plan of profit-sharing notes, whereby any employe may deposit with the company, up to the limit of his annual salary or wage, any amount of money. He is guaranteed a rate of 6 per cent, and if the profits justify it, he will earn an extra dividend. From 1919 to 1935, inclusive, these notes have returned the employes who invested in them an average of more than 12 per cent per year.

# Production

**S**TEELWORKS operations declined sharply to 66 per cent, a loss of 5½ points, reflecting widespread shutdowns in almost all districts, in observance of the July 4 holiday. A rebound to around the 70 per cent level is expected this week, as all producers again return to full schedules. In the comparable week a year ago the rate declined 6 points to 31 per cent and rebounded to 38 per cent the week following the holiday. Further details follow:

**Buffalo**—Remained at 84 per cent last week, with tentative schedules indicating the same rate this week.

**Cleveland-Lorain** — Averaged 71 per cent last week, down 13½ points from the preceding week. This was due to the loss of production on July 4 up to the holiday. Republic Steel

## District Steel Rates

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended July 4	Change	Same week 1935	1934
Pittsburgh .....	62	- 4	20	15
Chicago .....	71	None	33	28
Eastern Pa.....	46	- 1	21	18½
Youngstown....	64	-16	26	15
Wheeling .....	65	- 6	40	24
Cleveland .....	71	-13½	16	26
Buffalo .....	84	None	29	0
Birmingham..	58½	None	30	17½
New England ..	80	None	56	55
Detroit .....	90	-10	78	46
Cincinnati .....	65	-15	†	†
Colorado .....	50	None	†	†
Average.....	66	- 5½	31	22

†Not reported.

Corp.'s Corrigan, McKinney plant continued to operate 13 open hearths, Otis Steel Co. eight, and National Tube Co., Lorain, 12.

**New England**—Unchanged at 80 per cent last week, with an expected rate this week of 60 per cent due to furnace repairs. In about ten days the 80 per cent rate will be resumed.

**Youngstown**—Dropped 16 points to 64 per cent last week, largely as a result of the Independence Day holiday. Tentative schedules point to a rebound to 77 per cent at this week's opening on one of the strongest early July mill schedules in years.

**St. Louis**—Steelmaking operations averaged 70 per cent last week, with 21 open hearths out of a potential 30 melting.

**Chicago**—Unchanged at 71 per cent, on the basis of the short week. Production was reduced, however, by



the July 4 shutdown. The present week is expected to see output maintained around its recent peak. Lighting of a Federal blast furnace gives the district 25 stacks active out of 41.

Central eastern seaboard—Off 1 point to 46 per cent last week, due to shutdowns for the holiday. July, however, is expected to be a good producing month.

Colorado—Held at 50 per cent last week, with eight open hearths continuing to melt.

Cincinnati—Down 15 points to 65 per cent last week, because of the holiday, although the rate of rolling of light material for five days was near capacity.

Detroit—Off 10 points to 90 per

### JUNE IRON PRODUCTION

	No. in blast		Total tonnage	
	last day of	June	Mer- chant	Nonmer- chant
Ohio .....	32	33	88,272	509,313
Penna. ....	46	47	85,869*	738,538*
Alabama .....	10	12	66,016	93,219*
Illinois .....	12	12	64,343	186,978
New York.....	12	12	43,538	157,267
Colorado .....	2	2		
Indiana .....	12	12	6,453*	391,536
Maryland .....	4	4		
Virginia .....	1	1		
Kentucky .....	1	1		
Mass. ....	1	0		
Tenn. ....	1	0		
Utah .....	1	1	19,041*	145,199
West Va. ....	3	3		
Michigan .....	4	4		
Minnesota .....	1	1		
Missouri .....	0	0		
Total .....	143	145	373,832*	2,222,050*

\*Includes ferro and spiegeleisen.

cent last week because of the holiday. Steel ingot production is expected to return to 100 per cent this week.

Wheeling—Off 6 points to 65 per cent last week as 26 active open hearths out of 37 in the district took one day out, July 4, in holiday observance. With this week a return to 71 per cent is forecast.

Pittsburgh—Down 4 points to 62 per cent last week. In holiday observance most open-hearth plants in this district closed down at least July 4. However, in order to accommodate the shutdown, operations displayed a strong tone earlier in the week. Plants of United States Steel Corp. subsidiaries averaged ingot operations at 54 per cent through last week, whereas the independents averaged 67 per cent. Tin plate departments were off to 75 per cent, sheets were unchanged at 70, strip was up fractionally to 60 per cent, and pipe also advanced to 55 per cent. Out of 60 steelworks blast furnaces, 36 continue in operation.

Birmingham—Held at 58½ per cent, with 13 open hearths producing.

# First Half Iron Output Up 38 Per Cent; Gain in June

PRODUCTION of coke pig iron in the United States in the first half of 1936 showed a gain of 38.2 per cent over the corresponding period of 1935 and recorded a tonnage which was the best for the first half of any year since 1930. In the

### AVERAGE DAILY PRODUCTION

	Gross Tons			
	1936	1935	1934	1933
Jan. ....	65,461	47,692	39,537	18,348
Feb. ....	63,411	57,675	45,385	19,752
Mar. ....	66,004	57,120	52,438	17,484
Apr. ....	80,316	55,719	57,873	20,786
May .....	85,795	55,986	66,370	28,784
June .....	86,529	51,949	64,563	42,165
July .....		49,043	39,630	58,108
Aug. ....		56,767	34,199	59,137
Sept. ....		59,009	29,969	50,264
Oct. ....		63,818	30,689	43,824
Nov. ....		68,876	31,930	36,124
Dec. ....		68,242	33,161	38,456
Ave. ....	74,612	57,694	43,774	36,223

first six months of the current year, output has aggregated 13,579,356 gross tons, an increase of 3,749,422 tons over the 9,829,934 tons made in the six months of last year. The total for the first half of 1930 was 18,304,614 tons.

For June, average daily production made an almost inconsequential gain over May while active blast furnaces, dropping from 145 on May 31 to 143 on June 30, made June the only month this year to show recession. The May total was the best since June, 1930, with 162 stacks.

Daily output in June averaged 86,529 tons per day, this figure being an increase of 734 tons, or 0.85 per cent, over the May average daily production of 85,795 tons. The June output was the best since June, 1930,

### RATE OF OPERATION

(Relation of Production to Capacity)

	1936 <sup>1</sup>	1935 <sup>2</sup>	1934 <sup>3</sup>	1933 <sup>4</sup>
	Jan. ....	48.2	34.2	28.3
Feb. ....	46.6	41.4	32.5	14.3
Mar. ....	48.5	41.0	37.5	12.7
Apr. ....	59.1	40.0	41.4	15.1
May .....	63.1	40.2	47.5	20.9
June .....	63.6	37.2	46.3	30.6
July .....		35.2	28.4	42.4
Aug. ....		40.7	24.5	42.8
Sept. ....		42.5	21.5	36.4
Oct. ....		45.8	22.1	31.8
Nov. ....		49.5	22.8	26.2
Dec. ....		49.0	23.7	27.9

<sup>1</sup>Based on capacity of 49,777,893 gross tons, Dec. 31, 1935; <sup>2</sup>capacity of 50,845,741 gross tons, Dec. 31, 1934; <sup>3</sup>capacity of 50,975,561 tons, Dec. 31, 1933; <sup>4</sup>capacity of 50,313,975 tons, Dec. 31, 1932. Capacities by American Iron and Steel Institute.

with 97,817 tons per day, and compares with the rate of 51,949 tons per day in June, 1935.

Total production for June was 2,595,882 gross tons, which, compared with the 2,659,643 tons of May, was a loss of 63,761 tons, or 2.4 per cent. June was a one-day shorter month than May. Production in June, a year ago, was 1,558,463 tons.

Relating production to capacity, operations in June were at the rate of 63.6 per cent. This compares with 63.1 per cent in May and 37.2 per cent in June, 1935.

The 143 active blast furnaces on June 30 compares with 145 on May 31 and 91 in June last year. During the month 1 nonmerchant or steelworks furnace resumed and 4 were blown out or banked. Of the merchant class, 2 were made active and 1 was banked.

Furnaces resuming in June were: In Pennsylvania: One Eliza, Jones

### MONTHLY IRON PRODUCTION

	Gross Tons		
	1936	1935	1934
Jan. ....	2,029,304	1,478,443	1,225,643
Feb. ....	1,838,932	1,614,905	1,270,792
Mar. ....	2,046,121	1,770,990	1,625,588
Apr. ....	2,409,474	1,671,556	1,736,217
May .....	2,659,643	1,735,577	2,057,471
June .....	2,595,882	1,558,463	1,936,897
Tot. 6 mo. 1936	13,579,356	9,829,934	9,852,608
July .....		1,520,340	1,228,544
Aug. ....		1,759,782	1,060,187
Sept. ....		1,770,259	899,075
Oct. ....		1,978,379	951,353
Nov. ....		2,066,293	957,906
Dec. ....		2,115,496	1,028,006
Total.....		21,040,483	15,977,679

& Laughlin Steel Corp. In Massachusetts: Everett, Mystic Iron Works. In Tennessee: Rockdale, Tennessee Products Corp.

Stacks blowing out or banking were: In Ohio: Hamilton, Hamilton Coke & Iron Co. In Pennsylvania: Donora No. 2, American Steel & Wire Co.; Perry, Interlake Iron Corp. In Alabama: Ensley Nos. 5 and 6, Tennessee Coal, Iron & Railroad Co.

In the list of blast furnaces reported as dismantled or abandoned (STEEL, June 8, page 18) the Mary furnace of Thomas Iron Co., Hokendaugua, Pa., was omitted inadvertently. This furnace, sold for scrap (STEEL, May 25, page 105), was built in 1863 and has been idle for several years. It had an annual capacity of 150,000 tons. The total number of potential units in the United States is 253.



# Declares Technicians Must Help Solve Social Problems

**A**CTIVE participation of the country's several hundred scientific associations and societies in solving social and economic problems was urged by H. S. Vassar, laboratory engineer, Public Service Electric & Gas Co., Irvington, N. J., and retiring president of the American Society for Testing Materials, in addressing a large attendance at the thirty-ninth annual meeting of the society in Atlantic City, N. J., June 29-July 3.

Mr. Vassar made this appeal after accepting the statement that a few



A. C. Fieldner  
New president, American Society for Testing Materials

thousand people are sufficient at any time to change the thinking of America. Citing the historic comment of King Edward VIII during his inspection of the QUEEN MARY in March when he observed, "How do you reconcile a world that has produced this mighty ship with the slums we have just visited?" The speaker said that the power of tradition and other influences give the mind a permanent set and distort judgment on public affairs.

President Vassar asked for the scientific approach, the search for facts and determination of a meeting ground of contrary opinions instead of controversy and the warfare of present-day discussion of problems of government, finance, security, labor and related subjects. Unemployment is capable of solution if divested of prejudice, sentiment and rancor, he said.

Cloyd M. Chapman, chairman of the committee on standards, a committee which acts in the interim to pass upon matters of standards, auxiliary to action taken by the

membership at large at annual meetings, reported upon the question of heat insulation materials in connection with steel housing and other types of construction, and the study of plastics in their mechanical applications. Various other new projects have had the consideration of this committee.

P. H. Bates, national bureau of standards, Washington, reported upon research activities which cover a wide range of investigations including those upon the yield point of structural steel as affected by aging, which will be completed by 1937, and in which the Carnegie-Illinois Steel Corp. and Bethlehem Steel Co. have rendered active assistance.

## Society's Work Broadened

Research upon X-ray as the measure of incipient fatigue failure is in progress, continued Mr. Bates. The joint committee on the study of the effect of phosphorus and sulphur on steel, believing that its investigations have been completed so far as present commercial demand is concerned, has asked to be discontinued. Studies on galvanized wire and other types of fencing material, including stainless steel, are being conducted at 11 testing points.

The annual report of the executive committee, presented by C. L. Warwick, secretary-treasurer, Philadelphia, reflected a growth in society membership and a broadening of the effective work of the organization. It has been decided, with substantially unanimous approval of committee members, to discontinue committee A-4 on the heat treatment of iron and steel.

This has come about in part, explained Mr. Warwick, through the arrangements for co-operation with the American Society for Metals in development of recommended practices for heat treatment of metals, and in part through the fact that in recent years the various metals committees of the society have found it expedient themselves to develop such requirements for heat treatment as were needed for references in standards. The committee has been inactive for the past several years and while it served an extremely useful and necessary purpose in the earlier days of the society, it has in a measure outlived its opportunities for useful service under present circumstances.

Mr. Warwick also reported that

the reorganization of the eight district committees of the society under the charter for district committees referred to in the report a year ago has been completed. The committees have functioned actively along various lines during the year.

H. C. Parmelee, editor *Engineering and Mining Journal*, New York, outlined new developments in chemical engineering which have reached the stage of requiring attention from the testing organization. These include the three types of plastics—cellulose, synthetic resins and rubber products; carbon in various forms; and the detergents, which are derivatives of alcohols termed soapless soaps, used in industrial cleaning applications.

A. C. Fieldner, chief engineer, experiment stations division, United States bureau of mines, Washington,



T. G. Delbridge  
New vice president, American Society for Testing Materials

was elected president of the society to succeed Mr. Vassar.

T. G. Delbridge, manager, research and development department, Atlantic Refining Co., Philadelphia, was named vice president.

The following were elected members of the executive committee: O. U. Cook, inspecting engineer, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; H. F. Gonnerman, manager, research laboratory, Portland Cement association, Chicago; C. S. Reeve, manager, research development, Barrett Co., Leonia, N. J.; F. E. Richart, research professor of engineering materials, University of Illinois, Urbana, Ill.; and F. M. Waring, engineer of tests, Pennsylvania railroad, Altoona, Pa.

The executive committee announced that the society's fortieth annual meeting will be held at the Waldorf-Astoria hotel, New York, June 28-July 2, 1937.

A report of technical sessions held at Atlantic City will be found on page 66, this issue of STEEL.



# Men of Industry

**W**ILLIAM A. ANDERSON, formerly vice president, treasurer, and general manager of John A. Roebling's Sons Co., Trenton, N. J., has been elected president, to succeed the late Ferdinand W. Roebling Jr.

Joseph M. Roebling, eldest son of the late president, has been elected vice president, and his youngest son, Ferdinand W. Roebling III, has been made a director to succeed his father.

A. C. Cooley has been re-elected secretary and elected treasurer to succeed Mr. Anderson. Harvey Cooley has been reelected assistant secretary, and Walter M. Wells has been made assistant treasurer.

Upon Mr. Anderson's entrance in the Roebling mill more than 4 years ago, he began a study of wire making and mill operation. Eventually, he became superintendent of wire mills, and during the presidency of the late Col. Washington A. Roebling, Mr. Anderson was elected general manager and assistant to the president.

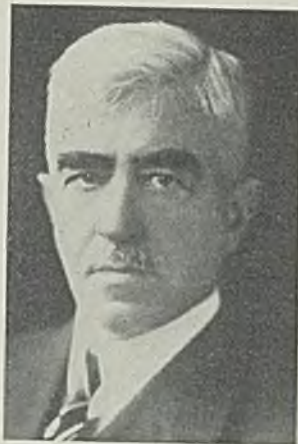
This is the first time in the history of the company that the position of president has been filled by one other than a Roebling.

James H. Herron, president, James H. Herron Co., engineer, Cleveland, was nominated for the presidency of the American Society of Mechanical Engineers, New York, for the 1937 period, at its semi-annual meeting held in Dallas, Tex., June 15-20. At present he is vice president of the society.

Vice presidents nominated to serve on the council are: James M. Toll, consulting mechanical and electrical engineer, New Orleans; James A. Hall, professor of mechanical engineering, Brown university, Providence, R. I.; R. J. S. Pigott, staff engineer in charge of engineering, Gulf Research and Development Corp., Pittsburgh.

Nominations for members of the council to serve as managers are: Kenneth H. Condit, editor, *American Machinist*, McGraw-Hill Publishing Co., New York; E. W. Burbank, district manager, Allis-Chalmers Mfg. Co., Dallas, Tex.; S. W. Dudley, dean of engineering, Yale university, New Haven, Conn.

Fred L. Riffin has been elected president of the Mueller Brass Co., Port Huron, Mich., succeeding O. B. Mueller, who resigned recently. Mr. Riffin had been closely associated with Mr. Mueller for many years, having started with the original Mueller company in Decatur, Ill., 32 years ago. When the present company was estab-



William A. Anderson

lished in 1917, Mr. Riffin took over active direction of sales, and some time ago was chosen executive vice president.

C. Q. Swenson has been appointed Michigan representative by the Michigan Products Corp., Michigan City, Ind., maker of stainless and heat-resistant alloy steel castings. Mr. Swenson is a metallurgist who has had considerable practical experience in the heat-treating industry in the Detroit and Michigan territory. His offices are at 2842 West Grand boulevard., Detroit.

Robert S. Rose, handling district service and metallurgical work at Springfield, Mass., for the Vanadium-Alloys Steel Co. and Colonial Steel Co., both of Pittsburgh, has been transferred to Boston as sales representative for the two companies, filling the vacancy caused by the recent death of



Robert S. Rose

James Mitchell, who was the oldest sales employe of Colonial Steel Co. Mr. Rose for the past two years has been chairman of the Springfield chapter of the American Society for Metals.

L. R. Wallis, Youngstown Foundry & Machine Co., Youngstown, O., has been appointed a member of the cost committee of the Gray Iron Founders' Society Inc., Cleveland.

Gerard Swope, president, General Electric Co., Schenectady, N. Y., has been reappointed national chairman of the Mobilization for Human Needs, sponsored by 35 welfare and character building agencies.

A. G. Phelps has been appointed sales manager for the Delco-Remy Corp., manufacturer of starting, lighting and ignition equipment. J. H. Bolles has been named assistant sales manager in the same office.

Kirk W. Todd, formerly vice president of the Central Ohio Steel Products Co., Gallon, O., and affiliated with K. W. Todd Co., investment bankers, Pittsburgh, has been elected chairman of the board of directors of the Central company.

Benjamin D. Brown, formerly treasurer, Albion Malleable Iron Co., Albion, Mich., has been elected president, in addition to his duties as treasurer. He fills the vacancy caused by the death last February of H. B. Parker, president and general manager of the Albion company.

H. Kline Weir, assistant secretary-treasurer of National Steel Corp., and son of E. T. Weir, chairman of National Steel Corp., has been elected president of the Peoples bank at Hollidays Cove, W. Va., succeeding the late J. C. Williams.

Charles W. Walton, secretary and treasurer of the Safety Car Heating & Lighting Co., New York, for more than 20 years, has retired from active business. Herbert K. Williams, formerly assistant to the president, has been named secretary, and William Stewart, previously assistant treasurer and assistant secretary, has been appointed treasurer.

Dean Herman Schneider, of the University of Cincinnati was presented with the Lamme medal for engineering achievement at Madison, Wis., June 25, by Dr. E. B. Roberts, manager of technical employment and training, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The award was originated by Benjamin



G. Lamme, late chief engineer of the Westinghouse company and is awarded annually.

John J. Hilt has been appointed vice president in charge of sales, contract division, Young Radiator Co., Racine, Wis. Mr. Hilt has been connected with the radiator industry for the past 16 years and has been with the Young Radiator interests since its inception. Mr. Hilt continues in the work with which he has been connected and been in charge of for the past eight years.

L. Ray Buckendale has been elected vice president in charge of engineering, Timken-Detroit Axle Co., Detroit. He formerly was executive engineer. Mr. Buckendale has been connected with the company for the past 25 years. He has been prominent in the Society of Automotive Engineers, and at present is chairman of the axle and wheels division of the S.A.E. standards committee, and also chairman of the rating committee for motor coaches and motor trucks.

Charles E. Nelson Jr. has been

named co-ordinator of purchases, production and planning activities for the Waukesha Motor Co., Waukesha, Wis., succeeding the late Albert S. Cronk. He has been identified with the firm since 1929, and following his return from Oakland, Calif., in 1935, where for a time he served the Fageol Truck & Coach Co., subsidiary, he was appointed factory production manager.

## Died:

GEORGE W. FEASER, 70, for 27 years superintendent of the old Oliver Chilled Plow Works foundry, South Bend, Ind., in that city, June 30.

John F. Samples, sales engineer with the New York office of the Carnegie-Illinois Steel Corp., in New York, June 29. Mr. Samples formerly was connected with the Truscon Steel Co. in New York. He was a graduate of the University of Tennessee.

George E. Harris, 74, treasurer, William H. Page Boiler Co., New York and

a director of the First National Bank & Trust Co. of Montclair, N. J., in the latter city, June 28.

Albertis C. Taylor, 59, vice president and general manager, Taylor-Winfield Corp., manufacturer of electric welders for automobile bodies, Warren, O., in that city, June 30. He was widely known as an expert in electric welding.

Henry Oliver, 64, son of the late David B. Oliver, and chairman of the board, Oliver Iron & Steel Corp. until his retirement in 1932, in Pittsburgh, July 1. From 1905 until 1927 he was president of the Oliver Snyder Steel Co., a subsidiary of the former company.

James A. Lenigan, 63, prominent foundryman, at his home in Cincinnati, June 19. He began his career with a steel foundry in Everett, Mass. Prior to erecting and operating two foundries in Barberton, O., in 1917, he was associated with the American Brake Shoe & Foundry Co., as general superintendent. He retired three years ago.

## Stainless Steel Plaques Awarded to Most Beautiful Bridges

NORTH GRAND ISLAND bridge at Niagara Falls, N. Y.; the Lorain road bridge, Cleveland, and Mortimer E. Cooley bridge near Wellston, Mich., have been declared the most beautiful bridges built during the past year, and they will receive awards from the American Institute of Steel Construction Inc., New York.

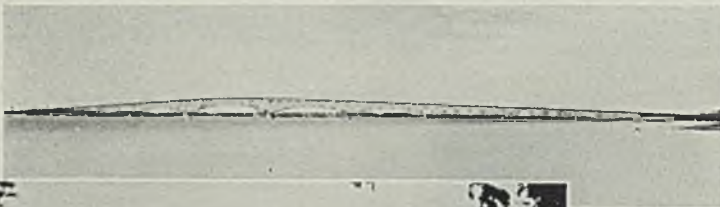
Similar selections have been made

annually for the past eight years.

This year 31 bridges were entered in the contest. They were divided into three groups and the winner in each group will be decorated with a stainless steel plaque. The North Grand Island bridge (top photo) won first prize in group A, comprising those which cost \$1,000,000 or more. It was fabricated by Jones & Laughlin Steel Corp., in conjunction

with the Fort Pitt Bridge Works.

The Lorain road bridge, (right) across Rocky river valley, was first among the bridges costing \$250,000 to \$1,000,000. This bridge was fabricated by Fort Pitt. Group C bridges included those costing less than \$250,000 and the award fell to the Cooley bridge (left). It was fabricated by Wisconsin Bridge & Iron Co.





# Activities of Steel Users and Makers

**C**ARBORUNDUM Co., Niagara Falls, N. Y., purchased property and assets of the Global Corp. also of Niagara Falls, at an assignee's sale for the benefit of creditors. The sale price was \$225,000. The Global works and business will be conducted as a division of Carborundum, instead of as a subsidiary as heretofore.

F. L. Jacobs Co., Detroit, recently purchased the Anderson Mfg. Co., Cambridge, Mass., manufacturer of steel spring covers.

Fitzgibbons Boiler Co. Inc. has moved its general offices and showroom to 101 Park avenue, New York.

United Engineering & Foundry Co., Pittsburgh, has leased new sales quarters in Chicago at 2376 East Seventy-first street, and has moved from 208 South LaSalle street.

Marion Machine, Foundry & Supply Co., Scottdale, Pa., bidding \$211.40, has been awarded a contract to supply machine parts for the Emsworth, Pa., locks.

Fordson Coal Co., subsidiary of the Ford Motor Co., has transferred part of its Pond creek coal mine near Pikeville, Ky., to the Eastern Coal Corp.

Crucible Steel Co. of America Inc., Pittsburgh, has moved its branch office in Cambridge, Mass., to 135 Binney street. W. P. Knecht is manager.

National Association of Flat Rolled Steel Manufacturers has moved its headquarters from 565 Frick building annex to 2445 Oliver building, Pittsburgh.

Machined Steel Casting Co., Alliance, O., has filed intention with the state of Pennsylvania for a certificate of authority to open and maintain an office in Pittsburgh.

J. L. Morrison Co., Niagara Falls, N. Y., manufacturer of stitcher machines, will move its plant to Dayton, O., about Aug. 15. The works since 1932 has been operated by the Harris-Seybold-Potter Co., Cleveland.

Intermountain Belting & Packing Co., Denver, has been appointed agent for the Lincoln Electric Co., Cleveland, manufacturer of shield

arc welders, electrodes and Lincoln Weld motors, covering the state of Colorado and part of Kansas, Nebraska and Wyoming.

Heller Co., Cleveland, maker of steel staples and stapling equipment, recently inaugurated a new merchandising policy consisting of the lending or renting of stapling machines to users of Heller staples. The agreement depends upon the size of the initial order and on the type and capacity of the machine needed.

The firm of P. E. Kelley and Frank M. Sanders doing business under the name of Kelsan Products, St. Clair, Mich., manufacturer of liquid rubber products, has been dissolved. Mr. Kelley is retiring from the company, and Mr. Sanders will remain with Kelsan Products. Mr. Kelley has no further interest in the business, the liabilities being assumed by Mr. Sanders.

## Scrap Exports Reach New High for 1936

**E**XPORTS of steel and iron scrap in May, 217,439 gross tons, made the largest total for any month this year and brought the total for five months of 1936 to 885,762 tons, compared with 933,186 tons for the same period in 1935.

While the total of exports in May, at 314,950 gross tons showed a gain of 12,963 tons over the 301,987 tons exported in April, the gain in scrap was 20,533 tons. Finished and semi-finished steel products declined from 105,081 tons in April to 97,511 tons in May.

Cumulative total exports for five months of 1936 were 1,336,640 gross tons, compared with 1,306,354 tons in the same period of 1935.

Gains and losses by various items were relatively small and no marked change from April was noted. Details of imports for May, with compari-

sons were presented in STEEL, June 29, page 22.

### UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Articles	Gross Tons		
	May 1936	April 1936	Jan. thru May, '36
Pig iron .....	121	215	833
Ferromanganese and spiegeleisen .....	60	142	210
*Other ferroalloys .....	156	280	966
Ingots, blooms, etc.....	982	2,841	5,201
Bars, iron .....	108	170	549
†Bars, concrete .....	377	303	1,153
†Bars, other steel.....	5,114	4,641	21,308
Wire rods .....	3,183	4,664	17,614
Boiler plate .....	188	411	1,236
Other plate, not fab....	5,207	6,390	24,173
Skelp, iron or steel.....	5,188	3,901	12,345
Iron sheets, galv.....	219	58	571
Steel sheets, galv. ....	4,830	5,464	23,766
Steel sheets, black.....	10,106	12,250	55,016
Iron sheets, black.....	605	518	3,097
Strip steel, cold-rolled	1,889	1,943	10,189
Strip steel, hot-rolled..	2,780	3,346	13,194
Tin plate, taggers' tin	25,889	24,886	105,110
Terne plate .....	373	267	1,469
Tanks, ex. lined, etc.	1,428	2,168	11,099
Shapes, not fab.....	3,166	5,282	10,616
Shapes, fabricated.....	1,605	2,320	7,918
Plates, fabricated.....	965	88	1,349
Metal lath .....	113	100	374
Frames and sashes.....	36	11	375
‡Sheet piling .....	257	167	1,277
‡Rails, 60 lbs. and over	2,734	4,882	23,274
‡Rails, under 60 lbs....	1,706	114	2,673
Rail fastenings .....	887	492	2,656
Switches, frogs, crsgs.	56	130	510
Railroad spikes .....	137	237	1,088
R. R. bolts, nuts, etc...	43	75	278
Boiler tubes, seamless	469	702	2,369
Boiler tubes, welded...	9	53	199
Casing and oil line pipe, seamless .....	791	1,725	6,155
Do., welded .....	248	85	913
Seamless black pipe, other than casing...	378	262	1,609
Malleable iron screwed pipe fittings .....	339	325	1,324
Cast iron screwed pipe fittings .....	217	141	800
Cast iron pressure pipe and fittings for	688	610	2,908
Cast iron soil pipe Do.	420	425	2,028
Welded black steel pipe	605	563	4,468
Welded black wrought iron pipe .....	203	127	724
Welded galv. steel pipe	852	512	3,578
Welded galv. wrought iron pipe .....	68	191	628
Riveted iron or steel pipe and fittings .....	68	74	381
Plain iron or steel wire	2,806	1,474	10,279
Galvanized wire .....	1,966	1,814	8,280
Barbed wire .....	3,215	3,055	12,783
Woven wire fencing...	180	149	976
Woven wire screen cloth .....	79	100	412
Wire rope .....	283	370	1,453
Other wire and mfrs...	326	367	1,955
Wire nails .....	786	850	3,554
Horseshoe nails .....	50	54	261
Tacks .....	24	24	128
Other nails, inc. staples	242	288	1,012
Ordinary bolts, machine screws, rivets, washers .....	621	561	2,631
Iron castings .....	342	381	3,074
Steel castings .....	213	338	1,141
Car wheels, tires, axles	594	379	2,328
Horseshoes and calks..	6	3	62
Iron and steel forgings, n. e. s. ....	415	323	2,079
Total gross tons.....	97,511	105,081	450,878
Iron and steel scrap..	213,366	190,845	863,577
Tin plate scrap .....		2,507	8,825
Waste-waste tin plate..	4,073	3,554	13,360
Total gross tons.....	217,439	196,906	885,762
GRAND TOTAL .....	314,950	301,987	1,336,640

\*New class. No comparable figures for previous year.  
 †New class. Previously included under former classification "Steel Bars."  
 ‡New class. Includes alloy, non-alloy and stainless steel bars (excepting concrete reinforcement bars).  
 §New class. Previously included with "Frames and Sashes."  
 ¶Previously shown at "50 pounds."

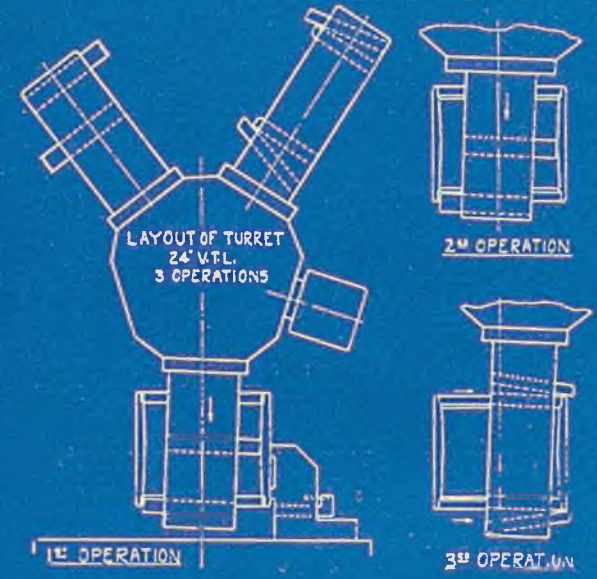
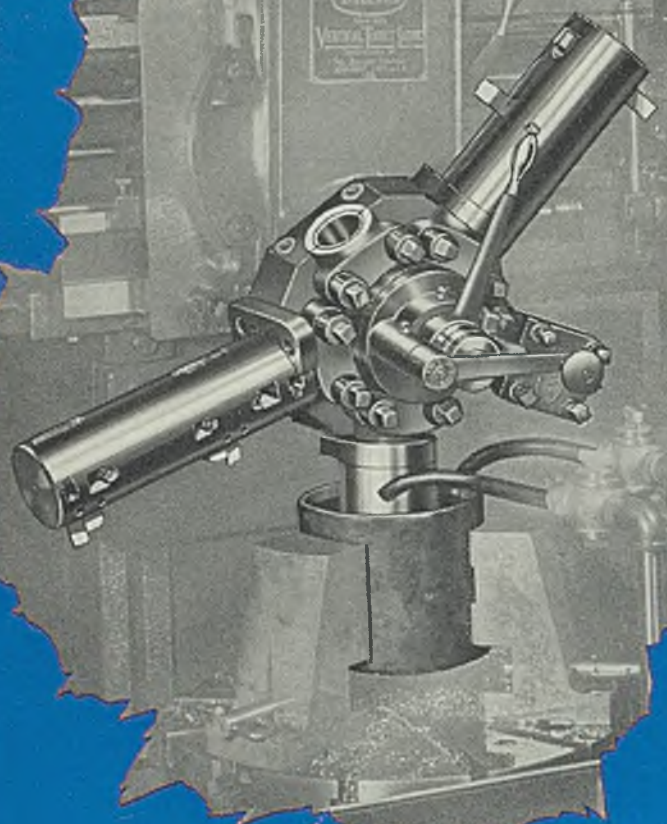
### FOREIGN TRADE OF UNITED STATES IN IRON AND STEEL

	Gross Tons			
	1936		1935	
	Imports	Exports	Imports	Exports
Jan.	50,489	241,564	22,784	262,740
Feb.	43,358	213,802	28,905	228,537
Mar.	56,720	264,337	21,409	323,035
April	49,621	301,987	28,866	205,336
May	59,391	314,950	47,719	286,598
5 mo.	259,235	1,336,640	149,655	1,306,354
June			33,208	289,687
July			31,894	296,802
Aug.			31,312	247,312
Sept.			53,158	244,419
Oct.			59,569	238,358
Nov.			56,637	205,242
Dec.			53,678	239,268
Total			469,954	3,067,336



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A CONICAL SOCKET IN 8 MINUTES  
FLOOR TO FLOOR



## 24" HIGH SPEED VERTICAL TURRET LATHE

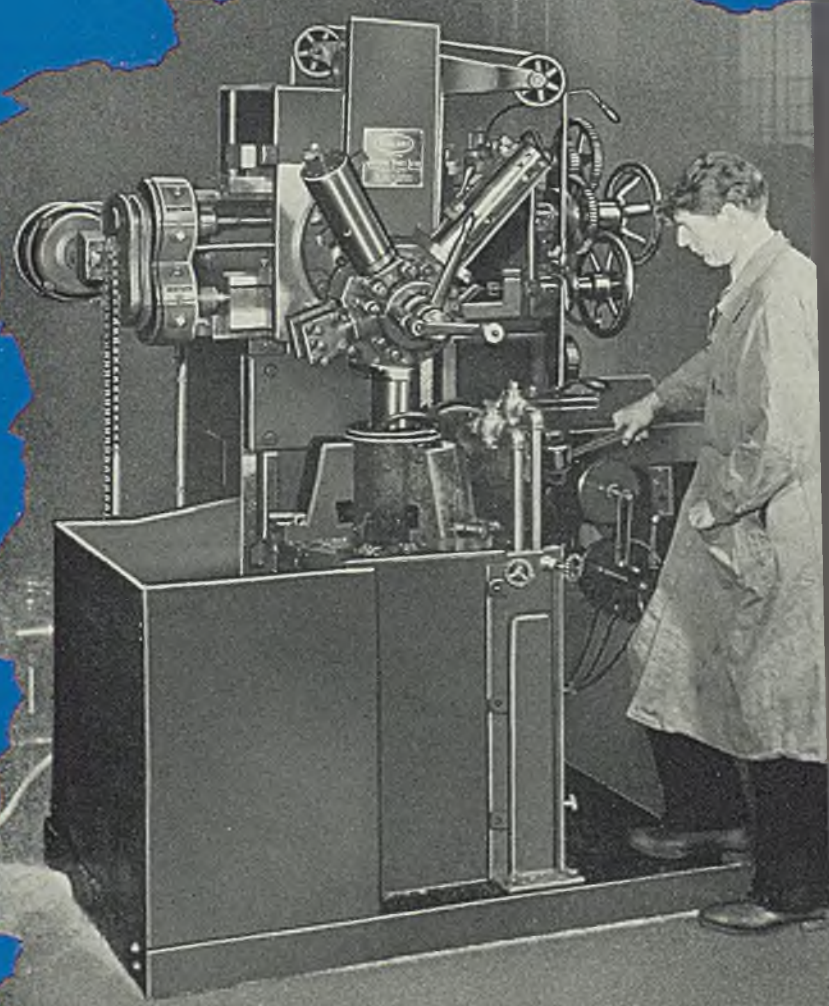
Piece Name— Conical Socket  
Material— Wrought Iron  
Attachments—Cutting Lubricant System,  
Thread Cutting

### OPERATIONS

Drucking  
Bore Inside Angles  
Face Both Ends and  
Counterbore Socket  
Cut Threads  
Load

Floor to Floor Time—8 Minutes  
Hourly Production—6.3 Pieces

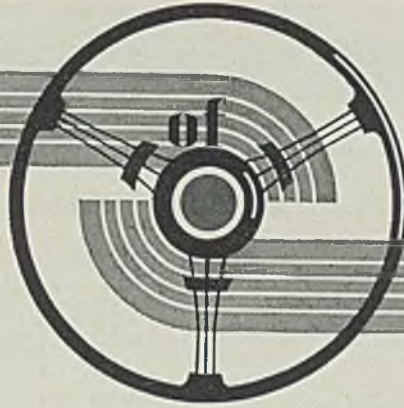
If you have a similar problem job  
or for that matter any problem job,  
let us analyze it to your advantage.  
Time Saved is Money Earned. If others  
profit, so can You.



THE BULLARD COMPANY

Bridgewater Connecticut





## DETROIT

**B**UICK has been given directions by the General Motors management to line up the manufacture of an increasing number of parts in 1937 for all of the General Motors models. Transmissions, coil-spring assemblies and rear axles are the items on which Buick will concentrate.

At Flint, Buick headquarters, some heavy equipment and retooling orders are coming out. Added to the \$15,000,000 spent to prepare for 1936 models, has come an authorization recently of at least \$1,500,000 for plant expansion.

All of the coil-springs, or "kneec-action" units, plus most of the transmissions and the rear axles for Olds, Pontiac, Buick, Cadillac and LaSalle will be made next year by Buick. Some 400,000 square feet of plant space is to be added by the five new buildings there.

Obviously, it is the intent of General Motors to group the production of these parts all under one wing for all its models, save Chevrolet. The latter will continue self-sufficient, continuing at Gear & Axle division in Detroit to make its own axles and coil springs. The Chevrolet transmission work will be kept at Saginaw, Toledo and Muncie, Ind.

## Buick Assumes Burden

Shunting on Buick most of the work mentioned will considerably relieve the pressure on Chevrolet. For some years the latter had been making Pontiac's rear axles, plus numerous other parts for General Motors subsidiaries.

Often, the jam on getting out schedules caused headaches, for Chevrolet likes to give its own model the preference. The case of Pontiac's rear axles again serves to prove the point. Visualizing the 1936 market as one taxing its capacity, Chevrolet made up a lot in advance of better than 15,000 Pontiac axles last December, and only after some strong persuasion succeeded in getting Pontiac to find the room to store them.

In the 1937 model season Buick must prepare to fulfill a 240,000-car year for Oldsmobile, a 200,000-car

quota for Pontiac, 170,000 models for itself, and 30,000 jobs for Cadillac and LaSalle combined.

The addition of these aggregates indicates General Motors has established 540,000 cars as the number it can make and sell in all lines above Chevrolet. Add about 1,000,000, as the Chevrolet quota and you have the largest producer in motordom figuring its minimum share of next year's market at 1,540,000 jobs.

Buick will make about 170,000 of the 1936 jobs, now working up the last parts releases, which were for 22,000 units. Pontiac at 200,000 is down for the widest tentative increase, followed in order, on a proportionate basis, by Cadillac-LaSalle and Oldsmobile.

## June Sales Are High

One of the five new Buick units will be a heat-treating plant for transmission work, another will be a transmission assembly unit with a 70,000-unit per month capacity, a gear and axle heat-treating shop, a metallurgical and standards building, a works engineering division and a mechanics division.

The machine tool, equipment, and a host of kindred salesmen are trekking to Flint these days. It is probably the biggest General Motors buy in these markets since the purchases for the new Grand Rapids, Mich., Fisher Body plant last fall.

Hudson and Studebaker continue definitely above the pay point with assemblies, based on good retail sales. Hudson's June sales, over 7600 cars, were the best for any June in seven years. Studebaker sold over 6000 models, better than twice June of a year ago.

Packard, Nash and Reo are other examples of the so-called independents who have had remarkably good business in June. Packard accounted for approximately 5100 models last month, Nash with Lafayette topped 4000 units together for the month, and Reo did almost as well as in May when 1600 cars and trucks were turned out.

Appreciating that a motorcar's overall appearance is distinctively styled

by its radiator shell and grille more than any other one part, Hudson has set about to make the 1937 Hudson and Terraplane lines quite different from anything in motordom.

These radiator shells will be considerably deeper than at present with the unusual feature of louvres being mounted in the shell's sides. The net effect will be one of body length and streamline feature. Presumably, louvres at the side of the radiator shell will thus obviate their being in the hood.

This die job, just placed by Hudson at a cost of around \$44,000, runs three to four times the usual figure to make a shell's die. Incidentally, Hudson has been in a scramble to place a lot of new tool work recently, calculated to amount to more than \$100,000.

Speaking of dies, a few of the shops in this business here have worked out a big time-saving practice on the making of wooden models. Usually, the first model which is made of clay is transcribed into wood after all alterations are done, this being a hand job requiring four to five weeks.

One of the large diemakers here is now making its wood die models from clay through the use of automatic cutters which are guided by photoelectric light beams and is doing the work in one-fourth to one-fifth of the time under former practice.

## Trend Is Toward Length

Several stamping shops here have been figuring on unusual sheet steel sizes for next year. Strangely, their inquiries have been toward paring down on widths and increasing lengths. A few years ago the rage was to get sheets rolled continuously in widths above 80 inches and there was talk at one time of more than 100-inch widths.

Analyzing a large number of inquiries at present, widths are running down to 73 and 71 inches as a general thing, compared with a fair average of 75 inches last year. But the stamping people are making it up in the lengths they want.

For example, one motor car maker here is considering a 71-inch wide sheet, 225 inches in length, and plans to stamp out one body top panel start-



# MIRRORS of MOTORDOM

ing with the front cowl right back through and including the trunk.

A large amount of welding would thus be circumvented, but a scrap loss that would be between 25 and 28 per cent in this instance, seems a serious obstacle at present.

Many of the 1937 sheet inquiries indicate that carmakers are figuring on cutting down car weight. The substitution of 19 and 20 gage sheets for inside body and floor parts as against 18 gage at present, is fairly general. For the most part, 18 gage stock will continue in fender and outside panel work.

Last week Midland Steel Products Co. closed for 1937 on what it terms "the same proportion of Chrysler frame business as it had this year." Recent reports recall that Murray Body came in for a share of the Plymouth frame business for 1937 season.

Currently, Chrysler Corp. common stock's market and its automobile assemblies seem to be running toward different poles. While the common scaled 114 last week on the Big Board in New York, aggregate assemblies in Detroit for Chrysler were slipping down close to the 20,000 per week mark.

Plymouth was down to 10,700 assemblies for the week, with the balance made up of Dodge at 8600, Chrysler at 900, and DeSoto with 875. Chrysler's June was not as good as the 112,000 models turned out in May considering the entire line.

## Chevrolet Takes Lead

Accordingly, Ford's figure for the week at 23,600 assemblies pulled away from the dead-heat for second place that Chrysler and Ford have been edging into behind General Motors in the last few weeks.

From the standpoint of individual performances, Chevrolet held the lead through last week, having assembled 30,000 more cars and trucks. Ford held second, and in third was Plymouth.

Following Dodge in fourth place, Olds was steady at around 4000 completed jobs for the week. Buick held at 3600, Pontiac at 4200, Hudson at 2500. July 4 holidays seemed to be taken generally by the industry although the vacation did not cut into total production greatly, for Saturday anyway is not considered a working day by most motor plants.

In the first six months of 1936 net earnings of Packard Motor Car Co. will be approximately the same as for the entire year of 1935 which were \$3,315,622. This indicates per share earnings for the six months

## Automobile Production

Passenger Cars and Trucks—U. S. Only  
By Department of Commerce

	1934	1935	1936
Jan. ....	155,666	289,728	364,004
Feb. ....	230,256	332,231	287,606
Mar. ....	338,434	425,913	420,971
Apr. ....	352,975	452,936	502,775
May ....	330,455	361,107	460,565
5 mo. ....	1,407,786	1,861,915	2,035,921
June ....	306,477	356,340	.....
July ....	264,933	332,109	.....
Aug. ....	234,811	237,400	.....
Sept. ....	170,007	87,540	.....
Oct. ....	131,991	272,043	.....
Nov. ....	83,482	395,059	.....
Dec. ....	153,624	404,528	.....
Year ....	2,753,111	3,946,934	.....

Estimated by *Cram's Reports*

Week ended:	
June 6 .....	101,896
June 13 .....	100,415
June 20 .....	100,733
June 27 .....	99,695
*July 4 .....	100,697
*Estimated.	

of about 22 cents a share. During the same period of 1936 Packard's sales totaled about 34,000 cars, an increase of 16,700 cars, or 97 per cent, over the first six months of 1935.

Continental Motors has shifted eight of its executives through a reshuffle of titles . . . Pierce-Arrow has been inquiring for body stampings on about 500 jobs. Murray Body had been doing the work . . . Hudson says its sales the first two weeks in June were the highest for any corresponding weeks in seven years. They sold 4977 cars . . . New Ford parts numbers are making an appearance in several cases. Likewise, Briggs on Chrysler work. A few but not all of the General Motors units also fall in this category . . . The International Truck frame contract is still open, but it looks like a Detroit body plant is in line for it . . . Machine tool buying has dropped off here, possibly owing to deliveries. The last big machinery program was for the East Jefferson avenue Chrysler plant . . . Ternstedt completed a fairly sizable steel buy last week . . . The average skilled worker in the automobile industry is now making \$1.03 per hour, according to a composite worked up of 33 plants here . . . A shakeup in the general sales departments of one of the low-price carmakers is in the making, according to advance word . . . A new cutting metal will soon be introduced on a national scale, according to reports here. Said to fall between the cast and cemented types as to

general characteristics, the new alloy is reported to have been undergoing intensive development for the past two years in actual mass-production in one of the large automobile plants. . . .

Reynolds Spring Co., Jackson, Mich., which has developed a new seat frame of steel and fibre, is building an addition to its plant. . . . Mullins Mfg. Co. has named Grace & Bennett Inc., Detroit, to direct a selling campaign and advertising on its all steel trailer. . . . More copper-lead bearings are to be used by motormakers next year. . . . Graham claims one of its supercharged models reached 60 miles an hour from a standing start in 14 seconds in a recent race with a Boeing transport plane. The latter trailed by 100 feet. . . . Chevrolet will build an addition to its annealing department at Saginaw sometime this fall. Surface Combustion Corp. has the contract for one 23 x 100-foot furnace there now. . . . Hupp has been selling some of its machine tools, recently disposing of four out of a battery of 12 large lathes. . . . Buick claims to be spending \$750,000 alone for its new forge shop. . . . United States Rubber Products Inc. has marketed a new inner tube treated with a substance to prevent air seepage.

## American Rolling Mill Acquiring Hamilton Furnace

Negotiations to give the American Rolling Mill Co., Middletown, O., full control of the Hamilton Coke & Iron Co., New Miami, O., were nearly complete last week. American Rolling Mill, which held a half interest in the company, is acquiring the 50 per cent interest of the Koppers Coke & Gas Co., Pittsburgh.

Financing for the purchase includes the private refinancing in New York by W. E. Hutton & Co. of \$2,000,000 of Hamilton Coke & Iron five-year serial 3½ per cent notes and \$2,000,000 3½ per cent sinking fund mortgage notes payable between 1941-46.

The deal will give American Rolling Mill control of its pig iron and fuel supply. Rebuilding of the Hamilton furnace (STEEL, June 29, page 24) is already underway. The furnace will be ready about Sept. 1. Daily capacity will be about 700 tons. The company has 45 by-product coke ovens, a gas and by-product plant and a fleet of ladle cars to transport iron over nine miles of private railroad to Middletown.



jury to one foot which prevented him from attending to his duties. He presented his resignation in May, but the corporation refused to accept it and when again presented a short time ago, it was accepted with regret.

A. E. Zimmerman, who has been active in the sheet metal business for the past 15 years, has been appointed superintendent of the Par-Brook Mfg. Co., sheet metal products, Cleveland.

H. L. Dalzell, associated with the company for the past year, has been promoted to sales manager. His previous experience has been with Youngstown Sheet & Tube Co. and Dalzell Bros. Co., Youngstown, O.

William Sasak, who has been in the engineering department for the past two years, has been promoted to chief engineer. He formerly had been connected with the Van Dorn Iron Works, Canton Art Metal Co., Jamestown Metal Equipment Co. and American Coach & Body Co.

William F. Henning has been appointed domestic sales manager of the American Screw Co., Providence, R. I. Mr. Henning has been assistant manager of this department for 15 years and succeeds to the post vacated by the death of Albert B. Peck.

Walter Bromley, formerly sales representative in the central states and the New England district, has been made assistant domestic sales manager.

Vincent Roddy, formerly director of the planning and research division, has been appointed assistant to the general manager, Eugene E. Clark. Harry Mayoh will continue as sales promotion manager, the position to which he was recently appointed.

Robert W. Frank has been appointed assistant chief metallurgist of the Duquesne works of Carnegie-Illinois Steel Corp., succeeding Wilbert A. Saylor, who has been transferred to the metallurgical department of the Ohio works of the company at Youngstown, O. Mr. Frank previous to his identification with the Duquesne works in 1933, had been with Jones & Laughlin Steel Corp. since 1921.

## Died:

**JAMES LIPPINCOTT**, 70, chairman of the board of the West Leechburg Steel Co., which recently merged with the Allegheny Steel Co., in Pittsburgh, Sept. 14. Mr. Lippincott was associated with the iron and steel industry for more than half a century. In 1885 he entered the employ of Carnegie Bros. & Co. Ltd., Pittsburgh, and three years later was attached to the executive department of the company. Soon after he left to join Kirkpatrick & Co.



James Lippincott

Ltd., Pittsburgh. In 1897, with associates, Mr. Lippincott founded the West Leechburg Steel Co., retaining his affiliation with Kirkpatrick & Co., and when the latter firm was sold to American Sheet Steel Co. in 1900, Mr. Lippincott was identified with the operating and sales departments of the American company until 1906. He served as secretary of the West Leechburg company until 1908 when he was appointed vice president and general manager. In 1913 he was named president and in April, 1935, succeeded to the chairmanship.

James Strachan Milne, 70, marine consulting engineer, New York, at his home in Brooklyn, Sept. 7.

Evan Jones, 54, an assistant superintendent for Carnegie-Illinois



Edwin R. Crawford

Steel Corp., in Houston, Tex., Sept. 8.

John Hull, founder and for many years head of the American agency for Swedish steel producers, at Westport, Conn., Sept. 15.

William S. Roe, 58, president, William S. Roe Inc., Newark, N. J., at Springfield, N. J., Sept. 3. He founded the company in 1906.

Norman L. Daney, 52, treasurer and general manager, Harris-Seybold-Potter Co., Cleveland, printing machinery, in Cleveland, Sept. 13.

L. R. Brown, 37, assistant advertising manager, Hagan Corp., Pittsburgh, and formerly with the Mesta Machine Co., Pittsburgh, at Pittsburgh, recently.

Emil A. Peterson, 71, president, Valley Iron Works, Appleton, Wis., in that city, Sept. 13. He became superintendent of the plant in 1898, treasurer and general manager in 1905, and president in 1921.

J. J. Oller, president, Landis Machine Co., Waynesboro, Pa., in Waynesboro, Sept. 3. Mr. Oller became a director of the company in 1907 and in 1910 was elected president.

Franklin Sailberlich, 74, since 1892 executive of several metalworking industries in Appleton, Wis., recently. He founded the Eagle Mfg. Co., agricultural tools, in 1892, and served as president until 1918. In 1919 he founded the Fox River Tractor Co. and was its president until 1931.

Alex. K. Hamilton, president, M. H. Treadwell Co., Chicago, maker of special machinery, and iron and steel castings, in that city, Sept. 8. Before becoming president of the Treadwell company in 1908, he was chief engineer for the Lackawanna Steel Co., Buffalo, and later chief engineer and general superintendent of Milliken Bros. Inc., Staten Island, N. Y.

Edwin R. Crawford, 66, president, McKeesport Tin Plate Co., McKeesport, Pa., in Duquesne, Pa., Sept. 13. He had been associated with the company since 1902. At the age of 15 Mr. Crawford entered the employ of the United States Iron & Tin Plate Co. Inc., as an office boy. Later he was promoted into the shipping department and thence upward until in 1898 he became secretary. From 1899 to 1902 he was traveling auditor for the American Tin Plate Co. In 1902, with associates, he projected the McKeesport company, becoming president. He was a director of the National Can Co., and the Blaw-Knox Co.



# DEPENDABILITY

WE would be lost without the things in life that we take for granted — that we accept without question.

Our customers after 39 years of experience take it for granted that they get *good strip steel* from West Leechburg — they are not disappointed — promises are kept and quality is assured. Nothing exceptional is offered them, just day-in-and-day-out service that leaves them free to worry [if they must] about other things rather than strip steel. Will you join our “satisfied customer” group?

*We roll and sell ALLEGHENY stainless.  
All grades in strip form.*



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BUFFALO—ROCHESTER—SYRACUSE [Brace-Mueller-Huntley, Inc.]

*Warehouse Stocks of Cold Rolled Strip Steel are carried by:*

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# Quotes Government's Own Figures To Refute Its Industrial Theories

**G**OVERNMENT interference in the orderly processes of American business is held responsible for continuance of unemployment in a report published by Farrel-Birmingham Co. Inc., Ansonia, Conn., entitled "Government Interference With the American Industrial System."

The report was written by the well-known business economists, Allen W. Rucker and N. W. Pickering, who vigorously refute the economic theories of New Deal spokesmen.

Reasoning by President Roosevelt, as revealed in a radio address April 25, is said to disclose an almost incredible view of the situation, when looked at in the light of achievements of the American industrial system.

From a study of government figures a new relationship between industrial and farm prices has been discerned, which is said to give an answer to the question as to the cause of unemployment, and why it continues.

## Free Industry Can Solve Problem

Conclusions based on this study are that industry never has failed, through improved machinery and methods, promptly to balance its costs and prices with the farm price level, until, and unless, interfered with by government, and that government interference is a major cause in the intensity of depression and slowness of recovery.

The most prosperous periods are those in which prices of manufactured goods, relative to the farm price index, are being reduced, the reduction being accompanied by increased employment, purchasing power and consumption. Unemployment and under-consumption come when the reverse is true.

Further reduction now in the industrial price level is obstructed by excessively high wage rates relative to farm prices and an additional increase in hourly wages threatens further price distortion and consequent decline in industrial and business activity.

President Roosevelt's statements referred to are condensed to the following: Consumption of industrial goods actually declines with the declining industrial price level; reduction of costs of manufacture does not mean more purchasing power and more goods consumed; new ma-

chinery and technique, with increased employe efficiency mean fewer men employed and more unemployed; wages should and must go up with prices.

From figures by the census of manufactures and the United States department of labor the conclusion is drawn that consumption of goods does not decline with a declining price level. The following table presents this situation, in the case of leading industries, giving the comparative decline in prices from 1923 to 1929 and percentage increase in employment in the same period.

	Department of labor price index		Employment in 1929, per cent increase over 1923
	1923	1929	
Iron and steel...	109.6	95.0	5.0
Agricultural implements .....	101.6	98.7	32.0
Auto tires .....	100.2	54.5	12.0
Drugs .....	96.4	71.5	10.0
Furniture .....	109.7	95.0	7.0
Gasoline .....	87.0	71.3	20.0
Paint .....	103.4	94.9	15.0
Paper and pulp	102.9	88.9	6.0

It is evident that through this period of declining industrial prices, consumption, employment and purchasing power were increasing and industries with greatest price declines met greatest goods consumption. The conclusion from this showing is diametrically opposed to the theories of the President.

## Wage Rate Destroys Ratio

Figures in this period and those in the period between 1929 and 1933 show a remarkable divergence, which is based on the relation of industrial and farm prices. In the earlier period prices declined not only in dollars but also relative to the farm price index. In the later period the decline in dollars was slight but in relation to the farm price index it was rising. This resulted in the heavy shrinkage in the products of some industries.

The study of these data indicates that under both the Hoover and Roosevelt administrations wages were sustained at a level higher than the conditions warranted, higher than the proper relation to the farm price index. Government interference with natural processes thus caused loss of consumption and decline in employment.

It is apparent that the industrial price level follows wage rates and it is said the artificial maintenance of these rates was responsible for the

malfunctioning of the American system in 1929-33. However, industry has been able by improved equipment and methods to offset in great part the effects of this condition.

The study concludes from the data that if the President's expression of economic and social philosophy, as quoted, is to prevail, it implies an extension of government interference — precisely the factor which has primarily caused excessive price distortion in the past six years. The fact that since the beginning of 1935 the cost of manufactured goods, due to excessive wage rates, has not been lowered, relative to farm prices, is considered to be a warning that further tinkering will be followed by recurrence of the conditions of the past few years.

## Hands Off Rule Asked

The following recommendations are made: Relieve manufacturers of the handicap of government interference and threat of government control; restore flexible working hours so that each industry may develop maximum efficiency and low-cost production; encourage labor to seek higher income through production of low-cost merchandise; stimulate confidence in industry, remembering that it is the successful and expanding enterprise which provides both employment and purchasing power; that the larger proportion of factory unemployed labor today was once on the payrolls of businesses which could not keep going in the face of government interference.

## Construction Begun on Australian Coke Ovens

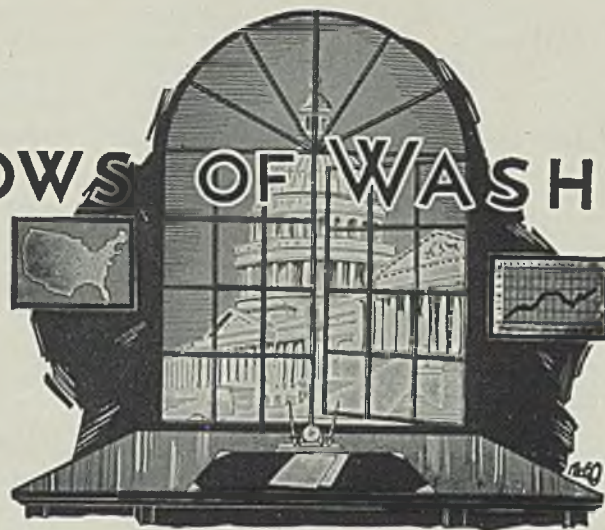
Installation of a battery of 72 Otto-Wilputte underfired coke ovens is under way in New South Wales, Australia, at the plant of Australian Iron & Steel Ltd., Port Kembla subsidiary of the Broken Hill Proprietary Co. Ltd., Newcastle, Australia.

Complete by-product and benzol recovery and coal preparation and coke handling equipment will be installed. Daily carbonizing capacity will be approximately 2100 net tons of coal. Plans and specifications have been made by the Wilputte Coke Oven Corp., 570 Lexington avenue, New York, which also recently completed plans for a battery of 20 underfired ovens for the American Smelting & Refining Co., at Rosita, Coahuila, Mexico. Heating of the latter is about to be started.

The ovens of both these types are similar to the two underfired batteries placed in operation in 1935 by the Carnegie-Illinois Steel Corp., at Gary, Ind.



# WINDOWS OF WASHINGTON



## WASHINGTON

ONE of the best sounding boards in the nation's capital is the National Press club where a large part of the newspaper correspondents appear at some time during the lunch hour. There has been a very definite change in the trend of the political thought expressed by these men—probably since the Republican convention in Cleveland.

The difference is noticeable not only among the out-and-out Republican newspaper men but among the Democrats as well. Before the Cleveland convention there was a definite opinion that President Roosevelt would be re-elected without difficulty. At the present time there is a feeling that Gov. Landon "has a chance." Some newspaper men, including many who have recently toured the nation to feel out the political situation in various states, give the Republican candidate a 50-50 chance. A few correspondents who had made previous trips report a very decided change in sentiment. Of course, there is no reason to believe that this sentiment will not change in the coming months—but so it stands today.

### Platforms Offer Little

Industry evidently has little to choose from in the two political platforms.

"We have taken the American business man out of the red," says the Democratic platform. "We have saved his bank and given it a sounder foundation; we have extended credit; we have lowered interest rates; we have undertaken to free him from the ravages of cut-throat competition. The American business man has been returned to the road to freedom and prosperity. We will keep him on that road."

On the question of monopoly and the concentration of economic power, the Democratic platform says:

"Monopoly and the concentration

of economic power, the creation of Republican rule and privilege, continue to be the master of the producer, the exploiter of the consumer, and the enemy of the independent operator. This is a problem challenging the unceasing effort of untrammelled public officials in every branch of the government. We pledge vigorously and fearlessly to enforce the criminal and civil provisions of the existing anti-trust laws, and to the extent that their effectiveness has been weakened by new corporate devices or judicial construction, we propose by law to restore their efficacy in stamping out monopolistic practices and concentration of economic power."

### Pledge Fight on Barriers

Dealing with the foreign trade situation the same plank states that:

"We shall continue to foster the increase in our foreign trade which has been achieved by this administration; to seek by mutual agreement the lowering of those tariff barriers, quotas and embargoes which have been raised against our exports of agricultural and industrial products; but continue as in the past to give adequate protection to our farmers and manufacturers against unfair competition or the dumping on our shores of commodities and goods produced abroad by cheap labor or subsidized by foreign governments."

Major George L. Berry, who is acting as co-ordinator of industrial cooperation, an appointment made by the President, and who is head of labor's Non-Partisan League, last week said that "encouragement to the company union now outlawed by congressional enactments, and its vicious ally, the yellow dog contract, is a certainty if national candidates are elected on the basis of the Republican platform."

It is this same Major Berry who, on the one hand, takes every oppor-

tunity he can to "crack" industry and on the other asks industry to cooperate with him in connection with his industrial council. Of course, these two things do not go hand in hand and it is hard to see why any members of industry or business go along with the major at all—but they seem to.

### EX-CONTROLLER GENERAL CALLS FOR ECONOMY

John A. McCarl, controller general of the United States for the last 15 years, whose term expired last week, took a parting shot at the Roosevelt administration by calling for the abolition of many of the emergency agencies which he described as tax consuming in the extreme.

In a statement issued just prior to the termination of his office, Mr. McCarl emphasized that he firmly believes the American system of government must be preserved.

"No one could serve 15 years as controller general of the United States," he said, "without the aid of a firm belief in both the wisdom and practicability of our system. With me, it is not just a belief. It is something more akin to a religion."

### TAX REDUCTION UPSETS ROUTINE

The bureau of internal revenue is calling attention to the fact that section 401 of the revenue act just passed reduces the rate of capital stock tax imposed on corporations from \$1.40 to \$1.00 for each full \$1,000 of the declared value.

In filing returns for the current taxable year ending June 30, 1936, corporations are required to make an original declaration of value for their capital stock and pay any tax due at the rate of \$1.00 for each full \$1,000 of such declared value. Under the law, an entirely new value may be declared for the capital stock on the 1936 return, regardless



of any declaration of value made any previous year.

In view of the fact that prior to the enactment of the recent revenue law, the capital stock tax return forms had been printed and forwarded to collectors of internal revenue for distribution, it became necessary, upon receipt of information that the revenue bill had become law, for the bureau to notify collectors to change the tax rate printed on the forms from \$1.40 to \$1.00 and, in the event the forms had already been distributed, to advise the taxpayers of the change in the tax rate made by the new act.

A treasury decision amending the capital stock tax regulations with respect to the rate of tax, and making certain other modifications necessary as a result of the further changes in the law, is in course of preparation by the bureau and will be issued at an early date.

#### **BERRY CRITICIZES INSTITUTE'S STAND**

Considerable discussion among Washington observers has centered around statements that John Lewis or some of his henchmen are reported to have made concerning the administration's approval of the effort to organize the steel industry. No one can vouchsafe for the statements, especially in view of the fact that several times recently Mr. Lewis has had long private talks with the President.

Major Berry, as president of labor's Non-Partisan League and Philip Murray, chairman of the steel workers' organizing committee, issued statements criticizing the American Iron and Steel institute's release concerning the union drive.

Secretary of Labor Perkins declined to comment on the declaration of the institute. It is known that Edward McGrady, assistant secretary of labor and a former official of the A. F. of L., and other mediators are remaining close to base, with indications that they will stay there for some time to come.

"A statement was issued by the American Iron and Steel institute reading as though taken bodily from the Republican platform," said Major Berry in his statement.

"The steel industry," he continued, "announces it is prepared to protect its employes 'from intimidation, coercion, and violence and to aid them in maintaining collective bargaining, free from interference from any source.'"

"I strongly urge," said Major Berry, "that interested persons compare this statement of the American Iron and Steel institute with the labor platform of the Republican party. There can be no misconception as to the purpose of the institute. It seeks to protect the company unions now installed in that industry and would use the labor plank of the Repub-

lican party to accomplish that purpose.

"The concern of the steel industry in protecting its employes from violence is tragic, since so many steel workers remember vividly the violence visited upon them during their last efforts at bonafide trade union organization.

"The issues are rapidly becoming clarified," continued the major. "Added to the ranks of the old guard, the Liberty League, the National Association of Manufacturers, and the grass rooters, is the institute, representative of the steel industry. The workers will be quick to realize that there is no hope for organization for them under the terms of the Republican platform and that their only hope for real collective bargaining and real collective action lies in supporting Franklin D. Roosevelt for re-election as President."

Mr. Murray in his statement said:

"The royalists of steel are interested in maintaining their own company union dynasty, and through this Frankenstein use it as a means to continue an alleged system of collective bargaining. Back of this is the same attitude that defended the 12-hour day in the steel mills; that bitterly opposed workmen's compensation; that fought every piece of social legislation introduced in congress or in state legislatures.

"The committee created to organize the steel industry has no interest in fomenting strikes or creating disorders, as it officially announced at its first meeting held in the city of Pittsburgh, Wednesday, June 17."

#### **SAYS WAGES MUST EXPAND WITH PRODUCTION**

An analysis of production, wages, and employment in all manufacturing industries has been made public by Mr. Berry with the statement "that manufacturing industry as a whole has not contributed to the support of the consuming market in proportion to the increase in production."

From the statistical data on charts which accompany the study, it is apparent, according to Major Berry, "that the accumulative effects of the unbalance from 1919 to 1929, between the power to produce and the power to consume was one of the principal reasons for industry's collapse in 1929.

"On the assumption that this premise is sound, it further appears that employment depends upon production, and production depends upon consumption, and it necessarily follows that for consumption to keep pace with an ever-expanding production, that buying power in the form of wages must likewise expand proportionately. When production advances ahead of buying power and the advance is maintained for an ap-

preciable period of time, business depressions must inevitably follow."

#### **CANADIAN AUTOMOTIVE EXPORTS SHOW INCREASE**

Exports of automotive products from Canada in May, were valued at \$1,956,511 compared with \$1,514,899 in April and \$2,903,842 in May, 1935, according to the automotive aeronautics trade division, department of commerce.

Automotive parts accounted for \$180,036 of the exports in May, \$261,539 in the previous month, and \$305,538 in May, 1935.

Foreign shipments of passenger cars from Canada increased from 3,108 units, valued at \$1,040,716, in April, 1936, to 3,945 units, valued at \$1,263,736, in May. Passenger car exports in May, compared with the previous month by price classifications were as follows: valued at \$500 or less, 3,333 against 2,587; over \$500 up to \$1,000, 588 against 467; over \$1,000, 54 against 54.

Exports of trucks from Canada in May totaled 1,277 units, valued at \$512,739, compared with 618 units, valued at \$212,644 in April.

#### **RECOVERY REFLECTED IN GERMAN MACHINERY SALES**

Increased sales in farm implements and machinery in Germany reflect the improvement of agriculture in that nation, a report to the United States commerce department from its Berlin office shows.

During 1934-35 the turnover of farm machinery was \$88,000,000 compared with \$41,200,000 in 1932-33, when the depression was at its worst, and an improvement of 5 per cent over the \$84,000,000 total of 1928-29.

In the 1934-35 period sales of farm products were \$3,280,000,000 or 82 per cent of the 1928-29 total. During 1932-33 these sales were \$2,550,000,000.

The German agricultural machinery industry depends almost exclusively on the domestic market, according to the report.

Continued improvement in Germany's machine tool industry also is indicated in a report from Consul A. W. Klieforth, Cologne.

While the domestic demand is not as active as in 1935, the report points out, export sales during the first four months of 1936 were considerably in excess of the corresponding period of last year. The outstanding foreign purchasers this year of German machine tools have been Russia, Italy, France, the United Kingdom, Sweden, and Brazil.

Shipments abroad from Germany of metal working machines increased from 69,748 pieces weighing 11,430 tons and valued at 20,075,000 reichsmarks (\$8,030,000) in the first four months of 1935 to 175,268 pieces, weighing 18,489 tons and valued at 33,250,000 reichsmarks (\$13,300,000) in the corresponding period of 1936, statistics show.



# Editorial

## Public Relations Becomes Industry's No. 1 Job

**L**AST Monday the steel industry issued a statement in regard to its labor policy. The gist of the announcement appeared in the last sentence, which read as follows:

"The steel industry will use its resources to the best of its ability to protect its employes and their families from intimidation, coercion and violence and to aid them in maintaining collective bargaining free from interference from any source."

The manner in which the public press handled this release was significant. Most of the newspapers which make an honest effort to present the news impartially carried the statement in full and provided an appropriate background of collateral information. Some others, which habitually color the news to favor the professional unions, placed undue emphasis upon what they interpreted as a belligerent note in the announcement. A few of the more prejudiced publications went so far as to visualize a pitched battle between the "powerful" \$5,000,000,000 steel industry and the "poor" CIO with its organization fund of \$500,000. It is likely that many citizens, blindly accepting the interpretation volunteered by certain newspapers, gained the impression that the "steel barons" (a pet phrase among anti-industrialists) are launching an offensive against the CIO.

### Industry Must Win Understanding of Press If It Is To Get Its Message Over To Public

This, of course, is a badly distorted interpretation. In fact, it is a timely warning to employers and employes in the steel industry that the prejudiced and unfriendly attitude of part of the fourth estate is an important factor to be reckoned with in the forthcoming rivalry for the favor of the general public. It means that the steel industry, now having launched a public relations campaign, henceforth not only must match wits with the clever and experienced propagandists of the professional labor union bloc, but also must contend with the unsympathetic attitude of certain purveyors of news and moulders of public opinion.

Therefore it is important that the industry utilize every resource within its power to acquaint the public with the true facts of the situation. It will be necessary to indulge in straight-

forward tactics to prove to the man in the street that the industry is fighting defensively against a movement that threatens the very foundation of personal liberty. It is not enough to say "Employment in the industry does not depend upon membership or non-membership in any organization. Advancement depends upon individual merit and effort. These are fundamental American principles to which the industry will steadfastly adhere."

These are clear statements of principle, and they are sincere and pertinent. But they must be amplified and reiterated time and time again before the average citizen will appreciate the justice of the industry's position. Steel's public relations campaign must be good enough to make up for years of inaction, complacency and ill-advised neglect of the public's interest.

### Employers Have Good Arguments That Never Have Been Presented To Public Effectively

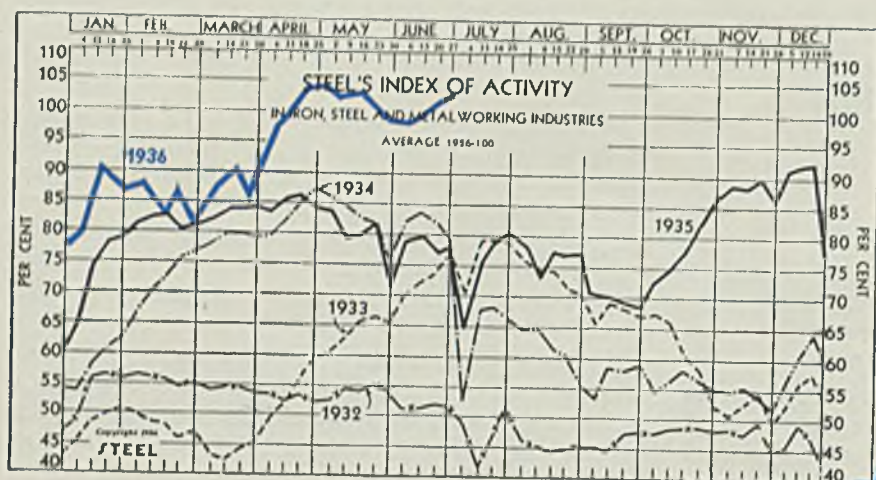
An encouraging feature of the approaching contest of skill in public relations lies in the fact that industry, never having pressed its advantage aggressively, today finds itself with untold resources in logic which never have been driven home to the public effectively.

For instance, how many persons in a crowd on Times Square, New York; State street, Chicago; Independence Square, Philadelphia; or Fifth avenue and Smithfield street, Pittsburgh; realize that only one out of ten persons in gainfully employed occupations in industry is a member of a professional labor union? How many laymen know that under the present alliance of new deal politicians and professional laborites a mere 5 per cent minority of pro-union employes can tie up a plant in which 95 per cent of the workers want to be free of labor union racketeering? How many ordinary citizens realize that a large number of union cards are taken out by terrorized workers who are willing to pay dues to escape the "inconvenience" of bombings, beatings and other forms of intimidation visited upon non-union employes by over-zealous organizers and agitators? How many heavily burdened tax payers know the extent to which their servants in congress in Washington are coerced by union labor pressure into voting favorably on union-dictated legislation?

The truth regarding these questions should be set forth in a carefully planned publicity campaign. Steel has a tremendous responsibility to the American public, but in it is a golden opportunity to preserve important human liberties!



# THE BUSINESS TREND



STEEL'S index of activity in the iron, steel and metal-working industries gained 1.0 point to 102.0 in the week ending June 27:

Week ending	1936	1935	1934	1933
Apr. 18	103.1	86.3	85.0	55.8
Apr. 25	103.6	84.9	87.5	59.5
May 2	103.2	84.6	86.0	60.3
May 9	103.0	79.3	84.4	62.5
May 16	103.1	80.5	82.4	65.2
May 23	100.4	82.8	81.9	66.1
May 30	98.6	71.9	75.7	65.3
June 6	98.8	79.3	82.3	69.9
June 13	99.4	80.0	83.6	72.1
June 20	101.0†	77.3	81.8	73.9
June 27	102.0*	78.4	79.4	77.0

†Revised. \*Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL). Average for 1926 equals 100, weighted as follows: Steel rate 40, and car loadings, power output and auto assemblies each 20.

## Industry Is Breaking Long And Short Term Records

WHEN automobile assemblies dropped slightly to 99,695 in the week ending June 27, a chain of 12 consecutive weeks in which output exceeded 100,000 cars weekly was broken. This is by far the best sustained run of high production enjoyed by the motor car industry since 1929. Only eight 100,000-car weeks were recorded in all of 1935, and there were none in the four previous years. Six are shown in 1930.

The minor recession in automobile activity in the last full week of June was more than offset by gains in other important fields of industrial activity. Revenue freight car loadings, after reaching for the 700,000 mark for three consecutive weeks and missing it by a narrow margin,

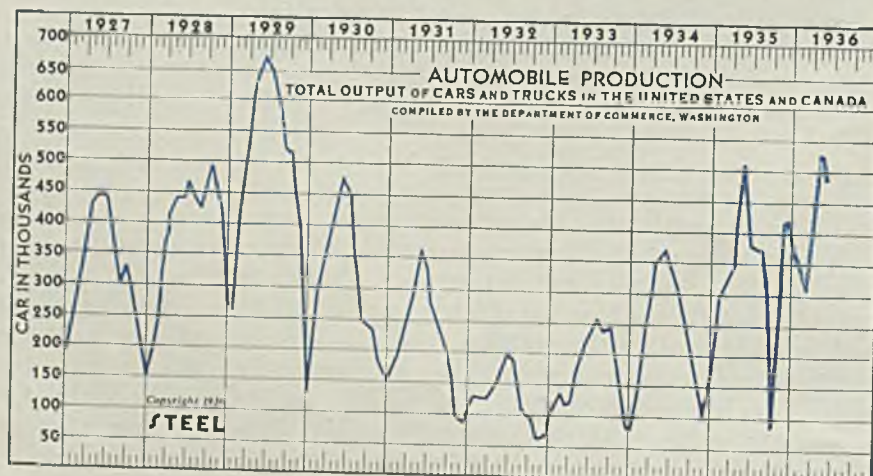
finally attained that goal with a total estimated at 718,344 cars. This is the best traffic week thus far in 1936.

Another high mark for the current year was established by the steelworks operating rate, which touched 71.5 per cent. This tops the previous high of 70.5 recorded in the third week of April.

Electric power output, having made a new all-time record in the previous week, topped it in the week ending June 27 with a reported total of 2,029,639,000 kilowatt-hours. To appreciate the real progress made in the consumption of electricity, it is appropriate to compare the current figure with the total of 1,723,000,000 kilowatt-hours reported for the corresponding week of 1929, which was a good predepression power year. The highest peak in that year was 1,860,000,000 established in the week preceding Christmas.

Gains in freight traffic, steelworks activity and power output lifted STEEL'S index to 102.0, an increase of 1.0 from the preceding week.

	1936	1935
January	377,306	300,325
February	300,874	350,345
March	438,945	447,888
April	527,726	477,059
May	480,571	381,809
June		372,085
July		345,178
August		245,092
September		92,863
October		280,356
November		408,555
December		418,303





## Merchandise Exports Show Sharp Gain; Imports Down

	Dollars (000 omitted)		Dollars (000 omitted)	
	1936		1935	
	Exports	Imports	Exports	Imports
Jan.	198,654	187,482	176,223	166,993
Feb.	182,030	192,771	162,999	152,491
Mar.	194,790	198,686	185,603	177,279
Apr.	193,490	202,437	164,350	170,567
May	201,042	191,110	165,457	170,207
June	.....	.....	170,193	156,756
July	.....	.....	173,371	177,698
Aug.	.....	.....	172,194	169,030
Sept.	.....	.....	198,189	161,653
Oct.	.....	.....	221,215	189,240
Nov.	.....	.....	269,400	168,955
Dec.	.....	.....	223,737	186,648

## May Building Awards Down Slightly; Above Year Ago

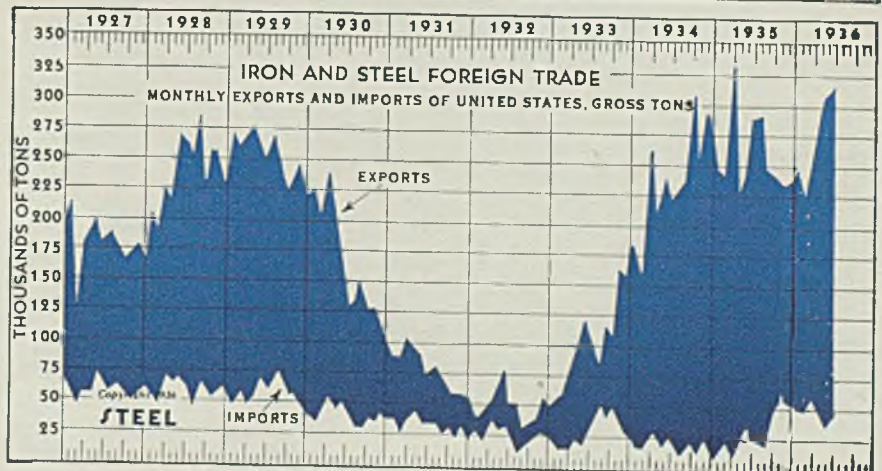
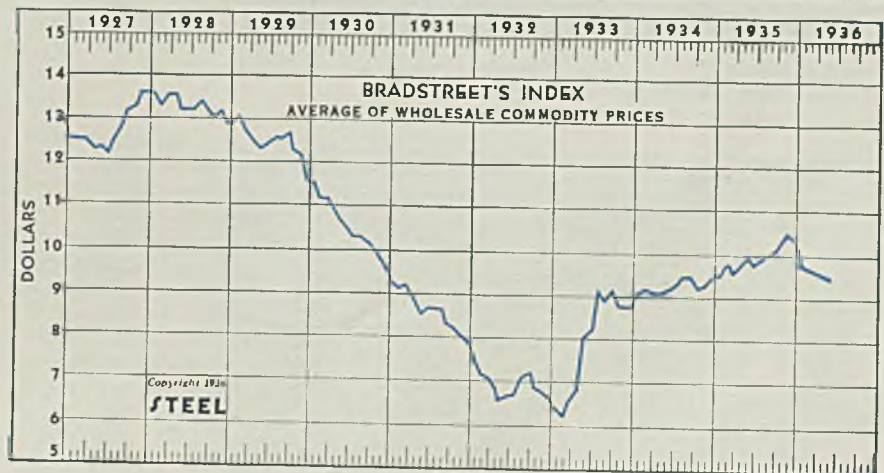
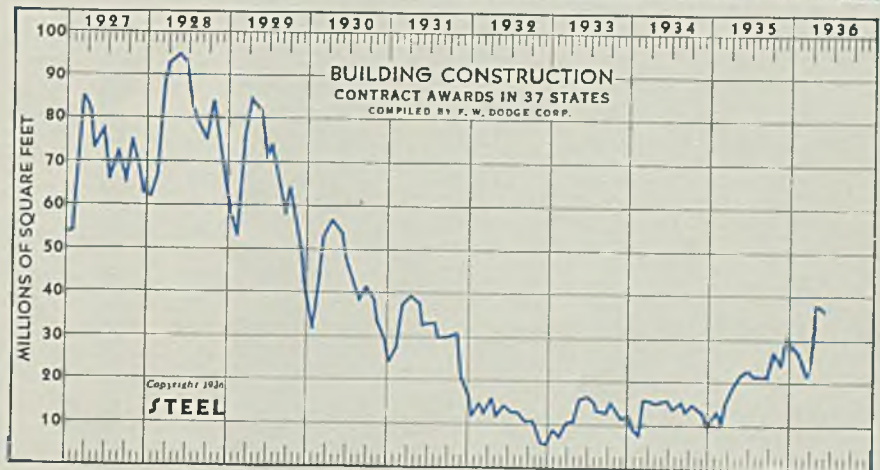
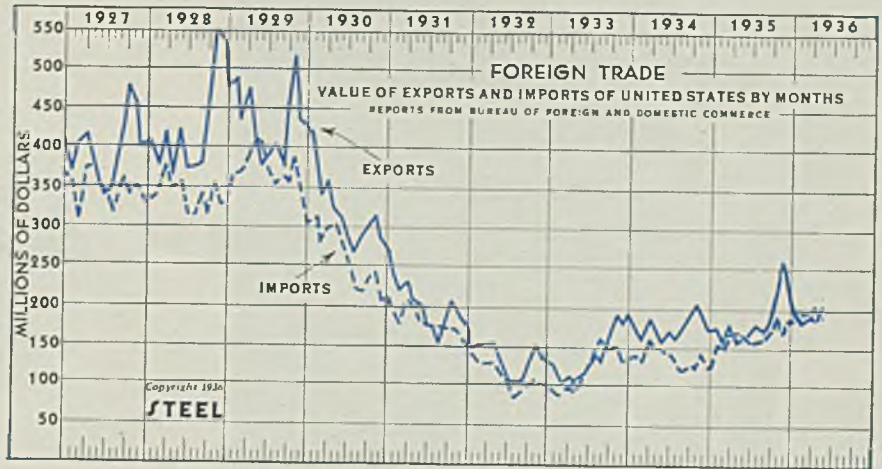
	Square Feet		
	1936	1935	1934
Jan.	27,053,300	11,245,100	9,568,700
Feb.	20,856,700	9,670,300	8,176,300
Mar.	31,308,100	15,845,300	14,788,900
Apr.	37,490,200	19,917,300	14,207,100
May	36,362,700	22,276,200	14,664,400
June	.....	22,878,800	13,986,500
July	.....	21,565,900	13,250,000
Aug.	.....	21,545,400	14,259,000
Sept.	.....	21,365,700	12,510,300
Oct.	.....	27,775,900	15,098,100
Nov.	.....	24,120,700	12,780,800
Dec.	.....	33,441,900	9,188,700

## Commodity Prices Register Sixth Consecutive Decline

	1936	1935	1934	1933
Jan. 1	\$10.36	\$9.49	\$9.01	\$6.53
Feb. 1	10.02	9.78	9.26	6.53
Mar. 1	9.92	9.79	9.17	6.54
Apr. 1	9.85	9.66	9.16	6.98
May 1	9.81	9.79	9.14	8.02
June 1	9.73	9.90	9.24	8.34
July 1	.....	9.84	9.32	9.01
Aug. 1	.....	9.91	9.48	8.99
Sept. 1	.....	10.00	9.45	9.05
Oct. 1	.....	10.17	9.27	8.84
Nov. 1	.....	10.28	9.29	8.81
Dec. 1	.....	10.40	9.49	8.83

## Iron and Steel Foreign Trade Continues Upward in May

	1936		1935	
	Imports	Exports	Imports	Exports
Jan.	50,489	241,564	22,784	262,740
Feb.	43,358	213,802	28,905	228,537
March	56,720	264,337	21,409	323,035
April	49,621	301,987	28,866	205,336
May	59,391	314,950	47,719	236,598
June	.....	.....	33,208	289,687
July	.....	.....	31,894	296,802
Aug.	.....	.....	31,312	247,312
Sept.	.....	.....	53,158	244,419
Oct.	.....	.....	59,569	238,358
Nov.	.....	.....	56,637	205,242
Dec.	.....	.....	53,678	239,268







For the production of plain carbon and low-alloy steels, the basic open hearth stands supreme

**M**ETALLURGICAL progress in iron and steel can be divided chronologically into three periods: (1) The state of metallurgy previous to the nineteenth century; (2) advance during the nineteenth century; and (3) progress realized in the present century.

The first part of the program can be disposed of quickly. In 1800 blast furnaces had been in existence for several centuries. Abraham Darby in 1735 had conceived the idea of treating coal as charcoal burners were treating wood, and the resulting coke was being used as fuel in some furnaces. The blast was cold, and no attempt had been made to utilize waste gases. In that period a blast furnace was capable of producing 1000 tons of pig iron yearly, which is about the daily production of one of our modern furnaces.

#### Early Developments

Wrought iron was manufactured by the dry puddling process invented by the Englishman Henry Cort in 1784, and crucible steel by the method of another Englishman, Benjamin Huntsman, who conceived it in 1740.

The French chemist, Reaumur, had discovered as early as 1722 the operation by which cast iron is converted into so-called malleable castings.

Tilt and lift hammers actuated by waterwheels were used chiefly for the working of wrought iron, although Cort in 1783 had invented the 2-high rolling mill. The slitting mill also had long been in existence.

The nineteenth century witnessed exceedingly important advances in the metallurgy of iron and steel, some of them of a revolutionary character. In 1811 Aubertot of France suggested the utilization of waste gases from blast furnaces. James Beaumont Neilson of Glasgow recommended in 1828 preheating the air for the blast furnace, while in 1833 and 1845 respectively, Robert du Four in France and James Palmer Budd in England proposed to preheat the blast by burning the waste gases. In 1840, Philip Taylor in England suggested closing of the top of the furnace, and in 1850, another Englishman, G. Parry, designed the bell and hopper for that purpose.

In 1830, James Hill and S. B. Rogers introduced the wet puddling method. In 1835 Bessemer invented

# A Review of

the process that bears his name, and in 1865 the open-hearth process came into existence through the invention by Siemens of the regenerative type of furnace and the application of that furnace to the making of steel by Emile Martin of France.

In 1860, E. A. Cowper designed regenerative brick stoves for preheating the air. The basic bessemer process we owe to two Englishmen, Sidney Gilchrist Thomas and his cousin, Percy C. Gilchrist, who in 1878, discovered the need of basic linings for removal of phosphorus. In regard to mechanical appliances for the working of steel, the 3-high mill was invented by John Fritz, an American, in 1857; the reversing mill by the Englishman Ramsbottom in 1866; the first continuous mill by another Englishman, Charles White, in 1861. The steam hammer was introduced in England in 1842 by James Nasmyth, although it had been suggested by James Watt as early as 1784. The universal mill was first used at Daelen in Germany in 1855. The hydraulic press was conceived by Bessemer as early as 1856 and fully developed by Gledhill in 1863.

#### American Contributions

In 1889, the American engineer W. R. Jones, introduced the use of the mixer in steelmaking, while in 1896 another American, M. A. Neeland, designed the double bell and hopper for closing the top of the blast furnace, which made possible automatic loading by skips.

Let us add a feather to our cap by claiming that we were the first to attempt at the South Works of the Illinois Steel Co. to apply radiography to the detection of flaws and defects in steel. That was in January, 1896, only a few months after Roentgen had announced the discovery of X-rays.

After this brief recital of the advance in the metallurgy of iron and steel during the nineteenth century, one cannot fail to be impressed by the scarcity of contributions by



# Progress in Ferrous Metallurgy

BY ALBERT SAUVEUR  
Harvard University

American metallurgists. The writer had occasion a few years ago to call attention to this, and some of his remarks are repeated because they seem to be nearly as justified now as they were then:

"We are rightly proud of our achievements, of the wonderful steel industry of our country, of our leading position as the greatest iron and steel producing nation in the world, but do not let us forget what we owe to the steel wizards of other lands. It will keep up from too complacent an attitude toward other metallurgical nations. It should stimulate in us a desire to contribute more substantially to the progress of the art in which we are interested.

## National Wealth Increased

"We have been eminently successful. Our iron and steel industry has added vastly to the wealth of the nation. A book has been written entitled *The Romance of Steel; or the Making of a Thousand Millionaires*. Our business men, our captains of industry, our financial wizards have played their parts most successfully. Can the same tribute be paid to our scientific and technical wizards? Have they played their parts, or have they been satisfied with following the tracks of wizards of other nations? Can they be accused of parasitic tendencies?

"Is it not true that although being by far the greatest iron and steel producing country, we have not contributed our share of these great inventions, discoveries, and scientific achievements? Is it not true that our contributions have been chiefly of a mechanical kind, that they have consisted in the main in labor-saving devices and machinery destined to cheapen and speed up production? In this we have been undoubtedly successful, and the importance of speeding up and cheapening produc-

tion is not to be denied or belittled, but should we be satisfied with great advances in this direction only?

"American mechanical wizards have passed through our steel plants and have left their marks, but do we not look in vain for evidences of the passage of American metallurgical wizards?

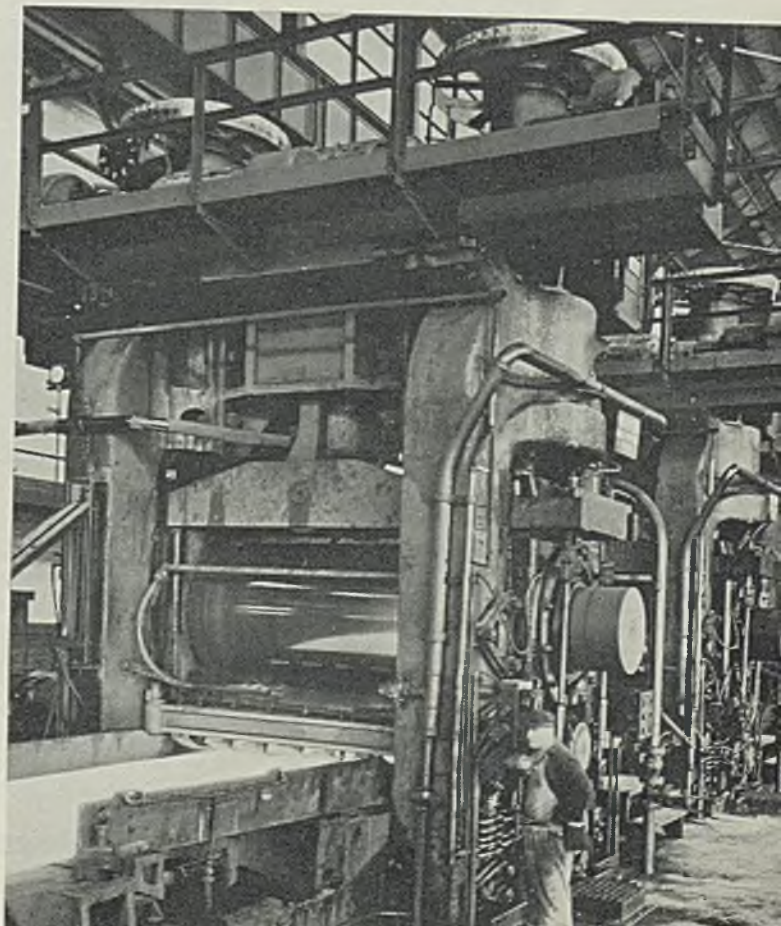
"Is it not also true that if the contributions of English metallurgists and scientists were withdrawn, the entire structure of the iron and steel industry would ignominiously collapse? We would have neither puddling furnaces, nor crucible steel, nor bessemer steel, nor open-hearth steel, nor rolling nor forging appliances."

Let us now consider metallurgical progress realized in the present cen-

ture. The nineteenth century was brilliantly ushered in from the metallurgical point of view by the announcement of Taylor and White of their discovery of high speed steel and its demonstration in 1900 at the Paris exposition. In the writer's opinion, it constitutes the most important contribution ever made by American metallurgists to the progress of our art.

## Induction Furnace American

This century has seen the development of the electric arc furnace for steelmaking, chiefly through the labor of the French engineer, Paul Heroult, and of the induction furnace, which we owe mainly to the pioneering and sustained efforts of two Americans, G. H. Clamer and E. F. Northrup. To be credited to



Probably the most important advance in the art of rolling since the 3-high mill is the American invention of the continuous sheet mill



this century also is the American invention of the continuous mill for the rolling of steel sheets by John B. Tytus of the American Rolling Mill Co., probably the most important advance in the art of rolling since the introduction of the 3-high rolling mill; the casting on cars suggested by the American, F. W. Wood, doing away with the casting pit; the discovery of stainless steel by Harry Brearley of England, and of the 18-8 type of stainless steel claimed by the Krupp Works in Germany. The Aston process for the manufacture of wrought iron, the nitriding process introduced by the German metallurgist, Adolph Fry, and the process by the Frenchman Perrin for the refining of steel should be added to the list.

If, in addition to these definite advances, we consider the progress made in alloy steels in general; in the art of welding; in centrifugal castings and especially in the casting of steel guns as developed at the Watertown arsenal; in the study of inclusions; in abnormality in steel and the influence of grain size; in the testing of steel and more especially in impact testing, testing for creep and fatigue tests; in the analysis of gases in steel; in extensive investigation of the 18-8 type of stainless steel; in malleablizing, in alloy cast iron and in the heat treatment of cast iron, we must reach the conclusion that this century which still has two-thirds of its life to go, has been quite productive, and that if the rate of advance is maintained to the end, highly gratifying results may be expected.

#### Beginnings of Metallography

So far I have not mentioned metallography. It is not to be inferred that it is because I do not consider the subject of sufficient importance to be discussed. On the contrary, it is in my opinion deserving of special treatment.

We might be celebrating today the fiftieth anniversary of the birth of metallography, for it was in May, 1886, that Dr. Sorby read before the British Iron and Steel Institute his epoch-making paper on "The Application of Very High Powers to the Study of Microscopical Structures of Steel."

It may be of interest to quote from a letter of H. M. Howe, dated Sept. 15, 1891, after I had asked him about the advisability of consulting Dr. Sorby before undertaking my work. It reads:

"... I see no possible objection to your addressing Dr. Sorby, who is a very good-natured old gentleman, so far as I have seen. It gives me great pleasure to hand to you the enclosed letter of introduction to Dr. Sorby. I cannot hold out any great hopes to you of his being able to aid you, for he has grown old and

I think has passed his days of activity. He is an excellent microscopist, and when I saw him a year ago, found him full of vigor, but so far as I could make out, disinclined to push his investigations in the structure of steel any further. However, it is quite possible that a letter from you might stir him up to renewed activity. If you do not get anything out of him, there is M. F. Osmond of Paris, who is a good friend of mine and who has considerable activity in microscopic work, who represents the future, and Dr. Sorby the past. I am sure that M. Osmond would be very glad to hear from you, and to co-operate with you, especially if you make it clear to him that you are carrying on work not as a private individual, but in a certain sense as the microscopist of the Illinois Steel Co., for the French attach the greatest possible importance to official positions."

#### Great Progress Made

In 1891 only three of us were actively engaged in the microscopical examination of iron and steel, namely Osmond in France, Martens in Germany and myself in the United States.

The study of steel under the microscope, from which the science of metallography was evolved, has progressed farther than its most enthusiastic supporters had dared to hope at the beginning of the present century. More than any other method of investigation, it has contributed in lifting the art of making steel from empiricism and the rule

of thumb to the position of a science.

It may not be out of place to recall its humble beginning in the United States and to follow briefly its sturdy growth. It was in 1891 that W. R. Walker, at the time general manager of the Illinois Steel Co., suggested that, following Sorby, I should study the structure of steel under the microscope. To Walker's vision we owe this early introduction of the microscope in the steel mill, although as might be expected, its wide adoption was slow and the obstacles that had to be overcome quite formidable. Those obstacles resulted from ignorance, ill will and prejudice, while ridicule was the favorite weapon of the opponents. When some metallurgical wags discovered that by photographing a certain variety of ginger snap under the microscope a design was obtained suggesting the structure of mild steel, it was a source of gratification in some quarters and it was predicted that a deathblow had been dealt to the microscopical examination of steel.

To the best of my knowledge and as already mentioned, only two men had preceded us in applying Sorby's methods to the study of steel, namely Osmond, who worked for a while with Werth in France, and Martens in Germany. Others who were destined to leave their imprints on the upward path followed somewhat in this order: J. O. Arnold, H. M. Howe, Roberts-Austen, Sir Robert Hadfield, J. E. Stead, and Henri Le Chatelier. Of these but three are now living—Sir Robert Hadfield, Le Chatelier, and the writer. I shall always cherish the memory of the privilege that was mine to work in close and friendliest association with them. They were stars of the first magnitude in the metallurgical sky.

#### Early Research Results

South Works of the Illinois Steel Co. was exclusively concerned at the time with the manufacture of bessemer steel rails, and it was natural that I should have focused my attention on that type of steel and on the finished product. It soon became apparent to us that the properties of steel rails were dependent largely upon the dimensions of their microscopical constituents or grain sizes, and that in turn these dimensions resulted chiefly from the finishing temperature. In this way the importance of controlling these temperatures was brought forcibly to the attention not only of rail makers, but of other manufacturers of rolled or forged products, who until then had held the view that worked articles should be finished at the highest possible temperature to reduce the power and hence the cost required to shape them.

We were able to show that a cer-



**DR. ALBERT SAUVEUR**, *Gordon McKay professor of metallurgy, Harvard university, Cambridge, Mass., is known as the dean of metallurgists. He has devoted a large portion of his time over a period of nearly 50 years to study of the metallurgy of iron and steel. The accompanying article constitutes the paper which he presented at the forty-fifth general meeting of the American Iron and Steel Institute in New York, May 28*



tain critical temperature existed, which we called  $\alpha$ , which yielded the smallest grain size after slow cooling following hot work. We now know that this temperature  $\alpha$  corresponds to the critical temperature  $A_{1.1}$ , or to the critical range  $A_3-A_1$ .

These early results were described in a paper, "The Microstructure of Steel," presented to the American Institute of Mining Engineers at its Chicago meeting in 1893. Well do I remember my misgivings in mailing this my first attempt at technical writing. It was, however, generously received and translated into French, German and Russian.

At the same meeting, Osmond presented a paper on "Microscopic Metallography," and Martens a paper on "The Microstructure of Ingot Iron in Cast Ingots." These three early contributions on metallography were discussed extensively under the topic of "Physics of Steel," and constitute a landmark in the progress of that science.

In 1896 I wrote my second paper, "The Microstructure of Steel and the Current Theories of Hardening." The following took part in a lengthy discussion: A. Ledebur, R. A. Hadfield, Ralph G. Scott, Henry C. Jenkins, J. O. Arnold, Roberts-Austen, Henry D. Hibbard, P. H. Dudley, E. D. Campbell, F. Osmond, and Henry M. Howe. This discussion and author's reply occupied 100 pages of the *Transactions* of the American Institute of Mining Engineers. It may be added that so far as the hardening of steel is concerned, the discussion has never ceased and is still going on today.

#### Industry Unenthusiastic

In 1897 a hurricane in the form of a new president, John W. Gates, struck the South Works of the Illinois Steel Co., which in its violence carried away the metallographical laboratory and its occupants. Mr. Gates was not accustomed to deal with things microscopic, macroscopic dimensions being more to his liking. Fortunately, by that time a seed had been sown which was destined to bring forth a rich harvest.

After having attempted in vain to convince President Harper of the newly created Chicago university that the teaching of metallography should be taken up at his institution and that I was the man for the job, it occurred to me that the Carnegie Steel Co. should open wide its doors. Had not Mr. Corey and Mr. Unger visited my laboratory and expressed interest in my work, and were they not themselves peeping through the microscope by this time?

I was referred to Charles M. Schwab, who took the matter under consideration that he might refer it to his superiors. The result of these conferences was condensed in a short

letter in which regret was expressed at the inability of the Carnegie Steel Co. to take advantage of my services. Mr. Corey abandoned metallography to become president of the United States Steel Corp.; Mr. Unger's interest in metallography has always been, I believe, lukewarm.

After more discouraging efforts to sell metallography to the Watertown arsenal and elsewhere, I decided to become a free lance—and before long, that is, in 1898, a quarterly paper known as *The Metallographist* made its appearance, a daring undertaking, as I look at it now in my more matured age, for a young man to attempt single handed. So many kind words have been spoken, however, about the part which this publication played in creating an interest in metallography that I am glad now I did not have, at the time, the wisdom and prudence to keep me from an undertaking appearing so hazardous.

#### Summary of Progress

Harvard university was the first educational institution I believe, to offer a course in metallography; that was in 1899, and I have had charge of that course ever since. The same university was also the first to list, some years later, a course in what we decided to call "Physics of Metals." The expression is now widely used.

Let me indicate briefly some of the developments which in my opinion indicate steps forward in the progress of metallography:

Invention in 1887 of the thermocouple by Le Chatelier, which marked the introduction of accurate temperature measurements in the steel industry, the importance of which can not be overestimated, and which made it possible for Osmond to discover the upper critical points of iron and steel.

Tschernoff's studies of the dendritic structure of steel ingots and steel castings which he started as far back as 1878.

Charpy's classical papers on the nature of copper-zinc alloys and other nonferrous alloys.

Roberts-Austen's early study of the iron-carbon equilibrium diagram and introduction of the use of a neutral body in determination of the thermal critical points.

Stead's studies of the occurrence of phosphorus in cast iron and in steel and his discovery of the brittleness which may be induced in low-carbon steel after cold working followed by annealing, sometimes referred to as Stead's brittleness.

Le Chatelier's design of the inverted type of microscope for metallographical work now so universally adopted.

Discovery of delta iron and of the action of some elements in causing the disappearance of the  $A_3$  critical



**B**ESSEMER steel may be produced in larger proportions in the future. Confirmation that higher phosphorus is beneficial to low-carbon steel should revive interest in this process

point introducing into the equilibrium diagram what is known as the gamma loop.

Study of the grain growth of ferrite after cold work deformations, which has been so fruitful in important results.

Aging of alloys through the precipitation of submicroscopic particles of the solute from supersaturated or from cold-worked solid solutions, an hypothesis which in my opinion affords the simplest and most satisfactory explanation of the hardening of steel.

#### Future Lies in Alloys

It was suggested that I discuss the future of steel, but I am not willing to predict in what directions metallographical progress will develop in years to come. This caution, however, does not forbid reasonable speculations.

For many years our attention has been focused upon the merits of alloy steels, and indeed their



superiority over ordinary carbon steels for many purposes is not to be denied. On the other hand, it is possible to go too far in that direction and to reject the use of plain carbon steels when they would answer our needs satisfactorily and at lower cost.

Further advance in the field of alloy steels can reasonably be expected. Indeed, it seems to be going on steadily. We have recently been presented with what is called high yield strength structural steel, containing substantial percentages of copper, that is, between 1.00 and 1.50 per cent, while some may in addition contain 0.10 and even as much as 0.30 per cent phosphorus. These steels contain little carbon, generally very little. It is doubtful whether such percentages of copper and phosphorus could be added to high-carbon steel without unpleasant results. It would seem as if some elements act as poisons when introduced in high-carbon steel, and as tonics when added to mild steel. The lower the carbon content, the more of these elements may be added with beneficial results.

This beneficial action of phosphorus is indeed an unexpected development in metallurgical progress. Have we then been wasting our time in debating whether the upper permissible limit of phosphorus should be 0.04 or 0.05 per cent, and in writing voluminous reports on the subject?

#### Good Future for Bessemer

Bessemer steel has had a raw deal and for many purposes still is an excellent metal. I am daring enough to predict that in future years it will be produced in larger proportions. If it can be confirmed that as much as 0.2 per cent phosphorus may be present in low-carbon steel with beneficial results, it should help in reviving our interest in Bessemer steel, for surely the basic open-hearth furnace is not the best tool for the production of steel containing so high a percentage of the element phosphorus.

To express a personal opinion, I have little faith in the eventual commercial success of the direct reduction of iron ore, a problem which has never ceased to fascinate some metallurgists and on which in recent years many millions have been spent. On final analysis it can only supply us with metallic iron, which must be remelted to be converted into steel; it must therefore compete with steel scrap. Unless it can be produced at a lower cost than scrap can be bought, it does not seem to hold much promise of commercial success. To be sure, it may be claimed that this product would be purer than ordinary scrap and that it would therefore command a higher price. I believe that steel-

makers will not respond enthusiastically to that claim.

It may not be out of place to note that this direct reduction of iron ore is going on steadily in the reduction zone of our blast furnaces. Unfortunately, as soon as we have produced this iron sponge we immediately proceed to introduce carbon into it, thus transforming it into pig iron. If we could extract it from the furnace through a suitable opening in the brick work at the lower level of the zone of reduction, we would have sponge iron. After all, that is what was done in the old Stuckofen, in which the reduction zone extended to the bottom of the furnace. Consider the low cost of that direct reduction, seeing that it requires only about one-third of a ton of coke to produce one ton of iron, assuming the iron to enter the furnace in the form of ferric oxide. If we use more coke in our blast furnaces, it is because of the necessity of melting the reduced iron and resulting slag.

Without desiring to detract from the great scientific importance of X-ray diffraction analysis, it is too



early to predict with any degree of accuracy what contribution it is likely to make to metallurgical progress. I may quote from some recent remarks I made on that subject:

"The discovery by X-ray analysis of the position occupied by the atoms in crystal structures has permitted the classification of metals into groups in accordance with their space lattices. The value of this classification as a means of advance has not yet been fully demonstrated. X-ray spectra reveal the relative grain size of metals, but this can be done more quickly and more accurately by microscopical observation. They also indicate the existence or absence of strains or cold work deformation, but these again can be detected under the microscope. It may be that X-rays disclose the presence of such strains before they can be observed under the microscope or after the microscope registers their disappearance, but the significance and application of this possibility is not evident.

"The contention of some that

X-rays can be used advantageously for the construction of equilibrium diagrams will not be generally accepted. In its present stage, X-ray analysis cannot be used as a method at all comparable with chemical or spectroscopic analysis for the detection of elements."

I quote also Sir William Bragg, and who could speak with greater authority. He writes: "Considerable progress has been made and knowledge gained in spite of the difficulties of technique and interpretation. Yet it is still to the future and to the skill which experience will bring that we must look for the solutions of many difficulties. Into such an immense subject the work that has already been done has made a relatively small advance."

This rather sudden and possibly exaggerated interest on the part of some metallurgists in X-ray diffraction analysis as a means of advance of the metallurgical art recalls the glorious days of the phase rule at the beginning of the century, when no one was expected to write a metallurgical paper without prefacing it with a description of the phase rule.

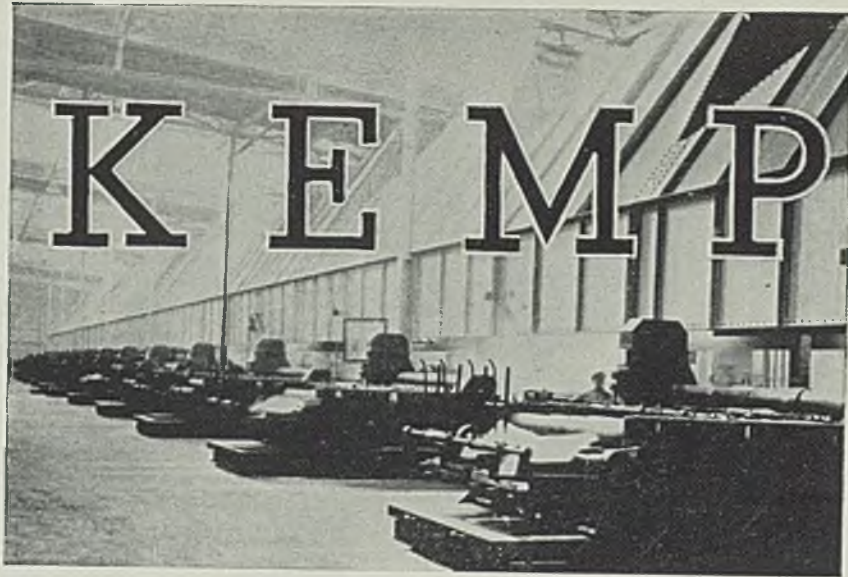
When I published the first edition of my book, *Metallography and Heat Treatment of Iron and Steel*, in 1913, I was criticized by some for not introducing the subject with an analysis of the phase rule, instead of delaying its treatment until the last chapter was reached.

Such criticisms are no longer heard, and I have never regretted the course I followed. This does not in any way imply a lack of appreciation on my part of the scientific importance of these subjects, but merely greater caution in estimating the part they are likely to play in metallurgical art.

## Meaning of Penetration in Fusion Welding Defined

The term "penetration" in fusion welding sometimes is confusing. The general understanding is that penetration means obtaining fusion all the way down to the bottom of the vee. This interpretation agrees with the definition given in the seventh edition of the *Welding Encyclopedia*, page 135, as follows: "Penetration: The very essential art of starting complete fusion clear through the welding line or at the bottom of the vee." The further statement is: "Weld penetration is a dimensional expression of the depth of the fusion zone below the original surface and/or edge planes of the base metal." In short, penetration broadly means the interlocking of the deposited weld metal with the base metal at the bottom of the vee and sides of the vee from the bottom to the top.





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**A**ERIAL view of new \$20,000,000 continuous strip-sheet mill formally opened June 30 at Lackawanna, N. Y., by Bethlehem Steel Co. Buildings cover 22 acres

## Bethlehem Enters Strip-Sheet Market with Opening of \$20,000,000 Continuous Mill

**O**NE of the few continuous mills to produce strip-sheets of extreme widths, enough to satisfy substantially all present-day demands for extra-wide sheet products for large forming operations, such as all-metal automobile tops, was officially opened for inspection last week at the Lackawanna divi-

**S**LABS elongated by the roughing mills enter this finishing train of mills at slow speed and emerge as light-gage strip at a speed of 1350 feet per minute

sion of the Bethlehem Steel Co. in Buffalo.

Located on a 67-acre tract adjacent to the Lackawanna plant, the new mill occupies 22 acres of floor space and has an annual capacity of 600,000 tons of strip, sheets and light plate.

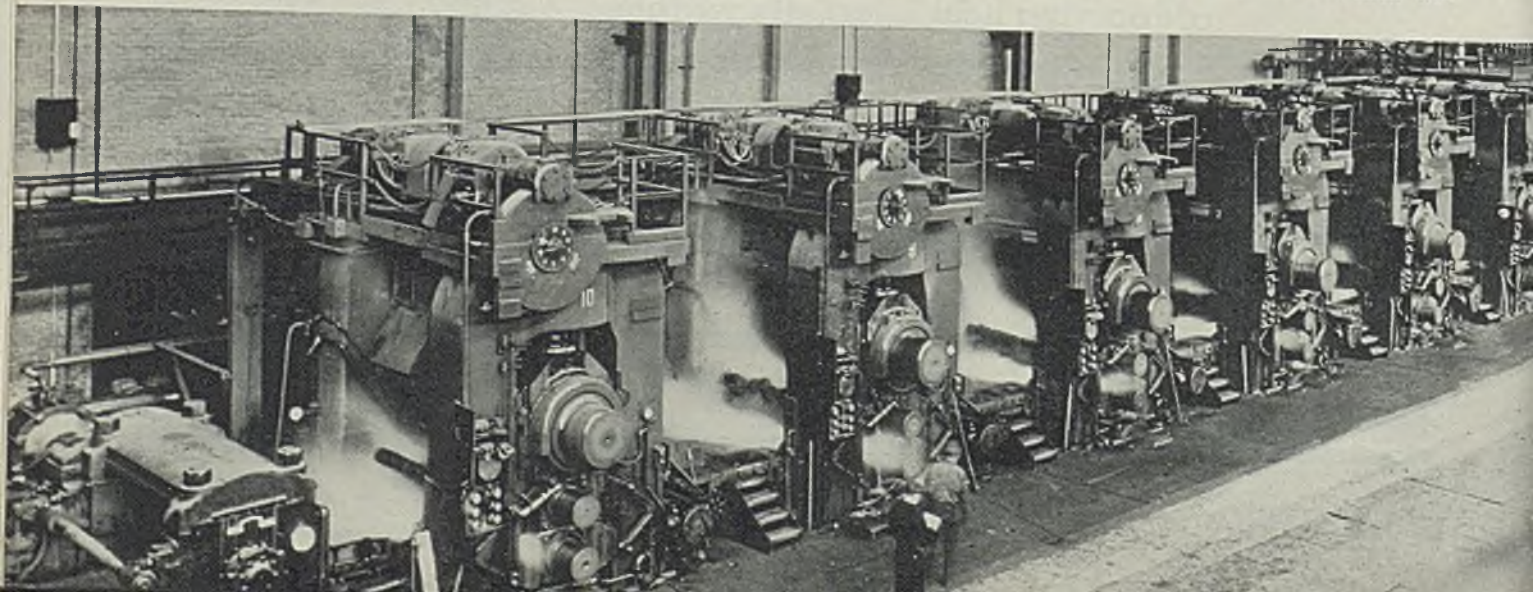
Broad strip up to 60 inches wide by 0.0625-inch thick and 72 inches wide by 0.078-inch thick, with a minimum width of 18 inches by 0.05-inch thick can be hot rolled continuously in one heating on the new hot mill.

Cold rolled strip is produced in a

range from 18½ inches to 72 inches wide and from 0.0125-inch thick for narrow widths up to 0.109-inch thick. By cross rolling on the 93-inch, 4-high skin pass mill sheets may be rolled up to 84 inches wide.

The new installation has ample and co-ordinated facilities for every important form of processing strip and sheets as such, but not including the reduction to tin mill gages or coating processes. Hot and cold rolled tin plate is made at the Sparrows Point, Md., plant of the company.

In general, the new 79-inch hot







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THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

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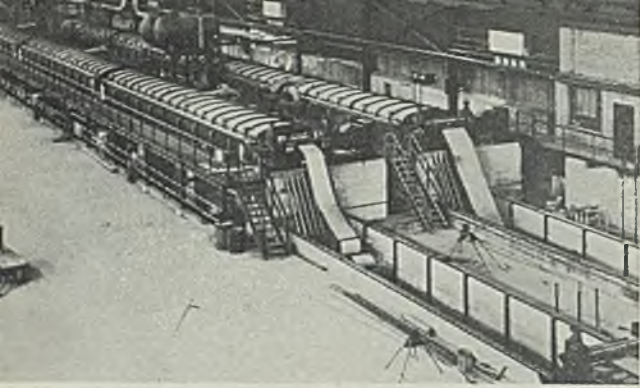
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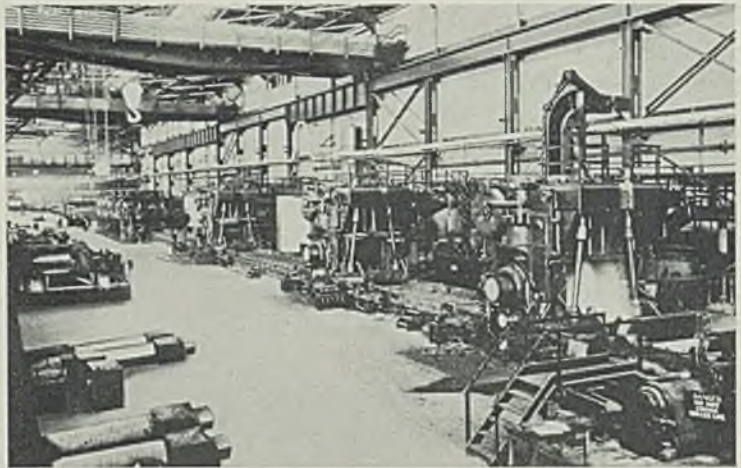
**T**WO continuous pickling lines at the new mill (left), looping pits in foreground providing slack for stitching strip lengths together. Below are stands 2, 3 and 4 of the roughing train which reduces slab from 4½-5 inches thick to ¾-1¼ inches

indicator on the pyrometer shows that the temperature has dropped to the right point—between 1900 and 1950 degrees Fahr.

The finishing train comprises a 2-high scale breaker, and six stands of 4-high rolls. Immediately following the last stand of the finishing train there is located a rotary flying shear for cutting material, hot, direct from the mill. At the lower end of the first transfer table there are two hot

strip mill is comprised of a roughing and finishing train. The roughing train includes a 2-high scale breaker, a 4-high spreading stand, and three 4-high universal stands with vertical rolls on the entering side. Between the scale breaker and the spreading stand there is a turntable for turning the slabs through 90 degrees when cross rolling is desired, and a pusher for entering the slab squarely into the rolls. Between the spreader and the following stand, there is a second turntable, for returning the spread slab to its original direction, and a squeezer for squaring up the edges and insuring correct width.

The slab from the roughing mill



**R**EMOVABLE furnace tops of the radiant-tube type (left) each serve three annealing boxes, facilities being provided to handle both sheet and coils. Below are two sets of three tandem cold rolling mill stands, one set handling coils up to 54 inches and the other up to 72 inches in width

coilers, in conjunction with which is a cooling conveyor for delivering the coils to the coil storage building from which point they are delivered to the cold strip mill for further processing.

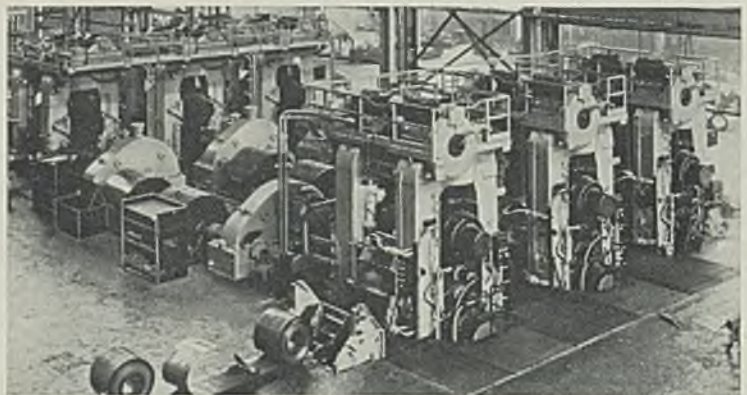
In the production of hot rolled strip it is important to secure the desired grain structure, which is controlled by the temperature of the strip as it leaves the finishing mill train. To indicate the temperature at which the strip leaves the mill a temperature-recording pyrometer has been installed and placed within



passes over a roller table about 95 feet long, leading to the finishing group of mills. Since the finishing temperature of the hot strip is a prime factor in the quality of material produced, this roller table also serves as a special temperature control table for the slab in transit between the roughing and finishing groups of mills. Special water cooling is provided at the rollers of the table to assist in controlling the temperature of the slab prior to its entry into the finishing groups of mills. The temperature at this point is indicated by an optical pyrometer, and the finishing temperature is also recorded by an ardometer which is located at the final finishing stand of rolls.

Two large fans are available for cooling off the slab as it approaches the finishing mills over the water-cooled rollers.

As the slab progresses down this



roller table the operator, who keeps his eyes on the pyrometer, controls the speed of the slab movement, retarding its progress if the metal is still too hot, or, if necessary, reversing the direction of the movement for a moment or two until the

view of the operator. This finishing temperature is maintained above the upper critical, so that no cold working takes place in the hot rolling, and consequently an anneal is unnecessary if any of the product is to be further reduced by cold roll-



# MODERN PROCEDURE IN ALLOY STEEL PRODUCTION

• A SERIES OF ADVERTISEMENTS BASED ON TIMKEN METHODS

NO. 1

## Research

Research is the foundation of progress. In the modernly equipped research laboratories of The Timken Steel & Tube Company, organized thought and experiment are constantly carried on with the object of increasing the quality and application of Timken Alloy Steels to broaden their field of usefulness.

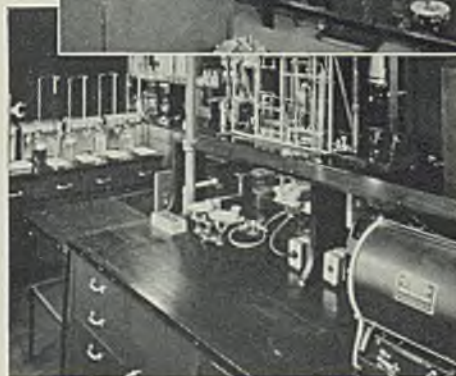
Out of Timken research in the past have come some of the most important developments in the alloy steel industry. Such developments as Timken Nickel-Moly Steel for the production of carburized parts; and grain size control now recognized by users of alloy steel as a standard specification.

In the course of their work Timken research technicians cooperate closely with all other departments. Thus the ramifications of Timken research extend into every phase of Timken quality control—chemical, metallurgical and production.

As a result of its recently enlarged facilities and the broadening of its scope, the efficiency and value of the Timken Research Department have been very definitely increased.

THE TIMKEN STEEL & TUBE COMPANY, CANTON, OHIO

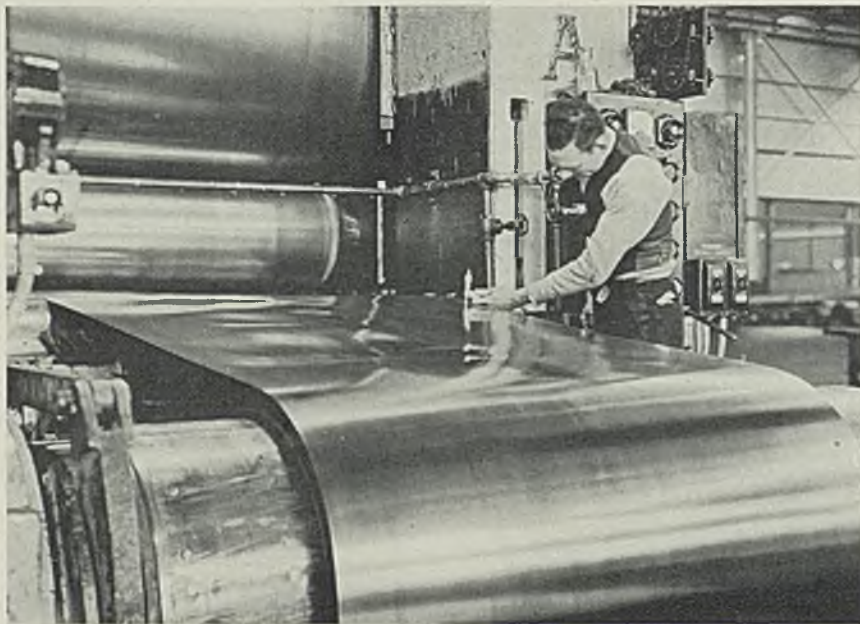
*District Offices or Representation in the following cities:* Detroit Chicago  
New York Los Angeles Boston Philadelphia Houston Buffalo Rochester  
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# TIMKEN ALLOY STEELS

ELECTRIC FURNACE AND OPEN HEARTH • ALL STANDARD AND SPECIAL ANALYSES





"Miking" the strip as it is rewound into coils under tension following rolling in the tandem cold mills

ing. Hot strip which is to be cold rolled is usually finished on the hot mills at slightly above the upper critical, and is cooled down to approximately the lower critical on its travel to the cooler, resulting in a small uniform grain structure, proper for starting the cold reduction in the cold mills and the subsequent treatments.

Since hot rolled strip is rolled singly and in great lengths, the speed at which it leaves the finishing stand must necessarily be high. The speed varies from 676 to 1352 feet a minute, depending upon the gage being finished—the thinner gages necessitating the higher speed. A single piece of strip 0.0625-inch in thickness and in widths under 48 inches will approximate 1150 feet in length, whereas in widths greater than 48 inches it will reach up to 500 feet.

#### Special Brick in Furnaces

In all three slab heating furnaces suspended roofs are used. The soaking zone and part of the primary heating zone are constructed of special spallac roof brick for an area of 800 square feet per furnace. This special brick minimizes the chance of spalling brick dropping on the heated slab.

An outstanding feature is the fact that the furnaces are fired with a mixture of blast furnace and coke-oven gas with a heating value per cubic foot of 285 B.t.u. This heating value gas has proved highly satisfactory with a consumption as low as 1,550,000 B.t.u. per ton of steel when heating approximately 55 gross tons per furnace per hour. This fuel gas is mixed in the main steel plant, which is about two miles distant, raised to three pounds per square inch, and then piped to the furnaces

of the hot strip mill. When it arrives at the furnaces, the fuel gas is reduced suitably in pressure by a butterfly valve operated by a regulator. This regulator insures constant pressure at all times on the inlet side of the furnace control valves, a highly desirable feature from the standpoint of fuel economy and good heating practice. The furnaces also are equipped to burn Bunker C fuel oil as an auxiliary fuel when there is a shortage of mixed gas supply.

#### Details of Cold Mill

The new cold strip mill comprises: A 3-stand 4-high 75-inch tandem cold strip mill followed by a reel, a 3-stand 4-high 54-inch tandem cold strip mill followed by a reel; one single stand 4-high 75-inch tempering mill equipped with a reel for rolling coils; one single stand 4-high 93-inch tempering mill, and one single stand 75-inch tempering mill without reels for rolling short sheet lengths. In addition, there is a single stand 2-high 54-inch skin pass mill, equipped with reel, for rolling coils.

Due to the physical conditions of the ground upon which both the hot and cold strip mills are constructed, a serious obstacle was presented when it was determined that the limiting depth of the oil cellar of the hot strip mill was 19½ feet below mill floor level and the limiting depth of the oil cellar in the cold strip mill was 17½ feet below mill floor level. Another point which received serious study was the fact that in the hot strip mill the distance between the two extreme points requiring lubrication was approximately 417 feet, whereas in the cold strip mill this intervening distance was 686 feet.

Bearing these physical limitations

in mind, a novel and advantageous arrangement of the oil cellar was designed, which consisted in general, of extending, contrary to all previous practice, the oil cellar underneath and beyond the center line of the mill proper, permitting an arrangement of the main oil reservoirs decidedly different than had ever been accomplished before in a similar type of mill. The main oil reservoirs were each approximately 22 feet long, 9½ feet wide and 6½ feet high, and they were so installed that the length of the main oil reservoirs was in a plane at right angles to the pass line of the mill proper. This arrangement permitted the main oil reservoirs to be located directly under the pass line of the mill and out of the way. The two main circulating pumps then were grouped symmetrically in front of their respective oil reservoirs with the result that an unobstructed passage was attained from end of the hot strip mill to the other, 7 feet wide by a minimum of 6 feet high.

#### Lubrication Is Automatic

From the standpoint of operation, all centralized pressure lubrication systems employed for use in connection with both the hot and cold strip mills are fully automatic and require a minimum of manual attention. All electrical controls are completely interlocked and the systems are complete with warning sirens which give the maximum protection against failure of the lubricant supply.

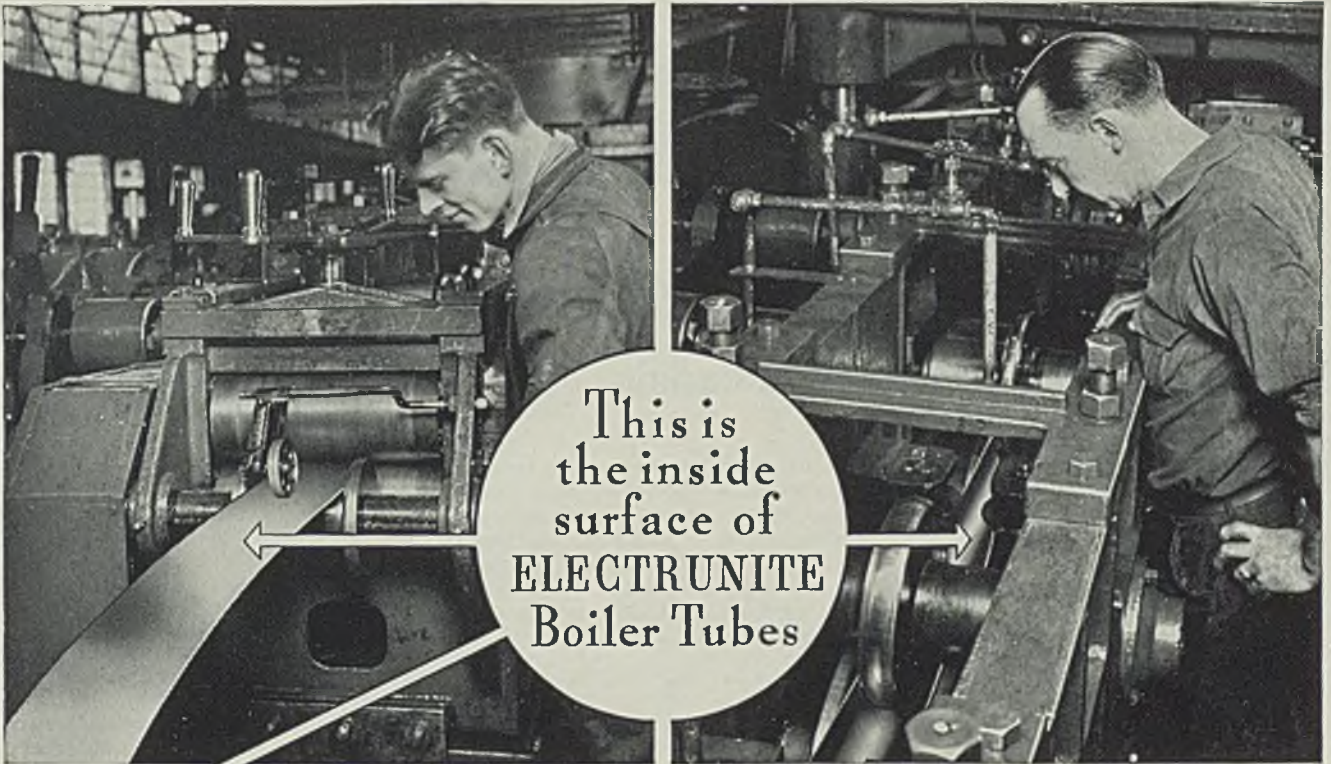
All centrifugal lubricating equipment embodies friction clutch drive and high-efficiency self-draining bowls. Not only are they the largest throughout capacity centrifugal machines obtainable anywhere, but also machines which operate at a comparatively low speed, thereby reducing the maintenance to a minimum.

Entering the hot strip rolling mill building, the great 4-high rolling mills and the scale-breaking mills rise 20 feet from the floor, although the lower roll of the 4-high mills is located almost out of sight below the floor level. Even these seem relatively small in a building 75 feet high, with traveling cranes of 60 tons or more capacity moving about high overhead, and with the pickling room barely visible far down through the long finishing room in a vista 1800 feet away.

Spaciousness is the factor that



# INSIDE INSPECTION IS POSITIVE



This is  
the inside  
surface of  
**ELECTRUNITE**  
Boiler Tubes



Don't you wish that you could crawl through every boiler tube you use...that you, personally, could check every inch of the inside surface for defects, for scabs, slivers and rolled-in scale?

Well, you can't crawl through a boiler tube...and even if you could, it would be a waste of time with **ELECTRUNITE** Boiler Tubes.

Look at the photographs above. Those two men are YOUR inspectors. As the flat-rolled steel—which has been pickled free from scale and thoroughly inspected on *both* sides at the mill—passes through the cold forming rolls, every square inch of the inside surface must pass their eyes. And they can see the steel up to the time it becomes a formed tube ready for electric resistance welding. No defect of the inside surface gets by these watchmen of quality. Cold forming, electric resistance welding, bright annealing, *thorough inspection*...all combine to produce uniform, dependable, safe tubes that cut installation costs and add years of life to any boiler.

If you want to eliminate boiler tube troubles, use **ELECTRUNITE**. Write for complete information.



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WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING  
CLEVELAND . . . OHIO



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# Progress in Steelmaking



## Strainer for Continuous Strip Mill Descaling System Is Self-Cleaning

**S**CREENING of high-pressure spray water is being accomplished effectively at a broad strip mill in Ohio by a recently developed automatic strainer. The unit consists essentially of a conical cylinder revolving in a cast-iron housing. Water enters the housing, passes through the straining media held in the slowly revolving cylinder, to the interior where the cleaned liquid is discharged at the bottom.

About 5 per cent of the cleaned water reverses its flow and jets from within the cylinder through the screening media, passing to a waste compartment which drains separately from the main discharge. This reverse action continuously and automatically keeps the straining media cleaned of solids which tend to accumulate on it during the straining process.

### Porcelain Disks Are Employed

The success of the unit is attributed in a large measure to the use of glazed perforated porcelain straining disks instead of wire meshes. The porcelain has the distinct advantage of being noncorrosive as well as resistant to acids.

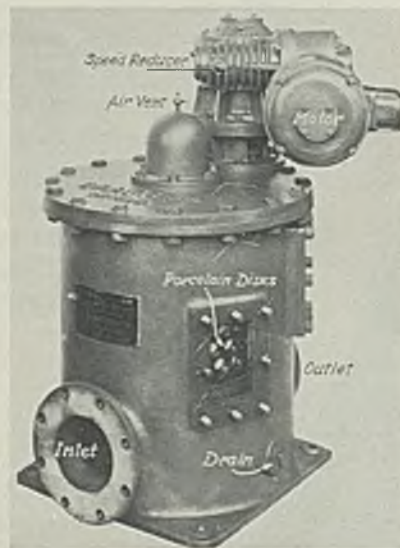
Moreover, the coefficient of friction on the glazed surface when wet is low which prevents plugging. The porcelain disks are held in place by brass retaining nuts, the number per machine of which varies according to the size of the strainer. The porcelain disks are made with 1/16, 1/32, 1/64 and 1/100-inch diameter holes. As the various disks pass the backwash chamber they are cleaned automatically. The machine is driven by a motor and speed reducer mounted on top.

The strainer is well suited to a service where the percentage of foreign matter in the water is high and the volume of liquid to be handled large. It is designed to deliver a steady

flow of finely cleaned water under pressure, thus protecting pipe lines, valves, spray nozzles, pumps, meters, cooling pipes, condensers, bearings, etc., from the abrasion or clogging caused by grit or solids. The strainer is built by H. A. Brassert & Co., Chicago.

### Affords Direct Reading

Introduction of a direct-reading eyepiece for measuring the grain size of iron and steel affords assistance to the metallurgist in checking materials. This device comprises a revolving circular plate containing eight glass micrometer disks with accurately ruled squares thereon. These disks are numbered from 1 to 8 inclusive to represent 1, 2, 4, 8, 16, 32,



*New type strainer for cleaning high-pressure spray water at continuous broad stripsheet mills*

64 and 128 grains per square inch on the magnified image of the specimen. The divisions correspond with the numbered standards of the American Society for Testing Materials. The new eyepiece can be used either visually or in connection with photomicrography.

### Bulge Prolongs Tank Life

Failure of continuous pickling tubs of vitrified brick for cleaning wire rods is caused by straight line construction according to a wire mill superintendent. A 6-inch bulge placed in the center of tubs, 40 to 42 feet long, will allow ample room for expansion and contraction without cracking the vats.

### Skip Pits Made Water Tight

Waterproofing blast furnace skip pits from the inside as well as any wet or damp masonry surface, foundations, boiler and elevator pits and other underground chambers subject to seepage is simplified by the application of a recently developed compound without first chipping away the old surface. It merely is mixed with water to a molasses-like consistency and applied over the surface in two coats with an ordinary scrub brush.

### Conceals Electrical Wiring

A novel method is employed to conceal the electrical wiring on a broad strip mill in the Great Lakes district to produce a finished appearance. The mill builders used particular care to run the necessary conduits to the tops of the mill housings in such a way that they are lost to the casual observer. This was done by enclosing the conduit in the mill steps and platforms.

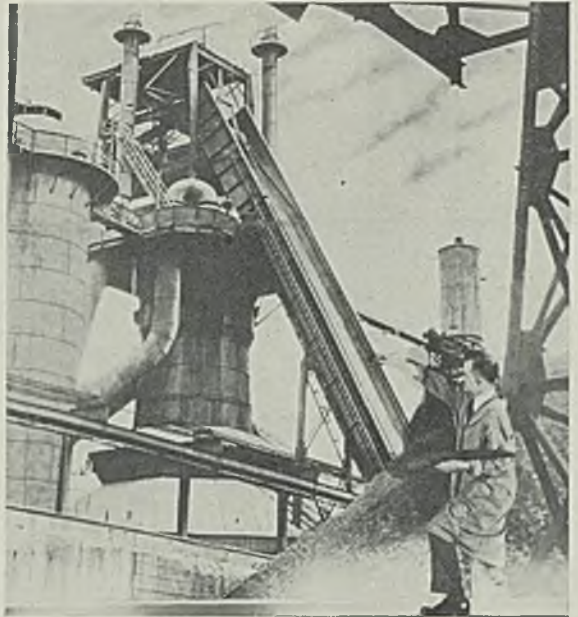


# Industry Tells Its Story

At

## Great Lakes Exposition

**W**ALTER BARTZ, photographer and artist, Youngstown Sheet & Tube Co., Youngstown, O., tinting a colored photomural in Romance of Iron and Steel section of the exposition



**O**PEN-PIT iron ore mining is shown in exhibit of Lake Superior Iron Ore association, Cleveland. This exhibit, perhaps 15 feet long, 10 feet wide and 10 feet high, is a life-like model of an open-pit mine which has been worked down bench by bench to considerable depth from the surface. A miniature locomotive pulls a string of ore cars into the mine and a steam shovel simulates the scooping up of ore and dropping it into the cars as the train backs up. The last car loaded, the locomotive

pushes the cars out of the mine for unloading.

♦ ♦ ♦

### PURE NICKEL AS DECORATION

International Nickel Co. Inc., New York, has embellished its exhibit with liberal use of nickel cathode sheets. These sheets are produced by an electrolytic method and are of 99.95 per cent purity. They are used to encase columns and backs and bases of display cases, being attached to the wood and steel framework by

screws. Some 4000 pounds of nickel is used in this manner, which at the market price of about 35 cents per pound represents a total of approximately \$1400.

♦ ♦ ♦

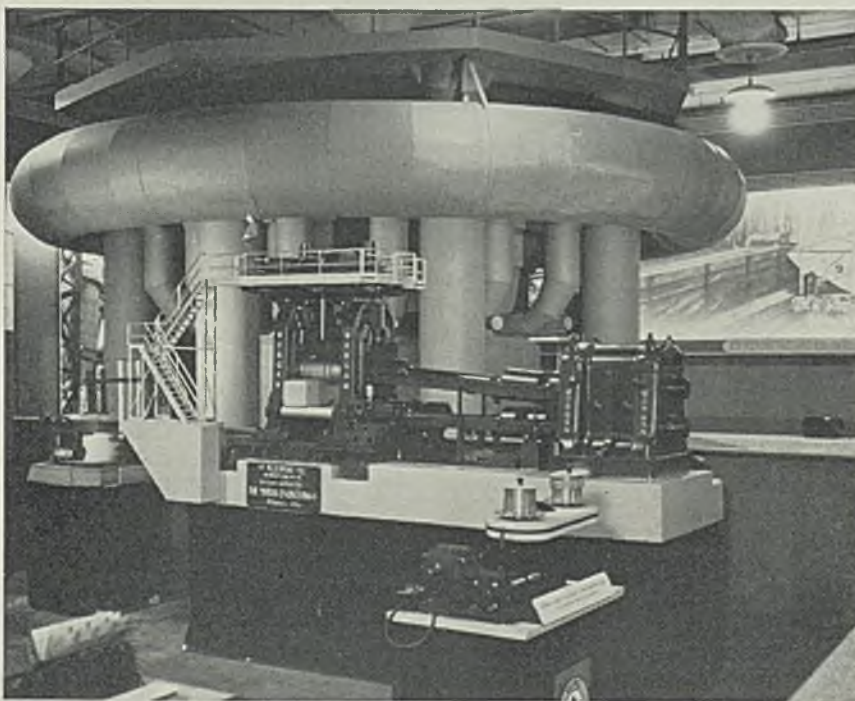
### MACHINE PRODUCES WIRE

Wire drawing and nail manufacture are demonstrated by the United States Steel Corp., New York. The wire drawing machine reduces 0.030-inch low carbon steel wire to 0.011-inch diameter by pulling it in sequence through a series of 11 drawing dies. A soap solution serves as the lubricant. The wire is fed through the machine from a coil and is recoiled automatically as it emerges. Another machine makes small wire nails from coiled wire. This machine also is automatic; the wire is fed into the machine from a coil and the nails emerge from a chute in the opposite side. Both machines are shown by the corporation's subsidiary, the American Steel & Wire Co.

♦ ♦ ♦

### VISITORS OPERATE MODELS

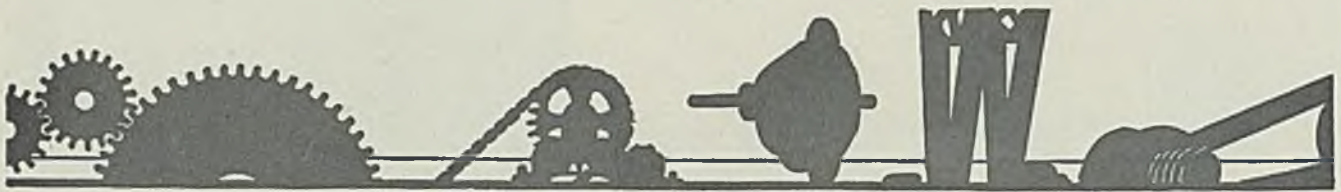
A penchant for the opportunity to operate machinery seems to be born in the average man. Recognizing this human desire, Timken Steel & Tube Co. and Timken Roller Bearing Co., Canton, O., have provided two glass-encased working models which visitors are permitted to manipulate by push buttons. One is a model of a tube piercing mill and the other a model of a 3-high reversing bar mill with elevating approach and delivery tables. Both models are exact reproductions of equipment in actual operation at the Timken steel plant.



A full-size cast house of a modern blast furnace, shown in the background, helps to tell the story of iron and steel. In the foreground are models of a blooming mill, wire mill, sheet galvanizing equipment and an electric furnace



# Power Drives



## Recalling Unusual Setup for Obtaining Flywheel Effect on Crankshaft Lathe

I GOT quite a kick from your article, 'Flywheels on Lineshafts,' which appeared in *Power Drives* for May 11," writes James A. Ahern, general superintendent, Blake & Knowles works, Worthington Pump & Machinery Corp., East Cambridge, Mass.

"An experience of mine may prove interesting. Back in 1904 when assistant superintendent of the machine shop at this plant, our line of machinery required many crankshafts of single and multiple throw with the crank forged integral or solid with the shaft.

"Methods for machining crankshafts at that time were crude and costly. Before turning on the lathe it was necessary to lay out, drill, and slot or saw to remove surplus metal. Determined to improve on this method I designed a fixture adjustable for any throw or stroke, so that the operator could rough turn and finish the crank pins from the solid in the lathe. At that time our lathes were belt driven.

### Intermittent Cuts Cause Slip

"On the larger crankshafts with the lathe running in back gear I had plenty of power, but on the smaller shafts to get the proper cutting speed and production I had to operate on open belt drive. The cut being intermittent, the belt would slip and would fail to carry the tool through; then my thoughts went to the flywheel. The Niles-Bement-Pond heavy production lathe fitted in with my plans nicely. My first thought was to make a new spindle and put the flywheel on the end. Instead I made a new faceplate with flywheel effect (heavy rim).

"The results were entirely satisfactory, so much so that I had a lot of visitors to see my crankshaft lathe. Among callers were the sales manager and his assistant from the Niles-Bement-Pond Boston office. Well, there was a good laugh all

around. Those fellows sold me the lathe.

"With the lathe in back gear the flywheel was also helpful, the flywheel taking the shock or blow off the gears and making for quiet running and longer life for the lathe. In conclusion, it appears to me that a flywheel on the lineshaft would not be of much use, but a flywheel on the machine would do the trick, when the cut is intermittent and the machine is belt driven. Of course in these modern times large belt driven machines are out of date; most of the new larger machines now have an all-gear drive.

"The fixture that I used at that time was designed on the same lines as is now used for the production of automobile crankshafts except the fixture is now built-in with the machine while mine was an attachment."

### Lineshaft Flywheels Are Boosters

Undoubtedly the proper place for flywheels is on the machine. However, many types of machines are not ordinarily provided with flywheels. On heavily loaded group drives of such machines the peak loads of the production cycles sometimes get together or synchronize for short periods. This extra loading is then transmitted back to the motor through the belts and lineshafting.

The flywheel on the lineshaft is in reality a "booster," serving some machines in step at one time and other machines at a different time. Even some machines with flywheels, especially old type equipment, do not have as heavy flywheels as modern production demands.

In the example cited by Mr. Ahern, a flywheel on the lineshaft would have been of little, if any, advantage. However, if all the machines in the group had been on similar crankshaft turning operations, it is probable that the lineshaft, unless it was heavily motored

or underloaded, would have shown some effect of the several intermittent loads, especially at periods when several cuts would get in step.

## Extended Shaft Drive

DRIVES with driven shaft operated at a higher speed than the driver are classed as severe service drives and require special engineering considerations. In one special drive of this type the problem was further complicated by the use of a motor with an extended shaft driving to a high-speed machine, also with an extended shaft. The step-up in speed was above 4 to 1.

Silent chain was used on the sprockets at both ends of the motor and machine. Naturally the pulls from both ends must be exactly even. To obtain this the keyways for the sprockets on both shaft and motor were cut in exact alignment. Also the keyways in the sprockets were cut in exact alignment with teeth. Thus when installed the two chains would pull together.

How necessary this was is indicated by later experience. Through an accident to the machine a new shaft was necessary. Not realizing the importance of perfect alignment of keyways the machinist cut them in the shaft a small fraction of an inch out of line. When put in operation the chains whipped and jumped because one sprocket was pulling ahead of the other. Although the error was so slight that careful measurements were necessary to prove its existence, nevertheless correction of the error resulted in the desired smooth operation.

\* \* \*

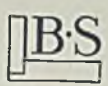
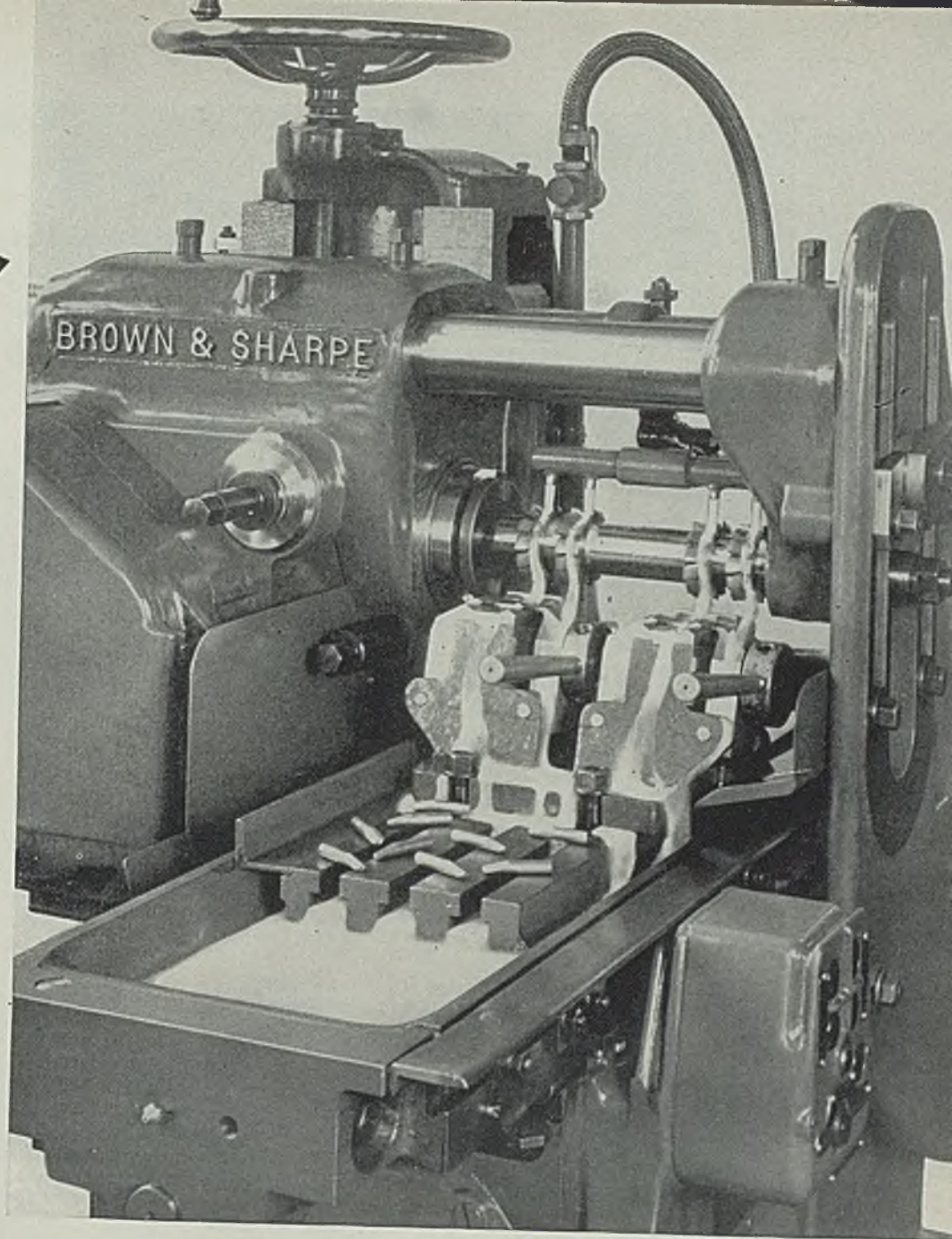
*Users are more often responsible for drive equipment that gives poor service or requires excessive maintenance than is the manufacturer. Lubrication, alignment and overloading are directly user-responsibility.*

\* \* \*

Often bearing trouble does not show up for a long time. Therefore, although a change to a less costly lubricant may not indicate any difference in operation, time may tell another story.



A NEW  
COST  
SAVER



Your work milled on this modern Electrically Controlled unit may show surprising savings. Why not investigate now?  
Brown & Sharpe Mfg. Co.  
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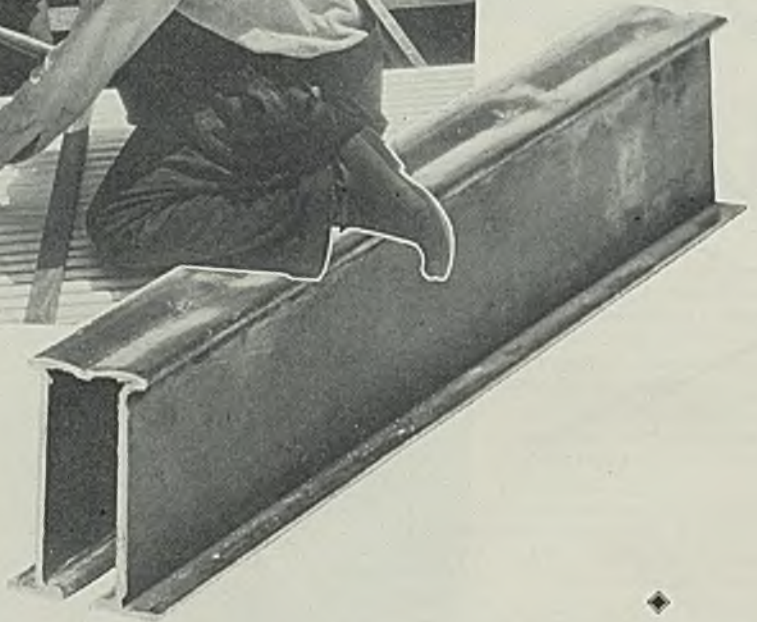
. . . . Particularly Advantageous for rapid **CLIMB MILLING** with Formed Cutters in Steel.  
*Automatic Backlash Eliminator on Table Feed Screw gives New production possibilities . . . eliminates automatically released during fast table travel.*

The new *Electrically Controlled*  
**BROWN & SHARPE**  
**No. 12 PLAIN MILLING MACHINE**





*Steps in the application of the new roof deck, showing welding of sections to purlins, and nailing of corrugated sheets to sections. Inset shows a section with slots for nailing one side only*



## Light Steel Sections Used In New Type Roof Deck

**A**S A BASIS for fabrication of lightweight steel roof decks, the Universal Metal Sections Co., Cleveland, has perfected a series of light steel beams embodying many new features. These beams, known as Universal sections, are cold rolled from one piece of 16-gage hot-rolled copper-bearing strip steel. They are 2 inches deep and 1½ inches wide overall, and they weigh 1.38 pounds per foot.

Several types of sections are fabricated by the company. For use where materials need be fastened to one side of the sections only, one design is provided with nailing slots on the top only, spaced at convenient intervals in such a way as not to impair the strength of the section. In installations where nailing to both sides is required, double nailing features are provided, with slots on both top and bottom of the pieces. In a more re-

cent design, two slots are provided on the bottom and by means of a patented arrangement nails driven upward through these slots are turned and automatically clinched so they cannot work loose.

Sections are furnished dipped in rust-resisting paint or galvanized, as desired. Because of their light construction, they are easily cut and handled on the job, and are readily adaptable for use in roofs, side walls, and partitions. The company is developing a series of various-sized sections intended for use in fabricating steel framework for houses, since the nailing feature makes this type of construction easily feasible. Thin walls and partitions, so popular in modern houses, use the lightweight sections to advantage as studding.

Steel roof deck is being supplied by the Universal Metal Sections Co. on

an increasing number of jobs. Its flexibility is the answer to many roof problems. Variation in the spacing of sections enables the deck to carry any normal roof load with any reasonable spacing of purlins. The sections are clipped or welded to the purlins, and a corrugated top sheet of 24-gage copper bearing steel is nailed to them. This sheet is then covered with insulating material mopped down with hot asphalt, and the whole is covered with bonded roofing to serve as a waterproofing.

The fixed continuous beam principle is used for both sections and top sheets, allowing purlins to be spaced wider without decreasing rigidity or roof strength. With this deck, horizontal eave projections up to 2 feet are feasible, and the sections may be inserted in holes in the wall, eliminating necessity for corbels. In construction of theaters and public halls acoustical materials may be nailed directly to the bottom of the deck, greatly simplifying application of such material. More pleasing architectural effects may be effected at lower cost as a result of this feature, it is claimed, since any type of material may be applied directly to the sections without the necessity of applying a superstructure of wood or plaster.



# Welding, etc. . . .



## Metallurgy of Welding

WITH exception of the element of time, metallurgy of welding is the same as metallurgy involved in the making of steel. But, due to the short duration of the welding heat cycle in many welding operations, strange things happen, metallurgically speaking, when ordinary metals are welded. Thus, 0.20 per cent carbon steel is subject to a high degree of hardening in spot welding and in many arc welding operations. Appreciable hardening of 0.05 per cent carbon steel for automobile bodies is encountered in both arc and flash welding. The hardness of steel is only one of the physical properties affected by application of a welding heat cycle.

### New Knowledge on Subject

The tendency of most metallurgists who deal with the making of metals and alloys by conventional methods is to deal with metallurgy of welding as a subject about which no one knows anything. But the situation is not quite that bad. A new generation of technical men is approaching maturity which never dealt with metallurgy except in connection with welding where the duration of the heat cycle ranges from 1/1000 to 1/10,000 the duration of the heat cycle used in the making of steel. The new generation of welding technicians has had to learn how to handle metals which are heated and cooled at extraordinarily high speeds.

The theory is the same as if a man were compelled to drink six glasses of beer in six minutes and were never allowed to drink it more slowly. He would soon learn to put salt in the beer to keep the gases otherwise formed in his stomach from blowing off his head.

## Notes on Recovery

BY COURTEOUS invitation, we recently inspected the welding and research activities of one of the large metal producing companies of the

by Robert E. Kinkead

*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.*

country. So far as we know every facility was placed at our disposal for getting information and various individuals were introduced to bring out specific problems and difficulties in connection with welding. It was known by everyone that we serve professionally other companies who are to some degree competitive with the one being visited.

As a result of the inspection it was disclosed that the progress with welding was substantial and along ration-

al lines. No serious blunders had been made. There were opportunities for further development in which the company was greatly interested. The plants were running full blast and raising wages.

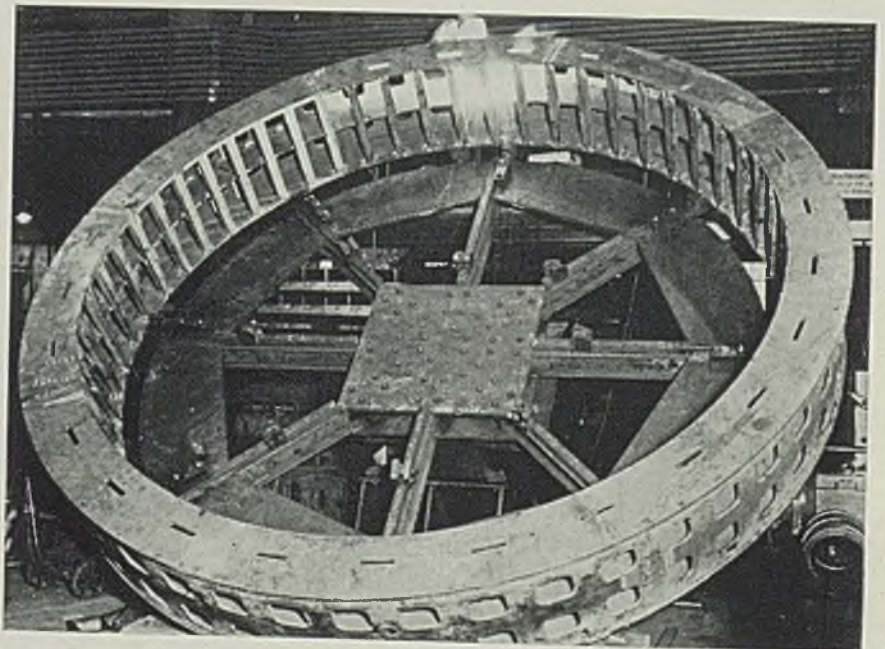
### Isolation Is Bad Policy

Another case was different. We visited a plant in the interest of a client to clear up a minor difficulty with welding. We waited an hour while furious conversations with the officials at the main office were carried on relative to the probability that we would discover some of their welding "secrets." Finally it was all fixed up and we were "shooed" around pretty fast through the departments in which welding was being done, with little opportunity actually to see anything.

Needless to say, there were no secrets. The organization had successfully kept all new information and ideas out of the plant for the last ten years. Rip Van Winkle had nothing on them in staying asleep for long periods. And they are still asleep so far as we are able to observe.

From long experience we have found that people who sleep too long are in an ugly mood when some one tries to wake them up. The depression became permanent with this company. They still have only a "skeleton" organization.

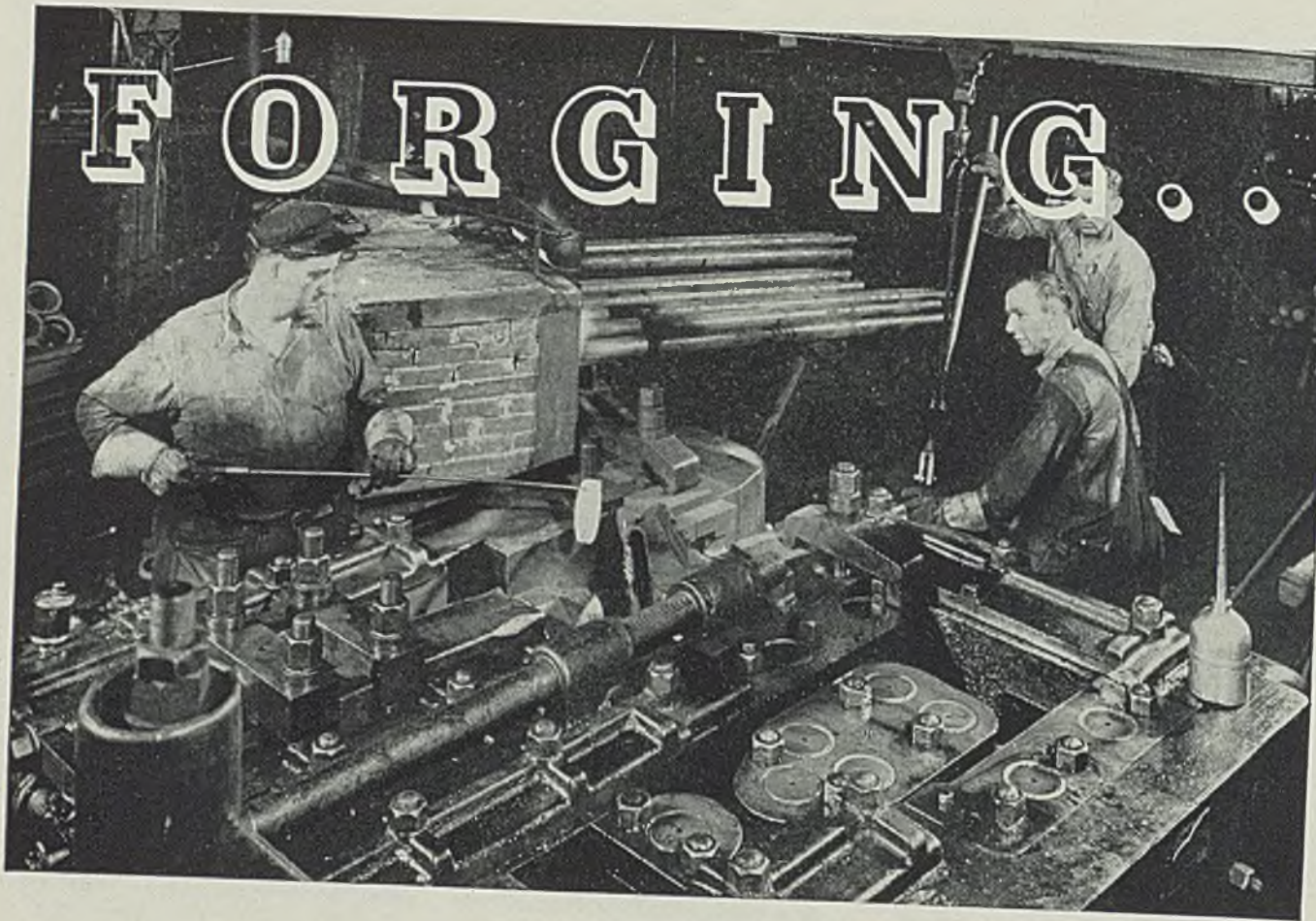
## Stator Yoke of Welded Construction



Here is shown a large welded steel stator yoke for one of three 14,000-kilovolt-ampere, 13,000-volt, 3-phase, 60-cycle, water-wheel driven generators now under construction in the plant of the Allis-Chalmers Mfg. Co., Milwaukee, for the Loup river public power district near Columbus, Neb. This yoke is 38 inches high, measures 252 inches across and weighs 32,000 pounds as it stands mounted upon the rotating welding table



# FORGING.



*... the basis of your saving*

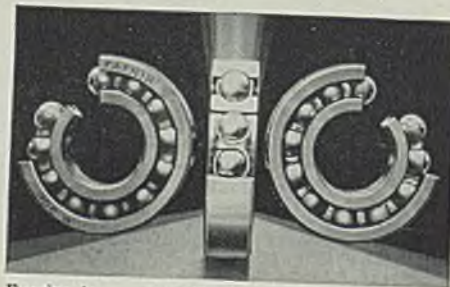
Forging the rings that later become raceways, from carefully selected bars of specially developed steel, is the foundation of the long, friction-free life which Fafnir Ball Bearings provide. The marked improvement in grain structure gained by this forging operation is just one of the hidden factors that contribute to the long-wearing, stress- and strain-proof performance that characterizes Fafnirs.

Such qualities pay greater and greater dividends as time goes

on. Extreme accuracy and long life are direct results.

There is a Fafnir Ball Bearing that exactly fills every requirement. Backed by the most complete line of types and sizes in America, Fafnir engineers can always help you select the bearing best suited to your needs. ... The Fafnir Bearing Company,

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Atlanta ... Chicago ... Cleve-  
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... Philadelphia.*



Forging is one of the 77 operations in the manufacture of a Fafnir Ball Bearing, of which this Single Row Bearing is a representative type.



# FAFNIR



**B A L L B E A R I N G S**



# Surface Treatment and Finishing



## Attention Called to Health Hazards in Industrial Electroplating Plants

BY C. B. F. YOUNG

Technical Director, United States Research Corp.,  
Long Island City, N. Y.

**H**EALTH hazards incident to many branches of industry have been the object of more or less attention during the past few years and the reason for a considerable expenditure of money for ventilation and other equipment. This has not been altogether true, however, in the case of the electroplating industry, with the exception of a few notable cases. The health hazards in connection with chromium plating and a few other processes recently developed have been recognized and due precautions have been taken in most cases. However, little or no attention has been devoted to the possible dangers which arise in connection with other types of plating baths, especially when they are not controlled by a competent chemist. Every day many workers are being subjected to fumes which might well become fatal.

### Fumes Prove Fatal

Such a case came to the attention of the writer recently when he was called upon to determine the cause of excessive gassing of brass and copper cyanide solutions. This condition had existed for some time without anyone in the plant realizing the dangers of gassing until one of the operators became ill and later died. The other operators in this department, eleven in number, were all given medical examinations and it was found that all were affected, some seriously. Since this incident, two other plants, to the knowledge of the writer, have

discovered similar conditions existing in their plating departments.

The actual causes for what hap-

### New Antidote Developed

**A**N EFFECTIVE method of administering first aid to victims of cyanide poisoning is found in the recently developed amyl nitrite-sodium thiosulphate antidote. It has been found to be more effective than the methylene blue treatment.

The materials required are: One liter or more of a 1 per cent solution of sodium thiosulphate and a carton of amyl nitrite pearls.

#### DIRECTIONS FOR TREATMENT

1. Have patient inhale content of one amyl nitrite pearl.
2. Cause vomiting by giving soap water or mustard water.
3. Give 500 cubic centimeters sodium thiosulphate solution by mouth.

Repeat the above procedure every fifteen minutes. If necessary, apply artificial respiration until physician arrives.

pened in this plant naturally became a source of grave concern and to present a clear picture of the whole situation it will be necessary to give the

reader a bird's-eye view of the situation.

The plant deposited copper and brass on steel. The steel was cleaned in a hot solution of sodium hydroxide-trisodium phosphate after which it was rinsed and given a flash coating of copper in a cyanide bath. It was then transferred to an acid copper bath where a heavy coating of copper was applied. After washing it was placed in a brass plating bath for a period of 15 to 20 minutes. If necessary the deposit was bright dipped, and the plating procedure altered. The material was finally lacquered, packed and shipped in an adjoining department.

There were five brass plating tanks, four copper cyanide tanks and one acid copper sulphate tank in this electroplating room. Other tanks, such as nickel sulphate, cleaning and washing tanks were also present but since they had no direct bearing in this particular case they will not be considered.

### Acid Mist Attacks Membranes

The acid copper sulphate tank was air agitated to permit the use of high current densities without burning the deposit. When testing the atmosphere for acid with litmus paper, a positive test was obtained approximately four feet away from the tank. An analysis of this solution revealed that it contained 20 ounces per gallon of copper sulphate and 7 ounces per gallon of sulphuric acid. The air passing through this solution carried small particles of sulphuric acid and copper sulphate into the atmosphere where they remained suspended and attacked the nose and throat membranes of the operators.

Next the copper cyanide tanks were inspected and it was noted that large quantities of gases were liberated at the cathode. These gases were basic when tested; they had an ammoniacal odor and produced a slight burning sensation in the nasal passages causing continual sniffing. The brass plating tanks were then examined and it was found that although the gassing was considerably less than in the case of the copper tanks, the same burning sensation was still noticeable.

The routine analysis of the brass



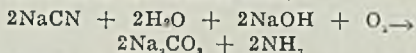
solution for copper, zinc, cyanide and carbonate showed nothing out of order except that the free cyanide was a little high. In order to counteract this sodium carbonate was added in definite amounts which reduced the gassing somewhat in both tanks. A further analysis revealed that iron was present as an impurity in large quantities. It was also noted that large quantities of organic materials were present.

#### Organic Compounds Are Factor

Two of the cyanide copper tanks were then analyzed. The first tank was found to contain 4 ounces per gallon of copper cyanide, 1.3 ounces per gallon of free sodium cyanide and 5.5 ounces per gallon of sodium carbonate. The second tank contained 3.01 ounces per gallon of copper cyanide, 0.7 ounces per gallon of free sodium cyanide, and 4.9 ounces per gallon of sodium carbonate. These figures indicated that the baths were not too far out of balance. Further analysis revealed that here too, iron, small amounts in this case, and large amounts of organic material were present. The organic compounds undoubtedly were added to produce a bright smooth deposit but they were causing a very low cathode

efficiency with a consequent increase in gassing. Time did not permit the identification of the organic compounds in any case.

It might be well, at this point, to analyse the above findings and correlate some of the data obtained. Iron was found in large quantities in the brass solutions. Iron has a tendency to become passive in basic cyanide solutions causing low cathode efficiencies and thus aid in the liberation of gases at the cathode. Ammoniacal odors were easily detected near these tanks. Ammonia is always formed in the solution when brass or copper cyanide baths are operated and this was undoubtedly the source of the ammoniacal odors. Ammonia can also be formed by the decomposition of cyanide solutions with the formation of sodium carbonate, thus,



From the above it is evident that ammonia can be liberated in large amounts during electrolysis. In a well balanced solution the ammonia, hydrogen and other gases are not released in quantities which will produce a hazard provided some ventilation is used. Wherever cyanide plating tanks are employed, there is a general tendency for gassing as the

current efficiency of this type bath is generally around 50 to 80 per cent. As a rule the gas evolved at the cathode is hydrogen, but if impurities are present or the bath is out of balance, injurious gases may also be produced.

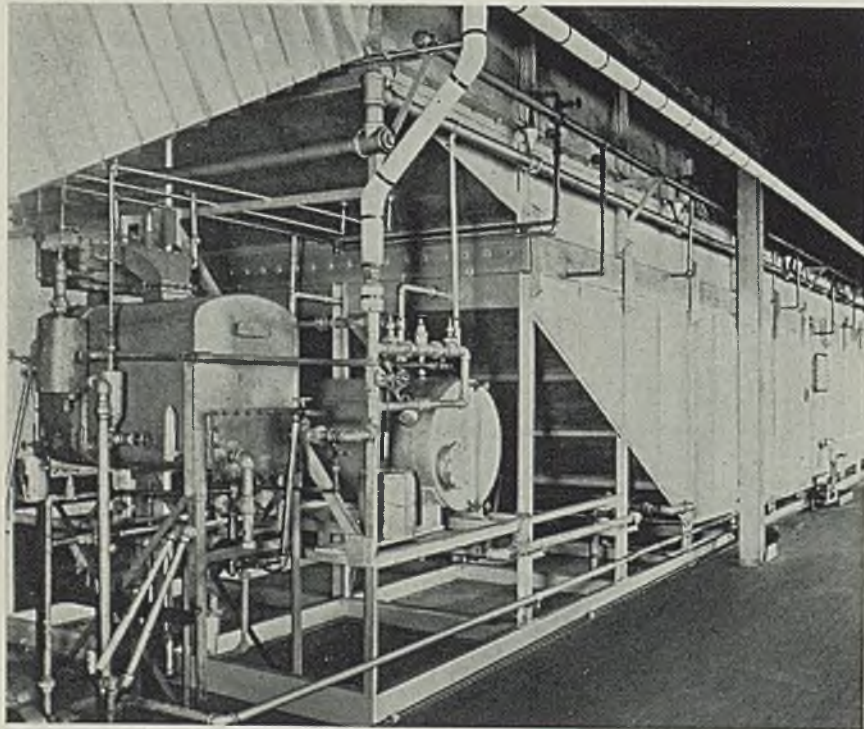
#### Poor Ventilation Increases Hazard

With these facts in mind the situation on this plant becomes clearer. Originally the plating department was not set off from the rest of the plant but because the vapors were obnoxious to workers in other departments a partition closing in the plating department was later installed. The winter just passed was very severe causing the workmen to close all windows and plug all cracks, thereby shutting off any natural ventilation which might have occurred. During these cold days the brass and copper tanks, operating at low efficiencies, liberated basic fumes of ammonia and ammonium compounds which attacked the nose and throat membranes of the operators. In addition to this the acid copper tank had been pouring forth sulphuric acid into the air in the form of a spray, due to the air agitation. This also attacked the membranes so that they became more irritated. It can be easily seen that the operators passing from one side of the department to the other would pass from a basic to an acid atmosphere, which would hasten the attack by a combination of the two reactions. The condition finally resulted in the death of one man and the placing of eleven others on compensation.

It might be argued that this was not an ordinary case, which might be true, but this could happen in many of the plating plants today. The writer is of the opinion that such conditions exist in many plants without being recognized. Insurance companies as well as employers are not sufficiently informed of such conditions and their results. How are they to know if such conditions exist? The answer is simple. It can be summed up in two words, scientific control. Such control can be attained by observing the following precautions:

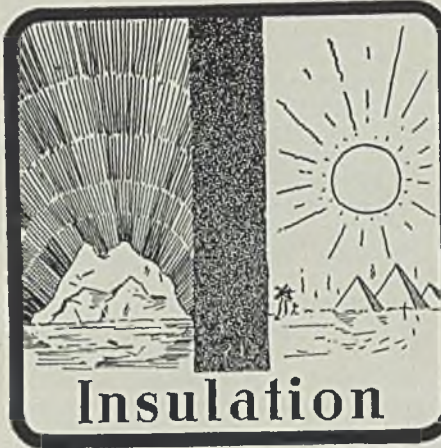
1. Analyze the baths once or twice a week and after each analysis (if necessary) correct the bath to ideal conditions.
2. Observe the solutions carefully. If an abnormal amount of gassing occurs at either electrode, examine the solution for impurities.
3. Properly ventilate the plant at all times.
4. If a tank is air agitated, insure proper ventilation to remove injurious spray of an acid or base, or substitute mechanical agitation.
5. The plant should be in charge of a chemist or chemical engineer who makes frequent trips through the department to detect hazards before any serious damage is done. If this cannot be done a consultant in

### Continuous Degreaser Cleans Auto Parts

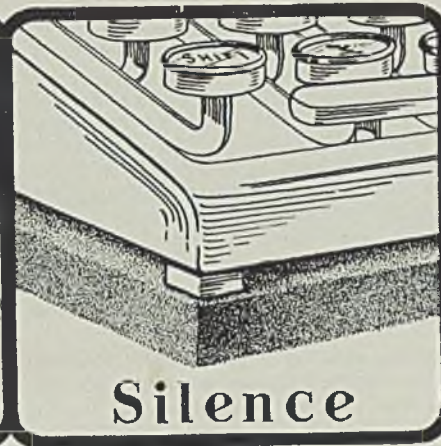


**D**ODGE division of the Chrysler Corp., Detroit, degreases fenders and other sheet metal parts prior to rustproofing in this large vapor degreaser built by the Detroit Rex Products Co., Detroit. The machine, 65 feet 5 inches long, 10 feet 5 inches wide and 19 feet 4 inches high, normally cleans 17,000 pounds of parts per hour and has a peak capacity of 60,000 pounds per hour. A still is operated in connection with the degreaser which reclaims dirty solvent at the rate of 50 gallons per hour

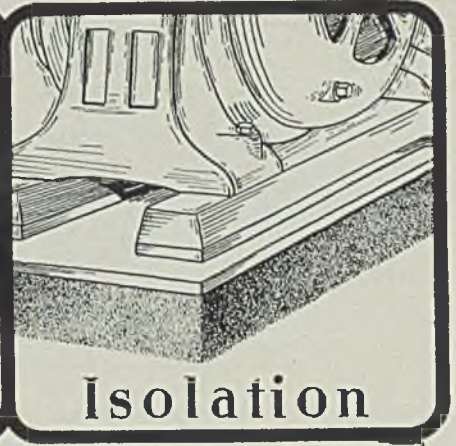




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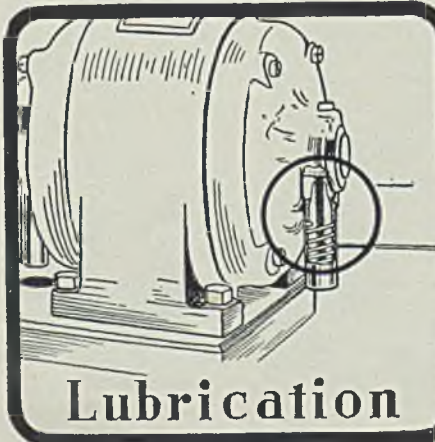
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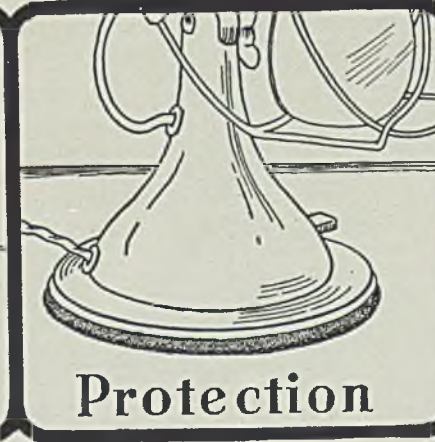
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the field of electroplating should be contacted. Inspection trips should be made once every three to four months, and if trouble is encountered he should be called in as soon as possible.

6. Always have the anode area equal to the cathode area during the time of plating. This tends to make the anode efficiency equal the cathode efficiency, thereby keeping the constituents of the bath constant.

7. Always operate the baths at the correct temperatures. Brass solutions should be operated at 90 to 115 degrees Fahr. Cold solutions produce a cathode efficiency which is generally below 70 per cent, thereby promoting the liberation of large amounts of gases which are entirely obnoxious.

8. Always use the correct current density. The voltage drop of the bath should never be used as a criterion. Two to three amperes per square foot should be used in brass plating.

9. The free cyanide should be kept within definite ranges. Eno should be present to keep the anode clean, but an excess should be avoided as it will cause excessive gassing.

10. No chemicals should be added unless specified by the chemist or chemical engineer in charge. Brighteners are used in limited amounts of these should be added.

11. The records of the bath should be checked weekly.

analysis and the materials added to each bath should be filed for future reference if trouble develops.

12. Whenever a tank is not functioning correctly, do not add just any chemical on the shelf in attempt to correct the trouble, but call in the plant chemist or consultant.

13. Hood all solutions which produce injurious fumes such as chromium plating baths, bright dip baths and others.

14. Have a physician examine the employees in the plating departments at least once or twice a year.

No attempt is being made to exaggerate the dangers to which plating room workers are exposed but it must be impressed on the minds of all concerned that carelessness and lack of scientific knowledge may mean disabled men and even death to some. It must be kept in mind that a plating bath is a chemical mechanism which, if not controlled, becomes inefficient and unbalanced. If allowed to operate in this condition poor work and health hazards will exist. When such conditions exist, they should be corrected by applying scientific reasoning and not any hit or miss system which the operator may concoct.

the Aluminum Co. of America, American Manganese Steel Co., Electro-Alloys Co., Rock Island Arsenal and the Watertown Arsenal. Mr. Cook stated the more familiar imperfections readily interpreted from the films are shrinkage cavities, flocculent shrink, blowholes from mold or metal gases, cracks, inclusions and pronounced dendritic formations. With close cooperation between engineering departments in modifying designs to attain better homogeneity and experiments with pilot castings in the foundry, Mr. Cook believes much can be accomplished. However, arbitrary specifications frequently impose hardships on the foundry and increase unnecessarily the ultimate cost to the consumer. Maintenance of adequate standards without expensive destructive tests was given as an important advantage of radiographic inspection.

#### Purpose of Inspection Varies

In summarizing the work of the five laboratories, Mr. Cook stated that the Aluminum Co. of America uses radiography primarily in the development of satisfactory casting or fabricating technique and to a comparatively small extent for the routine inspection of commercial products, as do the American Manganese Steel Co. and the Electro-Alloys Co. The unit at the Rock Island Arsenal is used strictly as an inspection tool. Manufacturers submit sample castings which are radiographed throughout. Complete reports are given to the producer for his guidance. The Watertown Arsenal combines both production and inspection routine as problems arise. The speaker also stressed the possible savings in machining costs through the application of the X-ray. A practical illustration of the use of radiography in a study of the best method of gating and risering a pilot casting was presented. Four methods were tried before finally the method eliminating the defect. The final method also resulted in a marked increase in the yield.

John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., questioned the need of X-ray equipment to examine the defects in a pilot casting such as discussed in the paper. He stated the composition was such that proper heat treatment would render it brittle and thus easily broken for complete study. Mr. Cook defended the use of the pilot and stated one shot with the X-ray would show all of the defects. Paul E. McKinney, Bethlehem Steel Co., Bethlehem, Pa., expressed the belief that the X-ray is an excellent tool if properly used.

The development of radiography in the testing of welded pressure vessels was discussed in the first part of a paper by J. C. Hodge, Babcock (Please turn to Page 101)

## Symposium on X-Ray Methods Throws New Light on Nondestructive Testing

FOUR sessions of the annual meeting of the American Society for Testing Materials in Atlantic City, N. J., last week were devoted to a symposium on radiography and X-ray diffraction methods.

A discussion of some of the basic principles underlying the radiographic process was presented by John T. Norton, Massachusetts Institute of Technology, Cambridge, Mass. Mr. Norton pointed out that an important part of the radiographic equipment is the detecting device, comprising the photographic film or paper, and the intensifying screens. The factors of contrast, latitude, speed and definition must be related properly to use the device to the best advantage. The X-ray source also contains several variable factors which the operator must adjust to obtain the best conditions for the particular problem. Not only must the image be intense enough to operate the detecting device, but it also must show the necessary variation in intensity to reveal the interior structure of the object.

Mr. Norton stated the question of sensitivity of the method is of considerable importance and to apply the method successfully the operator should know the size of the smallest

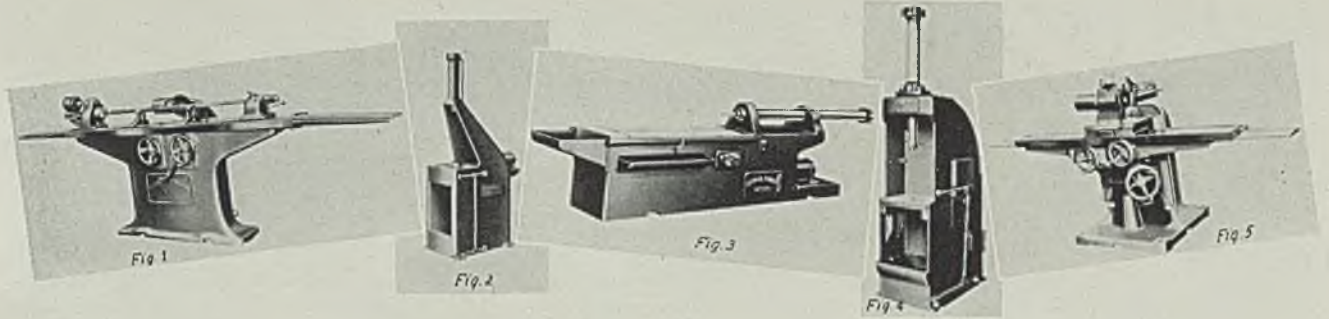
detectable defect. Also, the question of shielding to protect the film from extraneous X-ray effects forms a vital part of the correct radiographic technique and must be worked out carefully in each specific case. Three types of installations are in use, namely, the fixed, the semiportable which may be moved about with a crane, and the portable.

In reply to a question, the speaker stated that scattered radiation is usually present to a marked degree. While it may be several times the intensity of the direct radiation, only the direct radiation produces the desired contrast on the film. The time of exposure must be increased when the indirect radiation is taken out with a Bucky grid.

C. J. Phillips, Corning Glass Works, Corning, N. Y., mentioned the extremely small defects present in glass and inquired as to the availability of the X-ray to determine the size of such defects. It was stated that the defects were far too small to be determined by that method.

Earnshaw Cook, American Brake Shoe & Foundry Co., Mahwah, N. J., discussed the practice and results obtained by five X-ray laboratories in a paper "Foundry Applications of Radiography". Those discussed were





# New Line of Broaching Equipment Announced

COLONIAL BROACH CO., Detroit, announces a complete line of standard broaching machines, comprising eleven basic types in 49 different models. The line is designed to provide popular priced standard machinery to cover practically the entire field of broaching, reducing the necessity for most special designs with their accompanying high cost and low salvage values.

One feature of the line is the ability to change machines over easily from one size to another in the event of production changes. This has been made possible at a minimum cost, by designing and producing the machines on a unit basis comprising respectively the base, column and table. Another feature of the line of broaching machines is the attention given to progressive line production broaching. For instance, it is possible to mount several single ram broaching machines on a single base with continuous feed fixtures.

To facilitate this type of construc-

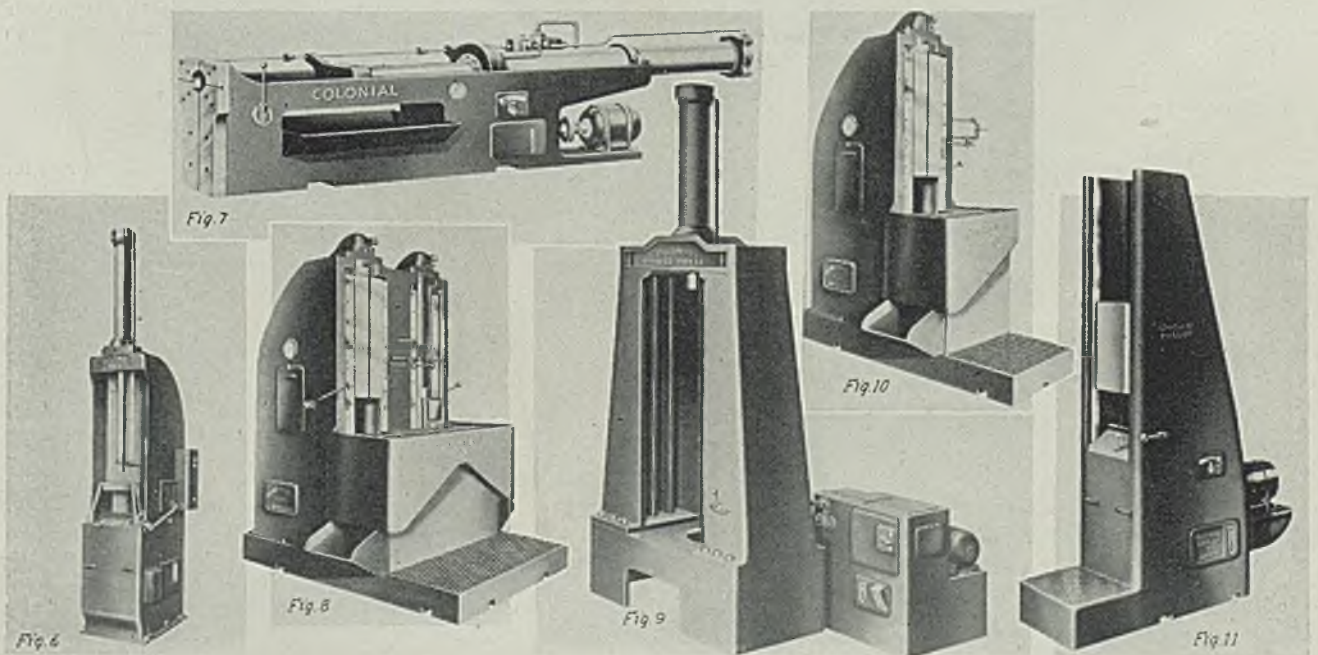
tion, the entire line of Colonial machines is featured by a combination of welded steel and cast iron. All units are operated through individual motor drives and all models have extra large coolant tanks and pumps. Design of the machines is such that chips do not accumulate around the work or tool, but drop down in large containers which are easily movable for cleaning. Simplicity design, construction, and operation has been a major objective throughout. Ways are in all cases made of hardened ground steel; rams are of rigid semisteel construction. All machines are operated through hydraulic pumps, and in a number of cases variable speed controls are standard equipment.

The line includes two models of broach sharpeners. The model shown in Fig. 1 is designed for sharpening cylindrical broaches and the machine in Fig. 5 sharpens surface broaches. A series of three light-duty presses, ranging from 1 to 4 tons, is

represented by the model shown in Fig. 2. All models of this series are produced with an 18-inch stroke and are hydraulic power operated.

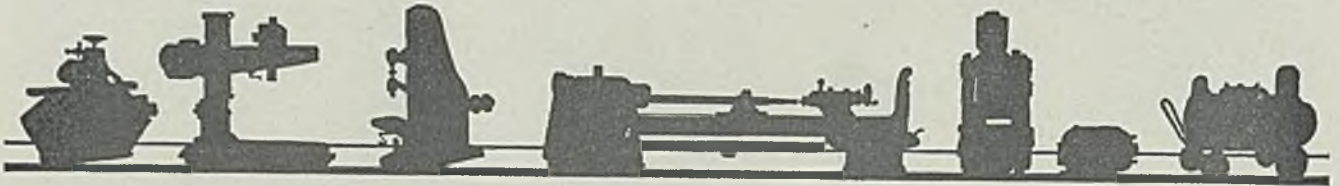
The Colonial horizontal surface push-type broach, Fig. 3, is ideally suited for continuous production of small parts. Incorporating standard 36-inch stroke, this 6-ton model is specifically designed for the provision of magazine-feed hoppers. The utility broaching line, Fig. 4, has many internal improvements. This line is available in from 6 to 15 ton ram capacity and in strokes of 24 and 36 inches. Another vertical machine designed for internal broaching is the high speed vertical "pull-up", available in three models ranging from 6 to 15 tons capacity and having a standard stroke of 36 inches, illustrated in Fig. 6. These machines are designed for high-speed work on such parts as bushings, finishing of internal gears, and other instances where fairly light cuts are

(Please turn to Page 74)





# New Equipment



## Hydraulic Die Spotter—

Baldwin-Southwark Corp., Philadelphia, has recently perfected a line of hydraulic die spotting presses for disclosing inaccuracies in surface contours of dies used in drawing automobile members, steel plate stampings, and similar operations. These machines make possible faster and more delicate closing of the dies and greater assurance against die breakage, it is claimed. A safety valve built in the press and set at a predetermined load prevents this load from being exceeded, the actual load applied being read from a gage. In case of power failure, a valve in the power inlet of the cylinder locks the fluid in the system so the press cannot move, preventing damage to dies and operators. Platens are actuated by two hydraulic rams, one in each column of the press. Rams are single or double acting, according to the requirements of the work. Uniform movement of the platen is assured by means of a rack and pinion mechanical equalizing device. Hydraulic power is provided by a rotary type pump which is housed in the welded plate top member. In spotting dies, half the die is covered with pigment and the press closed. The pigment marks the unpainted half at the

high spots or irregularities, which are then altered as necessary.



## Vertical Speed Press—

Oilgear Co., 1403 West Bruce street, Milwaukee, has recently designed a new 300-ton vertical two-column speed press. The main press structure is welded into one piece. Two hot-rolled steel plates, each with a 34 x 56-inch cut-out, are used in the front and back of the press. Similar pieces are used for the side pieces. The cross head is also of welded construction and accurately guided in the press frame. Pressing the foot pedal causes the crosshead to approach the work rapidly and then automatically slow down to pressing speed when work is reached. The ram continues downward until maximum tonnage is reached, holding this tonnage until released by operator. A hand lever is provided to lock the press at maximum tonnage if desired. All control mechanism is enclosed in the frame. The capacity of the press varies from 60 to 300 tons, and its net weight is 20,500 pounds. The stroke is 8 inches,

and daylight space is 26 inches. Overall height is 120 inches and it occupies a floor space of 60 x 58 inches.



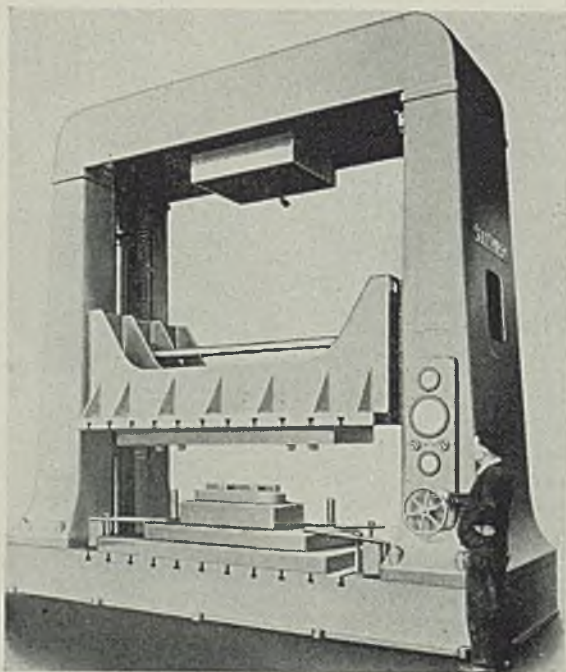
*Oilgear two-column speed press*

Approaching speed is 195 inches per minute, pressing speed 15 inches per minute, and returning speed 260 inches per minute.



## Midget Mercury Lamp—

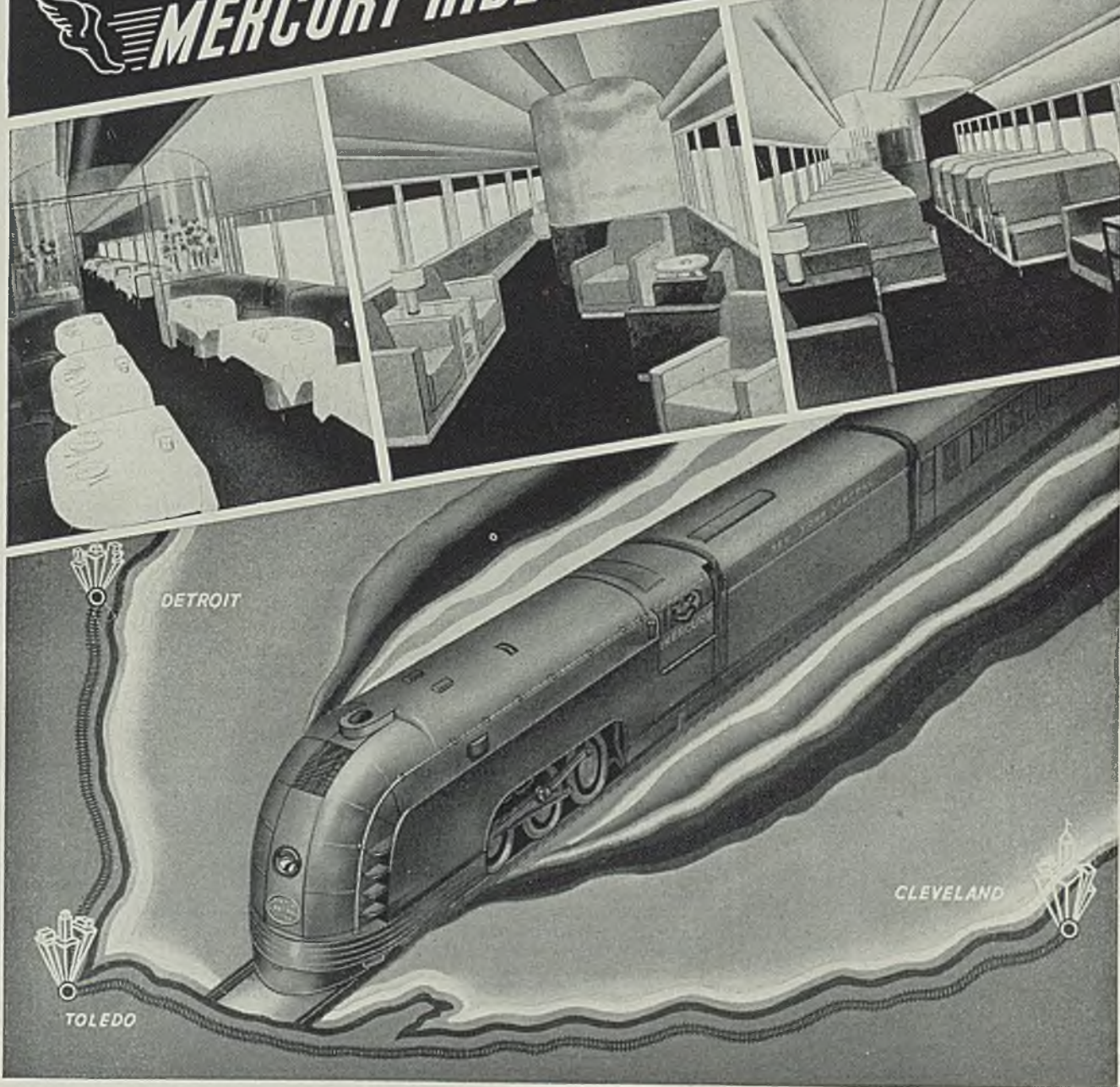
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a midget-size 85-watt mercury vapor lamp. The operating efficiency of this bulb is approximately 35 lumens per watt, producing approximately 3000 lumens of light, an illumination nearly equal to that of a conventional 200-watt incandescent bulb. The new bulb is designed primarily for use in industrial illumination to round out the line of 250 and 400 watt vapor lamps now offered. The high efficiency mercury lamps are especially applicable for use in dusty areas where it is costly to obtain a required illumination level from conventional types of lamps. The element in the bulb is encased in a small glass tube  $\frac{3}{8}$ -inch in diameter and 1  $\frac{1}{2}$  inches



*Southwark hydraulic die-spotting press*



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long. This is enclosed by a larger bulb 5 5/8 inches long for insulating purposes.

♦ ♦ ♦

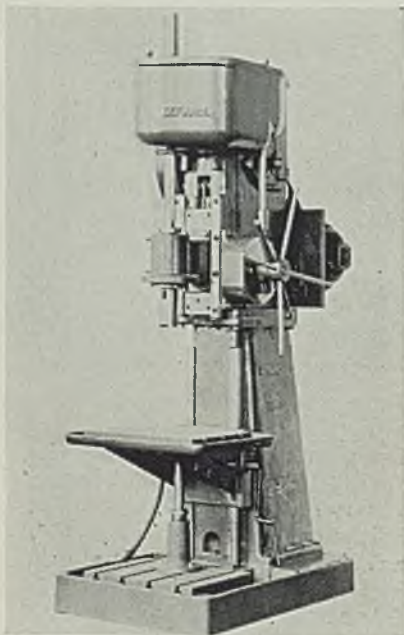
### Metal-Clad Switchgear—

Delta-Star Electric Co., 2400 Block, Fulton street, Chicago, has recently introduced a fully interchangeable metal-clad switchgear, which can be installed in as many sections as desired. The steel enclosed sections are mounted along side each other and the main insulated busses are joined by bus sections. Each section is equipped with a manually operated oil circuit breaker, ammeter, watt-hour meter and overload relays. Each section is 7 feet high, 5 feet deep, and 2 feet 2 inches wide.

♦ ♦ ♦

### Production Drill—

Defiance Machine Works, Defiance, O., announces a new production drill designed for continuous operation in production lines. An important feature of this new machine is the flexibility of speed both in feed and drill speeds. By transposition of gears built in the machine 12 speeds and 16 feeds are available. The drive is transmitted directly to the spindle, while the shafts and sleeve are mounted vertically in large ball bearings and have their upper ends splined to receive the speed gear train. Both speed and feed gears and shafts are made of heat treated alloy steel. The spindle rotates in roller bearings, which afford a means of take-up to maintain original alignment. The cutting lubricant pump is driven by the main drive



Defiance heavy-duty production drill

shaft and is arranged for belt drive. The table is furnished with either a

jackscrew or a set of pedestal blocks for vertical adjustment. The column is a cored casting having a large flange top and bottom for bolting head and base. Special columns may be supplied for assembling two or more heads to form a gang drilling machine. Capacity of the drill is two inches in steel, and a 7 1/2-horsepower motor is recommended for heavy duty work. Machine is furnished for either flat or V-type belt or chain drive.

♦ ♦ ♦

### Precision Bench Lathe—

Hardinge Bros., Elmira, N. Y., have recently announced a new enclosed head precision bench lathe with ball bearing spindle. The outstanding feature of this lathe, designed for production, tool room, or laboratory use, is the connected bearing enclosed headstock. The headstock frame is of heat



Hardinge Bros. enclosed head bench lathe

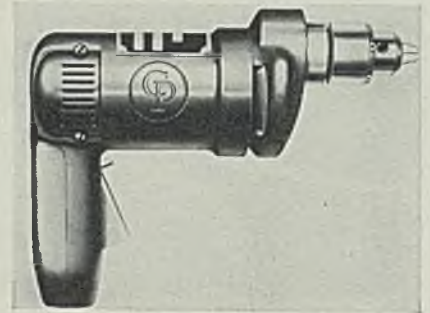
treated alloy steel with a hand scraped bearing surface to fit the ways of the lathe bed. Spindle is of ball bearing steel, hardened and ground both internally and externally, and is mounted in rotating members to reduce wear. It is furnished with a taper nose. Ball bearings are of the preloaded type, in which the balls are under pressure so that the variable film of oil is eliminated, resulting in greater accuracy in operation, it is claimed. Headstocks are mounted on a dual set of ball bearings in the front to absorb the work load, and a single race in the rear for a steadying support. A mechanical brake is mounted inside the headstock and is controlled by a lever on the outside. Drive, which is of dual V-type, is completely enclosed. The electrical drive units are furnished with either six or eight speeds forward and reverse, obtained without gears, clutches, or loose pulleys. Lathes are available in five sizes up to 1-inch capacity through collets and draw spindle.

♦ ♦ ♦

### Midget Electric Drill—

Chicago Pneumatic Tool Co., 6 East Forty-fourth street, New York, is announcing a new small-sized electric

drill especially designed for 3/16-inch wood and metal drilling. Overall length is 7 1/16 inches and weight is 2 pounds, 10 ounces. Three types are furnished for either 110 or 220 volt



Chicago Pneumatic midget electric drill

operation, a high-speed model rated at 5200 revolutions per minute free speed, a lower speed model at 3500 revolutions per minute free speed, and a slightly larger model designed for 1/4-inch operation, free speed 2500 revolutions per minute. These drills are fitted with two-pole switches with triggers and locks, box-type brush holder, sealed ball bearings mounted in steel inserts cast integral, and hardened helical gears. The spindle offset is 3/8-inch on the smaller models, 27/32-inch on the larger. As companion tools, the company has developed a series of screw drivers and nut runners with cushion clutches. Motor assemblies on these models are interchangeable with the new drills, and capacities range up to No. 8 screws or 3/16-inch nuts.

♦ ♦ ♦

### Two Handle Valve—

Homestead Valve & Mfg. Co., Coraopolis, Pa., has introduced a new two-handle lift-type plug valve which incorporates in its design positive mechanical seating and unseating. The valve has been designed to overcome operating obstacles encountered with high temperatures and pressures, infrequent operation, corrosion and the like. A mechanical leverage lifts the plug vertically from its seat sufficiently to break the friction between plug and body and allows for the free rotation of the plug. By the same process, the plug is mechanically reseated. Pressure range is from 125 pounds per square inch up and temperatures range up to 750 degrees Fahr. Valves for pressures up to 250 pounds per square inch are of iron, and for higher pressures are built of bronze or cast steel with alloy trim best suited for the service required.

♦ ♦ ♦

### Float Switch—

Rowan Controller Co., Baltimore, has recently perfected a new oil immersed float switch. This new device is in-





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YOU know that steel is a most adaptable metal. It can and should be made to various specifications to fit it perfectly for each different kind of service in which it is used.

At Granite City Steel Company your steel, in quantity order, is tailor-made to fit your particular job. Its specifications are adjusted to meet the special service demands which your product must encounter.

Unusual—yes. But possible here because the open hearth is a definite part of the plant, permitting us to tailor-make your steel from “heat to sheet.”

And Granite City Steel Company, only 15 minutes from Saint Louis, serviced by 29 railroads and the Mississippi River, offers better service to the Mississippi Valley, the West and the Southwest.

**GALVANIZED SHEETS  
STEEL SHEETS  
PLATES AND  
TIN PLATE**



# GRANITE CITY STEEL CO

GRANITE CITY, ILLINOIS

200 Fifth Ave., New York  
3525 Princeton Ave., Dallas  
1208 R. A. Long Bldg., Kansas City  
8 South Michigan Blvd., Chicago

1805 Boatmen's Bank Bldg., St. Louis  
1613 Pioneer Building, St. Paul  
1602 Mariner Tower, Milwaukee  
1750 Army Street, San Francisco



tended for use in corrosive or hazardous areas for operation of sump pumps, tanks, and other instances where liquid level must be controlled, particularly in blast furnaces, steel mills, coke plants and similar locations where the weatherproof and dust-tight construction may be used to advantage. The switch is completely oil-immersed, and is explosion proof. The tank and top are of cast iron, and the tank is easily removable in order to make the operating mechanism accessible. Switches are provided with renewable contacts and a quick acting make and break mechanism. The operating handle is built so that the switch may be arranged for operation either to maintain high liquid level or low liquid level. Switches are designed for operation at a 600-volt maximum.

## Complete Line of Broaching Equipment Is Announced

(Concluded from Page 69)

to be taken and a high production rate is demanded.

Designated as universal pull types of horizontal broaching machines, the horizontal and internal surface broach series shown in Fig. 7 comprises six models available in from 6 to 20-ton capacities and in 48 and 60-inch strokes. This group is particularly adapted to the broaching of keyways, and round and splined holes. Face plate capacity is such that the machines can also accommodate a wide range of surface broaching fixtures with tools up to 10 inches in overall width. Rugged follow rests can be supplied to facilitate handling of extra large broaches.

The two lines of vertical surface broaching machines shown in Figs. 8 and 10 incorporate a number of improvements and refinements, including a greater adaptability to line production, the provision as standard equipment of receding tables for work clearance during the return stroke and while loading and a number of internal operating improvements. These models are available in tonnages of from 6 to 25 tons and in strokes of 36 to 60 inches, and will handle surface broaches having a maximum width of 13½ inches per broach.

A line of power presses of the double-column type, Fig. 9, is provided, available in any capacity. Length of stroke is easily variable on this type of construction so that virtually any length of stroke can be supplied as standard. The heavy-duty vertical "pull-up" series, represented in Fig. 11, is designed for work where heavy-duty broaching is required. This type is available in capacities of from 10 to 20 tons and in both 48 and 60-inch strokes.

# Machine Tool Electrification Forum Discusses Problems of Standardization

**A**MONG other questions raised at the Machine Tool Electrification Forum held June 22-25 by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., was the necessity for standardization on dynamic balance of electric motors. Methods of obtaining a standard test were discussed, and permissible unbalance for various applications can not be determined unless some standard test is devised. The vibration of a motor in dynamic unbalance varies materially if the motor is on a flat steel plate or on various types of rubber mounting. A standard method of testing for dynamic unbalance of motors must be devised before any standards for dynamic or running balance can be determined.

The electrical wiring of machine tools requires some degree of standardization. Such wiring should be placed on the machine using stricter standards than the minimum standards contained in the national electric code. A discussion of standards used in the automobile industry and standards of the Westinghouse company on machine tool wiring indicated that a set of standards could be prepared. Such standards would not necessarily be used by the entire industry but should be established to indicate what is good practice in machine tool wiring. During this discussion, the importance of applying the electrical equipment and wiring while the machine is still in the design stage was emphasized.

### Standards Set at Minimum

Minimum standards for the application of control to machine tools were discussed. It was pointed out that standards in the electrical industry were minimum values and should be exceeded for moist and dusty atmospheres. On standard electrical control, it has been the policy of some electrical manufacturers to exceed the minimum standards by about 50 per cent to avoid trouble on difficult applications. Those machine tool builders using built-in control devices were advised to avail themselves of the experience gained in the electrical industry and not to crowd electrical equipment to such an extent that it will be unsafe for machine tool applications.

A discussion of motor applications brought out means of determining motor horsepower for varying or intermittent applications. Design possibilities of commercial alternating current and direct current motors were discussed together with the fields of application of each type. A chart for the determination of the

application of short-time rated motors was presented and the advantages and scope of application of short-time rated motors was discussed. The effect of frequent starts and reversals on machine tool motors was discussed and a basis for the calculation of the additional motor heating was presented.

Types of gearmotors and their field of application to machine tools were discussed. Various applications were shown and a chart for cost calculations was presented. Special mountings and means of lubrication of vertical gearmotors were described. The field of gearmotor application may be readily appreciated from an analysis of motor drives which developed that 80 per cent of motor driven devices operate at speeds below the motor speed.

The use of meters on machine tools has been receiving added attention from design engineers. Indicating meters may be used to indicate horsepower loads, speeds, total time of operation, oil pressure, position of machine members and other characteristics of a machine where an indication is desired. Various types and sizes of meters for these purposes were shown and discussed. Meters may also be used to obtain the power consumption of machine tools, and the requirements of meters for this purpose were discussed.

## Hard Surfaced Mine Bits Cut More; Take Less Power

Results achieved by oxyacetylene hard facing coal cutting machine bits have conceded the process a place among outstanding advances made in coal mining in recent years, according to the management of an Illinois mine. With exceptionally difficult conditions prevailing, the bits are run until the entire hard-facing material has worn away. In that time, 55 bits will cut an average of 20 places, 30-40 feet wide.

The process was introduced in 1934 and in that year 14,778 hard-faced bits cut 372,948 tons of coal—25.2 tons per bit—using 10 pounds of tungsten carbide for 4000 bits. Of particular interest are the power savings made as a result of hard facing the bits. In hard cutting, machines running, water-quenched bits registered peak loads of 400 amperes while under the same conditions machines using hard-faced bits required a maximum of only 175 amperes.



# Activity of Steel Industry Holds at High Level

## Construction Tonnage

## An Important Factor;

## Scrap Index Rises

**E**XCEPT for the July 4 holiday, steelworks operations last week held to a high level, and are expected to resume this week at a rate fairly close to that prevailing prior to the interruption.

The average for the entire week was 66 per cent, down 5 1/2 points from the preceding week. Steelmakers have a large unfilled tonnage, it being impossible for them to complete shipments on second quarter specifications before the price advance July 1. Heavy awards of structural steel featured the closing week of the quarter.

The desire to obtain protection on future construction work against third-quarter price increases resulted in a heavy volume of inquiries involving large tonnage, indicating that awards to fabricators will be extensive during the next 30 days, while shipments will hold up through the quarter.

Organized labor's drive in the industry has caused some uncertainty, but it has not become a pronounced factor in the market, consumers evidently placing little tonnage as a hedge against possible steelworks suspensions.

Operations of farm machinery manufacturers are holding at a good level for this period, despite the fact some implement plants have closed for inventories. Tractor builders are running at capacity.

Automobile assemblies for the week increased to an estimated 100,697 units, a gain of 1000 over the preceding week. Total production for June, estimated at more than 403,000 units, was approximately 41,000 more than in June, 1935. Some initial buying of steel for 1937 models is expected soon.

Scrap appears much stronger, with STEEL's price composite up 29 cents to \$12.75, the first rise since a gradual decline started early in April.

Average daily pig iron production in June—86,529 gross tons—was 0.85 per cent over May. The total—2,595,882 tons—was down 2.4 per cent. The six months' total this year, 13,579,356 tons, was 38.2 per cent over the comparable

### MARKET IN TABLOID

*DEMAND . . . . Diversified; featured by large structural awards.*

*PRICES . . . . . Steady.*

*PRODUCTION . . . . Holiday lowers operating rate to 66; Back to normal this week.*

*SHIPMENTS . . . . Strong.*

period last year. Stacks active at the end of June totaled 143, compared to 145 at the close of May.

Machine tool buying in the eastern districts during June exceeded any month since 1930 and volume was well distributed.

Shape awards for the week totaled 46,790 tons, up 7450 from the previous week.

Two New York awards accounted for 16,800 tons. Pending awards include 5450 tons for the Chicago river lock and water diversion works. Concrete bar awards in the week, amounting to 22,414 tons, included 19,000 tons for the United States engineers' office at Los Angeles. Los Angeles placed 12,810 tons of cast pipe.

Freight car orders in June, 5220, put the six months' total at 28,129 compared to 6333 last year in the same period. Chesapeake & Ohio last week placed 20,000 tons of rails.

STEEL's composite of iron and steel prices rose to \$33.48 from \$32.79 because of the advances which took effect July 1. The finished steel index advanced to \$53.40 from \$52.20. Increases of \$2 a ton were made on sheets, shapes, bars, hoops, hot-rolled strip, billets and sheet bars, while a \$3 a ton increase became effective on structural rivets.

Operations in the Wheeling district last week were down 6 points to 65; Cleveland 13 1/2 to 71; Pittsburgh 4 to 62; eastern Pennsylvania 1 to 46; Detroit 10 to 90; Youngstown 16 to 64; and Cincinnati 15 to 65. Other districts were unchanged.

Shipments of iron ore on the Great Lakes totaled 6,608,320 tons in June, compared to 4,241,636 tons in June, 1935, while the total for the first six months this year is 11,677,510 tons, against 8,145,393 in the same period last year.



# COMPOSITE MARKET AVERAGES

	July 3	June 27	June 20	One Month Ago June, 1936	Three Months Ago April, 1936	One Year Ago July, 1935	Five Years Ago July, 1931
Iron and Steel .....	\$33.48	\$32.79	\$32.77	\$32.79	\$33.10	\$32.44	\$30.78
Finished Steel .....	53.40	52.20	52.20	52.20	52.20	54.00	48.68
Steelworks Scrap.....	12.75	12.47	12.47	12.55	14.39	10.64	8.70

Iron and Steel Composites—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

	July 3, 1936	June 1936	April 1936	July 1935		July 3, 1936	June 1936	April 1936	July 1935
<b>Finished Material</b>					<b>Pig Iron</b>				
Steel bars, Pittsburgh .....	1.95c	1.85c	1.85c	1.80c	Bessemer, del. Pittsburgh .....	\$20.8132	20.8132	20.8132	19.81
Steel bars, Chicago .....	2.00	1.90	1.90	1.85	Basic, Valley .....	19.00	19.00	19.00	18.00
Steel bars, Philadelphia .....	2.26	2.16	2.16	2.11	Basic, eastern del. East Pa.....	20.8132	20.8132	20.8132	19.81
Iron bars, Terre Haute, Ind. ....	1.85	1.75	1.75	1.75	No. 2 fdy., del. Pittsburgh .....	20.3132	20.3132	20.3132	19.31
Shapes, Pittsburgh .....	1.90	1.80	1.80	1.80	No. 2 fdy., Chicago .....	19.50	19.50	19.50	18.50
Shapes, Philadelphia .....	2.11½	2.01½	2.01½	2.01½	Southern No. 2, Birmingham.....	15.50	15.50	15.50	14.50
Shapes, Chicago .....	1.95	1.85	1.85	1.85	Southern No. 2, del. Cincinnati..	20.2007	20.2007	20.2007	19.38
Tank plates, Pittsburgh .....	1.90	1.80	1.80	1.80	No. 2X eastern, del. Phila.....	21.6882	21.6882	21.6882	20.68
Tank plates, Philadelphia .....	2.09	1.99	1.99	1.99	Malleable, Valley .....	19.50	19.50	19.50	18.50
Tank plates, Chicago .....	1.95	1.85	1.85	1.85	Malleable, Chicago .....	19.50	19.50	19.50	18.50
Sheets, No. 10, hot rolled, Pitts...	1.95	1.85	1.85	1.85	Lake Sup., charcoal, del. Chicago	25.2528	25.2528	25.2528	24.25
Sheets, No. 24, hot ann., Pitts...	2.50	2.40	2.40	2.40	Ferromanganese, del. Pitts. ....	80.13	80.13	80.13	90.13
Sheets, No. 24, galv., Pitts.....	3.20	3.10	3.10	3.10	Gray forge, del. Pittsburgh .....	19.6741	19.6741	19.6741	18.67
Sheets, No. 10, hot rolled, Gary...	2.05	1.95	1.95	1.95	<b>Scrap</b>				
Sheets, No. 24, hot anneal, Gary..	2.60	2.50	2.50	2.50	Heavy melting steel, Pittsburgh..	\$14.00	\$13.80	\$15.75	\$12.30
Sheets, No. 24, galvan., Gary.....	3.30	3.20	3.20	3.20	Heavy melt, steel, No. 2, east. Pa.	11.50	10.90	12.70	9.75
Plain wire, Pittsburgh .....	2.40	2.40	2.40	2.30	Heavy melting steel, Chicago .....	13.25	12.75	14.35	10.25
Tin plate, per base box, Pitts.....	5.25	5.25	5.25	5.25	Rail for rolling, Chicago .....	14.00	14.00	15.75	11.25
Wire nails, Pitts. ....	2.10	2.10	2.10	2.60	Railroad steel specialties, Chicago	14.75	14.40	15.85	11.75
<b>Semifinished Material</b>					<b>Coke</b>				
Sheet bars, open-hearth, Youngs.	\$30.00	\$28.00	\$28.00	\$28.00	Connellsville, furnace, ovens .....	\$3.50	\$3.50	\$3.50	\$3.30
Sheet bars, open-hearth, Pitts.....	30.00	28.00	28.00	28.00	Connellsville, foundry, ovens .....	4.25	4.25	4.25	4.25
Billets, open-hearth, Pittsburgh....	30.00	28.00	28.00	27.00	Chicago, by-product foundry, del.	9.75	9.75	9.75	9.25
Wire rods, Pittsburgh .....	38.00	38.80	40.00	38.00					

# Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week.

<b>Sheet Steel</b>		<b>Tin Mill Black No. 28</b>		<b>Corrosion and Heat-Resistant Alloys</b>				<b>Structural Shapes</b>	
Prices Subject to Quantity Extras and Deductions (Except Galvanized)		Pittsburgh .....	2.75c	Pittsburgh base, cents per lb.				Pittsburgh .....	1.90c
Hot Rolled No. 10, 24-48 in.		Gary .....	2.85c					Chrome-Nickel	
Pittsburgh .....	1.95c	St. Louis, delivered	3.08c	No. 302 No. 304					
Gary .....	2.05c	<b>Cold Rolled No. 10</b>						Bars .....	
Chicago, delivered..	2.08c	Pittsburgh .....	2.60c	Plates .....					
Detroit, del. ....	2.15c	Gary .....	2.70c					Sheets .....	
New York, del. ....	2.30c	Detroit, delivered....	2.80c	Hot strip .....					
Philadelphia, del....	2.26c	Philadelphia, del....	2.91c					Cold strip .....	
Birmingham .....	2.26c	New York, del. ....	2.95c	Straight Chromes					
St. Louis, del. ....	2.10c	Pacific ports, f.o.b. cars, dock .....	3.20c					No. No. No.	
Pacific ports, f.o.b. cars, dock .....	2.28c	<b>Cold Rolled No. 20</b>		No. 410 No. 430 No. 442 No. 446					
Hot Rolled Annealed No. 24		Pittsburgh .....	3.05c					Bars .....	
Pittsburgh .....	2.50c	Gary .....	3.15c	Plates .....					
Gary .....	2.60c	Detroit, delivered....	3.25c					Sheets .....	
Chicago, delivered....	2.63c	Philadelphia, del....	3.36c	Hot strip .....					
Detroit, delivered....	2.70c	New York, del. ....	3.40c					Cold stp. 20.50 22.00 27.00 35.00	
New York, del....	2.85c	<b>Enameling Sheets</b>		Steel Plate					
Philadelphia, del .....	2.81c	Pittsburgh, No. 10..	2.45c					Pittsburgh .....	
Birmingham .....	2.65c	Pittsburgh, No. 20..	3.05c	New York, del. ....					
St. Louis, del .....	2.82c	Gary, No. 10 .....	2.55c					Buffalo, delivered....	
Pacific ports, f.o.b. cars, dock .....	3.15c	Gary, No. 20 .....	3.15c	Chicago or Gary .....					
Galvanized No. 24		<b>Tin and Terne Plate</b>						Cleveland, del. ....	
Pittsburgh .....	3.20c	Gary base, 10 cents higher.		Cleveland, del. ....					
Gary .....	3.30c	Tin plate, coke base (box) Pittsburgh .....	\$5.25					Birmingham .....	
Chicago, delivered..	3.33c	Do., waste-waste..	2.75c	Coatesville, base .....					
Philadelphia, del. ....	3.51c	Do., strips .....	2.50c					Sparrows Pt., base .....	
New York, del. ....	3.55c	Long ternes, No. 24 unassorted, Pitts.	3.50c	Pacific ports, f.o.b. cars, dock .....					
Birmingham .....	3.35c	Do., Gary .....	3.60c					St. Louis, delivered..	
St. Louis, del. ....	3.53c			Pittsburgh .....					
Pacific ports, f.o.b. cars, dock .....	3.80c							Chicago or Gary....	
				Moline, Ill. ....					
								Cleveland .....	
				Buffalo .....					



**Iron**

Terre Haute, Ind...	1.85c
Chicago .....	1.90c
Philadelphia .....	2.16c
Pittsburgh, refined..	2.75-7.50c
<b>Reinforcing</b>	
New billet, straight lengths, quoted by distributors.	
Pittsburgh .....	2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young...	2.10c
Gulf ports .....	2.45c
Pacific coast ports f.o.b. car docks .....	
Philadelphia, del.....	2.26c-2.36c
Rail steel, straight lengths, quoted by distributors	
Pittsburgh .....	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.....	1.95c
Gulf ports .....	2.30c

**Wire Products**

(Prices apply to straight or mixed carloads; less carloads \$4 higher; less carloads fencing \$5 over base column.)

Base Pitts.-Cleve. 100 lb. keg.	2.10c
Stand. wire nails.....	2.10c
Cement c'd nails.....	4.10c
Galv. nails, 15 gage and finer .....	4.60c
do. finer than 15 ga. (Per pound)	
Polished staples.....	2.80c
Galv. fence staples.....	3.05c
Barbed wire, galv....	2.60c
Annealed fence wire	2.65c
Galv. fence wire.....	3.00c
Woven wire fencing (base column, c.l.)	\$58.00
<b>To Manufacturing Trade</b>	
Plain wire, 6-9 ga.	2.40c
Anderson, Ind. (merchant products only) and Chicago up \$1; Duluth up \$2; Birmingham up \$3.	
Spring wire, Pitts. or Cleveland .....	3.05c
Do., Chicago up \$1, Worc. \$2.	

**Cold-Finished Carbon Bars and Shafting**

Base, Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs. ....	2.25c
20,000 to 59,999 lbs. ....	2.20c
60,000 to 99,999 lbs. ....	2.15c
100,000 lbs. and over.....	2.12½c
Gary, Ind., Cleve., Chi., up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.	

**Alloy Steel Bars (Hot)**

(Base, 3 to 25 tons.)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem .....	2.55c
<b>Alloy</b>	
S.A.E. Diff. S.A.E. Diff.	
2000.....0.25	3100.....0.55
2100.....0.55	3200.....1.35
2300.....1.50	3300.....3.80
2500.....2.25	3400.....3.20
4100 0.15 to 0.25 Mo. ....	0.50
4600 0.20 to 0.30 Mo. 1.25-1.75 Ni. ....	1.05
5100 0.80-1.10 Cr. ....	0.45
5100 Cr. spring .....	base
6100 bars .....	1.20
6100 spring .....	0.70
Cr., Ni., Van. ....	1.50
Carbon Van. ....	0.95
9200 spring flats .....	base
9200 spring rounds, squares .....	0.25

**Piling**

Pittsburgh .....	2.25c
Chicago, Buffalo .....	2.35c

**Strip and Hoops**

(Base, hot rolled, 25-1 ton)  
(Base, cold-rolled, 25-3 tons)

Hot strip to 23½-in.	
Pittsburgh .....	1.95c
Chicago or Gary..	2.05c
Birmingham base	2.00c
Detroit, del. ....	2.15c
Philadelphia, del.	2.26c
New York, del....	2.30c
<b>Cooperage hoop.</b>	
Pittsburgh .....	2.05c
Chicago .....	2.15c
<b>Cold strip, 0.25 carbon and under.</b>	
Pitts., Cleveland..	2.60c
Detroit, del. ....	2.81c
Worcester, Mass.	2.80c
Cleveland	
Worcester, Mass.	
Carbon	
0.26-0.50....	2.60c
0.51-0.75....	3.45c
0.76-1.00....	4.95c
Over 1.00....	6.50c
6.70c	

**Rails, Track Material**

(Gross Tons)

Standard rails, mill	\$36.37½
Relay rails, Pitts.	
20-100 lbs. ....	25.50-28.00
Light rails, billet qual. Pitts., Chi....	\$35.00
Do., reroll. qual....	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel.....	2.10c
Spikes, R. R. base..	2.60c
Track bolts, base....	3.60c
Tie plates, base.....	1.90c
Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up \$2; 16 and 20 lbs., up \$1; 12 lbs. up \$2; 8 and 10 lbs., up \$5. 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:

<b>Carriage and Machine</b>	
½ x 6 and smaller.....	70-10 off
Do. larger .....	70-5 off
Tire bolts .....	50 off
<b>Plow Bolts</b>	
All sizes .....	70-5 off
<b>Stove Bolts</b>	
In packages with nuts attached 75 off; in packages with nuts separate 75-5 off; in bulk 82½ off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.	
Step bolts .....	65 off
Elevator bolts .....	65 off
<b>Nuts</b>	
S. A. E. semifinished hex.:	
½ to ¾-inch.....	60-20-15 off
Do., ½ to 1-inch.....	60-20-15 off
Do., over 1-inch.....	60-20-15 off
<b>Hexagon Cap Screws</b>	
Milled .....	80-10-10 off
Upset, 1-in., smaller .....	85 off
<b>Square Head Set Screws</b>	
Upset, 1-in., smaller.....	75-10 off
Headless set screws .....	75 off

**Rivets, Wrought Washers**

Struc., c. l., Pittsburgh, Cleveland	3.05c
Struc., c. l., Chicago	3.15c
¾-in. and smaller, Pitts., Chi., Cleve. 70 and 5 off	
<b>Wrought washers,</b>	
Pitts., Chi., Phila. to jobbers & large nut, bolt mfrs....	\$3.25 off

**Cut Nails**

Cut nails, Pitts.; (10% discount on size extras)	\$2.75
Do. less carloads, 5 kegs or more, no discount on size extras .....	\$3.05

Do., under 5 kegs; no disc. on size extras..... \$3.20

**Pipe and Tubing**

Base \$200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

**Welded Iron, Steel Pipe**

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ points less. Wrought pipe, Pittsburgh.

<b>Butt Weld Steel</b>	
In.	Blk. Galv.
¼ and ¾.....	60 44½
½.....	64½ 55
¾.....	67½ 59
1-3.....	69½ 61½
<b>Iron</b>	
½.....	31½ 15
¾.....	36½ 20½
1-1¼.....	39½ 25½
2.....	41½ 26
<b>Lap Weld Steel</b>	
2.....	62 53½
2½-3.....	65 56½
3½-6.....	67 58½
7 and 8.....	66 56½
9 and 10.....	65½ 56
<b>Iron</b>	
2.....	37 22½
2½-3½.....	38 25
4-8.....	40 28½
<b>Line Pipe Steel</b>	
¼, butt weld.....	56
¼ and ¾, butt weld.....	59
½, butt weld .....	63½
¾, butt weld .....	66½
1 to 3, butt weld .....	68½
2, lap weld .....	61
2½ to 3, lap weld.....	64
3½ to 6, lap weld.....	66
7 and 8, lap weld.....	65
<b>Iron</b>	
¼-1½ inch, black and galv. take 4 pts. over; 2½-6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8-12-inch, no extra.	

<b>Boiler Tubes</b>	
C. L. Discounts, f.o.b. Pitts.	
<b>Lap Weld Charcoal Iron</b>	
2-2¼.....	33 1¼..... 8
2½-2¾.....	40 2-2¼.....13
3.....	47 2½-2¾.....16
3¼-3½.....	50 3.....17
4.....	52 3¼-3½.....18
4½-5.....	42 4.....20
	4½.....21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%.

Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 points under base.

**Seamless Boiler Tubes**

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound. Less-carloads revised as of July 1, 1935, card.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

**Seamless Tubing**

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs. ....	32%
15,000 ft. or 22,500 lbs. ....	70%

**Cast Iron Water Pipe**

Class B Pipe—Per Net Ton

6-in. & over, Birm. \$39.00-40.00	
4-in., Birmingham.....	42.00-43.00
4-in., Chicago .....	50.40-51.40
6 to 24-in. Chicago..	47.40-48.40
6-in. & over, east. fdy.	43.00
Do., 4-in. ....	46.00
Class A pipe \$3 over Class B	
Std. ftgs., Birm. base..	\$100.00

**Semifinished Steel**

**Billets and Blooms**

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., Buffalo & Young.....	\$30.00
Philadelphia .....	36.67
Duluth .....	32.00
<b>Forging Billets</b>	
6 x 6 to 9 x 9-in., base	
Pitts., Chi., Buff.....	37.00
Forging, Duluth .....	39.00
<b>Sheet Bars</b>	
Pitts., Cleve., Young, Chi., Buff., Canton, Sparrows Pt.	30.00
<b>Slabs</b>	
Pitts., Chi., Cleve., Young .....	30.00
<b>Wire Rods</b>	
Pitts., Cleve., No. 4 to 5 .....	\$38.00
Do., No. 5 to ½-inch .....	40.00
Do., over ½ to ¾-inch .....	42.00
Chicago up \$1; Worcester up \$2	
<b>Skelp</b>	
Pitts., Chi., Young, Buff., Coatesville, Sparrows Point....	1.89c

**Coke**

**Price Per Net Ton**

**Beehive Ovens**

Connellsville, fur....	\$3.50-3.65
Connellsville, fdry....	4.25-4.35
Connel, prem. fdry.	5.35-5.50
New River fdry.....	6.00
Wise county fdry....	4.45-5.00
Wise county fur....	4.00-4.50
<b>By-Product Foundry</b>	
Newark, N. J., del.	9.70-10.15
Chi. ov., outside del.	5.00
Chicago, del. ....	9.75
New England, del....	11.50
St. Louis, del. ....	10.00-10.50
Birmingham, ovens	6.50
Indianapolis, del. ....	9.40
Cincinnati, del. ....	9.50
Cleveland, del. ....	9.75
Buffalo, ovens .....	7.50-8.00
Detroit, ov., out. del.	9.00
Philadelphia, del. ....	9.38

**Coke By-Products**

Per gallon, producers' plants.

<b>Tank lots</b>	
Pure and 90% benzol....	18.00c
Toluol .....	30.00c
Solvent naphtha .....	30.00c
Industrial xylol .....	30.00c
Per lb. f.o.b. Frankford.	
Phenol (200 lb. drums)...	15.50c
Do. (450 lbs.) .....	14.50c
Eastern Plants, per lb.	
Naphthalene flakes and balls, in bbls., to jobbers	7.25c
Per 100 lbs. Atlantic seaboard	
Sulphate of ammonia.....	\$1.25
†Western prices, ½-cent up.	



## 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 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	\$20.50	\$21.00	\$20.00	\$21.50
Birdsboro, Pa.	20.50	21.00	20.00	21.50
Birmingham, Ala., southern del.	15.50	15.50	14.50	21.00
Buffalo	19.50	20.00	18.50	20.50
Chicago	19.50	19.50	19.00	20.00
Cleveland	19.50	19.50	19.00	20.00
Detroit	19.50	19.50	19.00	20.00
Duluth	20.00	20.00	.....	20.50
Erie, Pa.	19.50	20.00	19.00	20.50
Everett, Mass.	20.50	21.00	20.00	21.50
Hamilton, O.	19.50	19.50	19.00	.....
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	19.50	19.50	19.00	20.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	19.50	19.50	19.00	20.00
Sparrows Point, Md.	20.50	.....	20.00	.....
Swedeland, Pa.	20.50	21.00	20.00	21.50
Toledo, O.	19.50	19.50	19.00	20.00
Youngstown, O.	19.50	19.50	19.00	20.00

### Delivered from Basing Points:

Akron, O., from Cleveland	20.76	20.76	26.26	21.26
Baltimore from Birmingham	21.08	.....	19.96	.....
Boston from Birmingham	20.62	.....	20.50	.....
Boston from Everett, Mass.	21.00	21.50	20.50	22.00
Boston from Buffalo	21.00	21.50	20.50	22.00
Brooklyn, N. Y., from Bethlehem	22.93	23.43	.....	.....
Brooklyn, N. Y., from Bmghm.	22.50	.....	.....	.....
Canton, O., from Cleveland	20.76	20.76	20.26	21.26
Chicago from Birmingham	19.72	.....	19.60	.....
Cincinnati from Hamilton, O.	20.58	20.58	20.08	.....
Cincinnati from Birmingham	20.20	.....	19.20	.....
Cleveland from Birmingham	19.62	.....	19.12	.....
Indianapolis from Hamilton, O.	21.93	21.93	21.43	22.43
Mansfield, O., from Toledo, O.	21.26	21.26	20.76	21.76
Milwaukee from Chicago	20.57	20.57	20.27	21.07
Muskegon, Mich., from Chicago	.....	.....	.....	.....
Toledo or Detroit	22.60	22.60	22.10	23.10
Newark, N. J., from Birmingham	21.61	.....	.....	.....
Newark, N. J., from Bethlehem	21.99	22.49	.....	.....
Philadelphia from Birmingham	20.93	.....	20.81	.....
Philadelphia from Swedeland, Pa.	21.31	21.81	20.81	.....
Pittsburgh district from Neville Island	.....	.....	.....	.....
Saginaw, Mich., from Detroit	21.75	21.75	21.25	21.25
St. Louis, northern	20.00	20.00	19.50	.....

Delivered from Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis from Birmingham	19.68	.....	19.50	.....
St. Paul from Duluth	21.94	21.94	.....	22.44

†Over 0.70 phos.  
**Low Phos.**  
 Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., \$24.00, Phila. base, standard and copper bearing, \$25.13.

Gray Forge	Charcoal
Valley furnace	19.00
Pitts. dist. fur.	19.00
Lake Superior fur.	\$22.00
Do., del. Chicago	25.25
Lylees, Tenn.	22.50

**Silvery†**  
 Jackson county, O., base; 6-6.50 per cent \$22.75; 6.51-7—\$23.25; 7-7.50—\$23.75; 7.51-8—\$24.25; 8-8.50—\$24.75; 8.51-9—\$25.25; 9-9.50—\$25.75. 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	timore bases (bags)	\$45.00
Fire Clay Brick	Domestic dead - burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)....	40.00
Super Quality	Domestic dead - burned gr. net ton f.o.b. Chelwelah, Wash. (bulk)...	22.00
Pa., Mo., Ky.	Basic Brick	.....
First Quality	Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	.....
Pa., Ill., Md., Mo., Ky.	Chrome brick	\$45.00
Alabama, Georgia...\$38.00-45.00	Chem. bonded chrome...	45.00
Second Quality	Magnesite brick	65.00
Pa., Ill., Ky., Md., Mo.	Chem. bonded magnesite	55.00
Georgia, Alabama...	Ohio	.....
First quality	First quality	\$40.00
Intermediary	Intermediary	37.00
Second quality	Second quality	28.00
Malleable Bung Brick	Malleable Bung Brick	50.00
All bases	Silica Brick	.....
Pennsylvania	Pennsylvania	\$45.00
Joliet, E. Chicago...	Joliet, E. Chicago...	54.00
Birmingham, Ala.	Birmingham, Ala.	48.00
Ladle Brick (Dry Press)	Ladle Brick (Dry Press)	.....
Pa., O., W. Va., Mo.	Pa., O., W. Va., Mo.	\$24.00
Do., wire cut.	Do., wire cut.	22.00
Magnesite	Magnesite	.....
Imported dead - burned grains, net ton f.o.b. Chester, Pa., and Bal-	Imported dead - burned grains, net ton f.o.b. Chester, Pa., and Bal-	.....

## Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	\$20.50
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	\$18.00
Do., for barge	\$19.00

## Ferroalloys

Dollars, except Ferrochrome	Ferromanganese,
78-82% tidewater, duty paid	75.00
Do., Balti., base...	75.00
Do., del. Pittsb'gh	80.13
Spiegeleisen, 19-20% dom. Palmer-ton, Pa., spot	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight all, cl.	69.50
Do., less carload.	77.00
Do., 75 per cent. Spot, \$5 a ton higher.	126-130.00
Silicomane, 2 1/2 carb. 2% carbon, 90.00; 1%, 100.00	.....
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.30- 1.40
Ferrovandium, 35 to 40% lb., cont.	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
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	Lead	Alumi-	Antimony	Nickel					
	Electro, Lake, del. Conn. Midwest	Casting, Straits Tin New York Spot Futures	Lead East N. Y. St. L.	Zinc num 99% Spot, N. Y.	Chinese Cathodes					
June 27	9.50	9.62 1/2	40.37 1/2	39.70	4.60	4.45	4.85	*19.00	13.00	35.00
June 29	9.50	9.62 1/2	40.50	39.75	4.60	4.45	4.85	*19.00	13.00	35.00
June 30	9.50	9.62 1/2	40.87 1/2	40.15	4.60	4.45	4.85	*19.00	13.00	35.00
July 1	9.50	9.62 1/2	40.60	39.60	4.60	4.45	4.85	*19.00	13.00	35.00
July 2	9.50	9.62 1/2	40.50	39.20	4.60	4.45	4.85	*19.00	13.00	35.00

\*Nominal range 19.00 to 21.00c.

### MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 950c Conn. copper

Yellow brass (high)	15.12 1/2
Copper, hot rolled	17.00
Lead cut to jobbers	8.25
Zinc, 100-lb. base	9.50
High yellow brass	17.37 1/2
Seamless copper	17.50
High yellow brass	13.12 1/2
Copper, hot rolled	13.75
Copper, untrimmed	14.50
Yellow brass (high)	15.37 1/2

### OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	Heavy Copper and Wire	Composition Brass Borings	Light Copper
New York	6.00- 6.25	New York	6.12 1/2- 6.25
Cleveland	6.25- 6.50	Chicago, No. 1	5.75- 6.00
Chicago	5.75- 6.00	Cleveland, No. 1	5.75- 6.00
St. Louis	6.00- 6.25	St. Louis, No. 1	5.50- 6.00
New York, No. 1	7.50- 7.75	New York	.....
Chicago, No. 1	7.12 1/2- 7.37 1/2	Chicago	.....
Cleveland, No. 1	7.00- 7.50	Cleveland	.....
St. Louis, No. 1	7.00- 7.50	St. Louis	.....

### Light Brass

Chicago	3.50- 3.62 1/2
Cleveland	3.25- 3.50
St. Louis	3.25- 3.75
New York	3.50- 3.75
Cleveland	3.50- 3.75
Chicago	3.25- 3.50
St. Louis	3.25- 3.75
New York	2.50- 2.75
Cleveland	2.25- 2.50
St. Louis	2.25- 2.75
Borings, Cleveland	8.00- 8.50
Mixed, cast, Cleve.	11.75-12.00
Mixed, cast, St. L.	12.25-12.75
Clips, soft, Cleve.	13.75-14.00
Brass ingot, 85-5-5-5	9.50
Stand. No. 12 alum.	16.25-17.00

### SECONDARY METALS

Stand. No. 12 alum.	16.25-17.00
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# Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; † indicates brokers prices

<b>HEAVY MELTING STEEL</b>		<b>COUPLERS, SPRINGS</b>		Buffalo	8.50-9.00	Chicago, rolled steel	14.50-15.00
Birmingham	9.00-9.50	Buffalo	14.75-15.25	Cincinnati, dealers..	5.25-5.75	Cincinnati, iron	10.50-11.00
Bos. d'ck. No. 1, exp.	†10.50	Chicago, springs.....	14.50-15.00	Cleveland	8.25-8.75	Eastern Pa., iron	13.50-14.00
N. Eng. del. No. 1..	9.50	Eastern Pa.	16.00-16.50	Detroit	6.50-7.00	Eastern Pa., steel..	16.00-16.50
Buffalo, No. 1	12.00-12.50	Pittsburgh	16.50-17.00	Eastern Pa.	5.75-6.50	Pittsburgh, iron	14.00-14.50
Buffalo, No. 2	11.00-11.50	St. Louis	13.25-13.75	New York	†2.25-2.50	Pittsburgh, steel	16.50-17.00
Chicago, No. 1	13.00-13.50			Pittsburgh	8.00-8.50	St. Louis, iron	11.50-12.00
Cleveland, No. 1	13.00-13.50			Toronto, dealers	4.00	St. Louis, steel	13.00-13.50
Cleveland, No. 2	12.00-12.50					Toronto, net	8.50
Detroit, No. 1	10.00-10.50	<b>ANGLE BARS—STEEL</b>				<b>NO. 1 CAST SCRAP</b>	
Detroit, No. 2	8.50-9.00	Chicago	14.00-14.50	<b>CAST IRON BORINGS</b>		Birmingham	10.50-11.50
Eastern Pa., No. 1..	12.00	St. Louis	12.75-13.25	Birmingham, plain..	4.00-5.00	Bos. dist. No. 1 mach.	†8.75-9.00
Eastern Pa., No. 2..	11.50	Buffalo	14.50-15.00	Boston dist. chem..	†6.00-6.25	N. Eng., del. No. 2..	9.50-10.00
Federal, Ill.	10.75-11.25			Boston dist. for mills	†3.50-4.00	N. Eng. del. textile..	11.00-11.50
Granite City, R. R..	12.25-12.75	<b>RAILROAD SPECIALTIES</b>		Buffalo	8.00-8.50	Buffalo, cupola	11.50-12.00
Granite City, No. 2..	9.00-9.50	Chicago	14.50-15.00	Chicago, dealers	6.00-6.25	Buffalo, mach.	12.50-13.00
New York, No. 2	†7.25-7.75			Cincinnati, dealers..	5.00-5.50	Chicago, agri. net...	10.00-10.50
N. Y. d'ck. No. 1, exp.	†10.00	<b>LOW PHOSPHORUS</b>		Cleveland	8.25-8.75	Chicago, auto	11.00-11.50
Pitts., No. 1 (dlr.)	14.25-14.75	Buffalo, billet and bloom crops	14.75-15.25	Detroit	6.50-7.00	Chicago, mach. net..	12.00-12.50
Pitts., No. 1 (dlr.)	13.75-14.25	Cleveland, billet, bloom crops	17.50-18.00	E. Pa., chemical....	10.00-13.00	Chicago, rail'd net..	11.00-11.50
Pittsburgh, No. 2..	12.75-13.25	Eastern Pa., crops..	16.50	New York	†4.25-4.50	Cinci., mach. cup....	10.75-11.25
St. Louis	11.00-11.50	Pittsburgh, billet, bloom crops	17.25-17.75	St. Louis	4.00-4.50	Cleveland, mach....	15.25-15.75
Toronto, dealers	7.50	Pittsburgh, sheet bar crops	15.50-16.00	Toronto, dealers....	5.00	Eastern Pa., cupola	14.00-14.50
Valleys, No. 1	13.50-14.00					E. Pa., mixed yard..	11.00-11.50
		<b>FROGS, SWITCHES</b>		<b>PIPE AND FLUES</b>		Pittsburgh, cupola.	15.00-15.50
<b>COMPRESSED SHEETS</b>		Chicago	13.00-13.50	Cincinnati, dealers..	7.75-8.25	San Francisco, del.	13.50-14.00
Buffalo, dealers	11.00-11.50	St. Louis, cut	12.50-13.00	Chicago, net	7.50-8.00	Seattle	10.00-11.00
Chicago, factory	11.50-12.00					St. Louis, No. 1	11.00-11.50
Chicago, dealer	11.00-11.50	<b>SHOVELING STEEL</b>		<b>RAILROAD GRATE BARS</b>		St. L., No. 1 mach.	11.50-12.00
Cleveland	12.75-13.25	Chicago	13.00-13.50	Buffalo	10.50-11.00	Toronto, No. 1, mach., net	9.00
Detroit	10.50-11.00	Federal, Ill.	10.50-11.00	Chicago, net	8.25-8.75		
E. Pa., new mat....	11.50	Granite City, Ill.	10.00-10.50	Cincinnati	7.00-7.50		
Pittsburgh	13.75-14.25	Toronto, dealers	6.50	Eastern Pa.	10.00-10.50		
St. Louis	7.75-8.25			New York	†6.00-6.25		
Valleys, No. 1	13.00-13.50	<b>RAILROAD WROUGHT</b>		St. Louis	7.50-8.00		
		Birmingham	7.50-8.00			<b>FORGE FLASHINGS</b>	
<b>BUNDLED SHEETS</b>		Boston district	†7.25-7.50	Boston district	†6.25-6.50	Buffalo	11.00-11.50
Buffalo	10.00-10.50	Buffalo, No. 1	11.00-11.50	Buffalo	11.00-11.50	Cleveland	11.50-12.00
Cincinnati, del	7.75-8.25	Buffalo, No. 2	12.50-13.00	Detroit	9.00-9.50	Detroit, No. 1 mach. net	13.00-13.50
Cleveland	9.00-9.50	Chicago, No. 1, net..	12.50-13.00	Pittsburgh	12.75-13.25	Detroit, break.	11.00-11.50
Pittsburgh	12.75-13.25	Chicago, No. 2	13.00-13.50			Detroit, auto net...	11.00-11.50
St. Louis	6.25-6.75	Cincinnati, No. 2...	10.00-10.50			Eastern Pa.	13.50
Toronto, dealers	4.50	Eastern Pa.	13.50-14.00	<b>FORGE SCRAP</b>		N. Y. breakable.....	9.00-9.25
		St. Louis, No. 1	10.25-10.75	Boston district	†5.50-6.00	Pittsburgh	12.50-13.00
<b>SHEET CLIPPINGS, LOOSE</b>		St. Louis, No. 2	11.75-12.25	Chicago, heavy	14.00-14.50		
Chicago	8.00-8.50	Toronto, No. 1, dlr.	7.00	Eastern Pa.	12.00-12.50	<b>MALLEABLE</b>	
Cincinnati	5.75-6.25					Birmingham, R. R..	11.50-12.50
Detroit	7.00-7.50	<b>SPECIFICATION PIPE</b>		<b>ARCH BARS, TRANSOMS</b>		New England del....	15.00-16.00
St. Louis	5.50-6.00	Eastern Pa.	12.00-12.50	St. Louis	13.50-14.00	Buffalo	15.50-16.00
		New York, brokers..	7.75-8.25			Chicago, R. R.	15.50-16.00
<b>STEEL RAILS, SHORT</b>				<b>AXLE TURNINGS</b>		Cincinnati, agri. del.	12.50-13.00
Birmingham	12.00-12.50	<b>BUSHELING</b>		Boston district	†5.75-6.00	Cleveland, rail	16.25-16.75
Buffalo	15.50-16.00	Buffalo, No. 1	11.00-11.50	Buffalo	11.00-11.50	Detroit, auto, net...	14.50-15.00
Chicago (3 ft.)	15.00-15.50	Chicago, No. 1	11.50-12.00	Chicago, elec. fur...	12.75-13.25	Eastern Pa., R. R..	16.00-16.50
Chicago (2 ft.)	15.50-16.00	Cincl., No. 1, deal...	8.50-9.00	Eastern Pa.	11.00-12.00	Pittsburgh, rail...	17.00-17.50
Cincinnati, del.	14.00-14.50	Cincinnati, No. 2	4.50-5.00	St. Louis	9.00-9.50	St. Louis, R. R.	13.00-13.50
Detroit	14.50-15.00	Cleveland, No. 2	8.25-8.75	Toronto	4.50	Toronto, net	7.00
Pitts., open-hearth,		Detroit No. 1, new..	9.50-10.00				
3 ft. and less	15.75-16.25	Valleys, new, No. 1	12.75-13.00	<b>STEEL CAR AXLES</b>		<b>RAILS FOR ROLLING</b>	
St. Louis, 2 ft. & less	15.25-15.75	Toronto, dealers	6.00	Birmingham	11.50-12.50	5 feet and over	
				Boston district	†11.00-11.25	Birmingham	11.50-12.50
<b>STEEL RAILS, SCRAP</b>		<b>MACHINE TURNINGS</b>		Buffalo	15.50-16.00	Boston district	†9.00-9.50
Boston district	†7.50-8.00	Birmingham	5.00-6.00	Chicago, net	15.00-15.50	Buffalo	12.50-13.00
Chicago	13.00-13.50	Boston district	†3.00-3.25	Eastern Pa.	17.00	Chicago	13.75-14.25
Pittsburgh	14.25-14.75	Buffalo	6.50-7.00	St. Louis	13.00-13.50	Eastern Pa.	15.00-15.50
St. Louis	12.50-13.00	Chicago	6.00-6.50	Toronto	8.50	New York	†9.50-10.00
Buffalo	12.50-13.00	Cincinnati, dealers..	5.75-6.25			St. Louis	14.25-14.75
Toronto, dealers	8.50	Cleveland	7.50-8.00	<b>SHAFTING</b>			
		Detroit	5.75-6.25	Boston district	†13.25-13.50	<b>LOCOMOTIVE TIRES</b>	
<b>STOVE PLATE</b>		Eastern Pa.	7.50	Eastern Pa.	18.50	Chicago (cut)	14.50-15.00
Birmingham	7.00-7.50	New York	†3.50-3.75	New York, brokers..	14.00-14.50	St. Louis, No. 1	12.00-12.50
Boston district	†4.75-5.00	Pittsburgh	9.50-10.00	St. Louis	13.50-14.00		
Buffalo	10.00-10.50	St. Louis	4.00-4.50			<b>LOW PHOS. PUNCHINGS</b>	
Chicago	7.50-8.00	Toronto, dealers	4.00	<b>CAR WHEELS</b>		Buffalo	14.75-15.25
Cincinnati, dealers..	7.75-8.50	Valleys	9.50-9.75	Birmingham	11.00-11.50	Chicago	15.00-15.50
Detroit, net	9.00-9.50			Boston dist. iron....	†7.75-8.00	Eastern Pa.	16.00-16.50
Eastern Pa.	10.50	<b>BORINGS AND TURNINGS</b>		Buffalo, iron	13.50-14.00	Pittsburgh (heavy)	17.00-17.50
New York, fdry....	†7.00-7.25	For Blast Furnace Use		Buffalo, steel	15.50-16.00	Pittsburgh (light)..	16.00-16.50
St. Louis	7.50-8.00	Boston district	†2.00	Chicago, iron	13.25-13.75		
Toronto, dealers, net	5.50						

<b>Iron Ore</b>	Eastern Local Ore	iron, 6-10% man.	10.50	<b>Manganese Ore</b>
Lake Superior Ore	Cents, unit, del. E. Pa.	No. Afr. low phos.	10.50	(Nominal)
Gross ton, 51½%	Foundry and basic	Swedish basic, 65%	9.50	Prices not including duty.
Lower Lake Ports	56-63% con. (nom.)	Swedish low phos..	10.50	cents per unit cargo lots
Old range bessemer	Cop.-free low phos.	Spanish No. Africa		
Mesabi nonbess.	58-60% (nom.)	basic, 50 to 60%	10.50	
High phosphorus	Foreign Ore	Tungsten, spot sh.		
Mesabi bessemer	Cents per unit, f.a.s. Atlantic	ton unit, duty pd..	\$15.85-16.90	
Old range nonbess.	ports (nominal)	N. F. fdy., 55%.....	7.00	Caucasian, 50-52% .....
	Foreign manganiferous ore, 45.55%	Chrome ore, 48%		So. African, 50-52% .....
		gross ton, c.i.f.....	19.25	Indian, 50-52% .....
				28.00
				28.00
				28.00



# Warehouse Iron and Steel Prices

*Cents per pound for delivery within metropolitan districts of cities specified*

<b>STEEL BARS</b>	Cincinnati .....	3.25c	Buffalo .....	3.37c	Pittsburgh (h) .....	3.05c	St. Louis.....	3.55c
Baltimore*.....	Houston .....	3.25c	Chattanooga..	3.56c	San Francisco .....	3.35c	St. Paul .....	3.65c
Boston†.....	Los Angl., cl..	2.45c	Chicago .....	3.30c	Seattle .....	3.70c	<b>COLD FIN. STEEL</b>	
Buffalo .....	New Orleans ..	3.50c	Cincinnati .....	3.52c	St. Louis.....	3.45c	Baltimore (c) ..	3.88c
Chattanooga..	Pitts., plain (h)	3.05c	Cleveland, ¼-		St. Paul .....	3.40c	Boston .....	3.90c
Chicago (J)....	Pitts., twisted		in. and over	3.31c	Tulsa .....	3.70c	Buffalo (h)....	3.55c
Cincinnati .....	squares (h) ..	3.175c	Detroit .....	3.52c	<b>NO. 24 BLACK</b>		Chattanooga*	4.13c
Cleveland .....	San Francisco	2.45c	Detroit, ¾-in.	3.85c	Baltimore*†....	3.70c	Chicago (h)....	3.65c
Detroit .....	Seattle .....	2.45c	Houston .....	3.00c	Boston (g)....	3.95c	Cincinnati .....	3.87c
Houston .....	St. Louis.....	3.25c	Los Angeles..	3.60c	Buffalo .....	3.25c	Cleveland (h) ..	3.50c
Los Angeles..	Tulsa .....	3.25c	Milwaukee .....	3.41c	Chattanooga..	4.16c	Detroit .....	3.79c
Milwaukee 3.21c-3.36c	Young.....	2.30c-2.60c	New Orleans ..	3.55c	Chicago .....	3.95c	Los Ang. (f) (d)	5.85c
New Orleans..	<b>SHAPES</b>		New York†(d)	3.40c	Cincinnati .....	4.12c	Milwaukee .....	3.76c
New York†(d)	Baltimore*....	3.10c	Philadelphia*	3.10c	Cleveland .....	3.91c	New Orleans*	4.30c
Pitts. (h)....	Boston† .....	3.29c	Phila. floor....	4.95c	Detroit .....	4.04c	New York†(d)	3.96c
Philadelphia*	Buffalo .....	3.25c	Pittsburgh (h)	3.25c	Los Angeles..	4.35c	Philadelphia*	3.91c
Portland .....	Chattanooga..	3.56c	Portland .....	3.35c	Milwaukee .....	4.06c	Pittsburgh .....	3.50c
San Francisco	Chicago .....	3.30c	San Francisco	3.25c	New Orleans ..	4.50c	Portland (f) (d)	6.15c
Seattle .....	Cincinnati .....	3.52c	Seattle .....	3.55c	New York†(d)	3.89c	San Fran. (f) (d)	5.95c
St. Louis.....	Cleveland .....	3.31c	St. Louis.....	3.45c	Philadelphia*†	3.75c	Seattle (f) (d)	6.15c
St. Paul.....	Detroit .....	3.52c	St. Paul .....	3.55c	Pitts.** (h) 3.55c-4.85c		St. Louis.....	3.75c
Tulsa .....	Houston .....	3.00c	Tulsa .....	3.50c	Portland .....	4.10c	St. Paul .....	4.17c
<b>IRON BARS</b>	Los Angeles..	3.60c	<b>NO. 10 BLUE</b>		San Francisco	4.00c	Tulsa .....	4.65c
Portland .....	Milwaukee .....	3.41c	Baltimore*....	3.10c	Seattle .....	4.40c	<b>COLD ROLLED STRIP</b>	
Chattanooga ..	New Orleans ..	3.55c	Boston† .....	3.40c	St. Louis.....	4.10c	Boston, 0.100-	
Baltimore*....	New York†(d)	3.37c	Buffalo .....	3.62c	St. Paul .....	4.00c	in., 500 lb. lots	3.395c
Chicago .....	Philadelphia*	3.10c	Chattanooga..	3.36c	Tulsa .....	4.75c	Buffalo .....	3.39c
Cincinnati .....	Pittsburgh (h)	3.25c	Chicago .....	3.15c	<b>NO. 24 GALV. SHEETS</b>		Chicago .....	3.27c
New York†(d)	Portland (l)....	3.50c	Cincinnati .....	3.32c	Baltimore*†....	3.90c	Cincinnati (b)	3.22c
Philadelphia*	San Francisco	3.25c	Cleveland .....	3.11c	Buffalo .....	4.00c	Cleveland (b)	3.00c
St. Louis.....	Seattle (l).....	3.70c	Det. 8-10 ga.	3.21c	Boston (g)....	4.00c	Detroit .....	3.18c
Tulsa .....	St. Louis.....	3.45c	Houston .....	3.35c	Chattanooga..	4.86c	New York†(d)	3.36c
<b>REINFORCING BARS</b>	St. Paul .....	3.55c	Los Angeles..	3.75c	Chicago (h)....	4.65c	St. Louis.....	3.45c
Buffalo .....	Tulsa .....	3.50c	Milwaukee .....	3.26c	Cincinnati .....	4.82c	<b>TOOL STEELS</b>	
Chattanooga..	<b>PLATES</b>		New Orleans ..	3.55c	Cleveland .....	4.61c	(Applying on or east of	
Chicago.....	Baltimore*....	3.10c	New York†(d)	3.31c	Detroit .....	4.82c	Mississippi river; west	
Cleveland (c)	Boston† .....	3.31c	Portland .....	3.35c	Houston .....	4.40c	of Mississippi 1c up)	
			Philadelphia*	3.20c	Los Angeles..	4.40c	Base	

## Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, July 1

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons		Continental Channel or North Sea ports, metric tons	
	l. K. ports	£ s d	Quoted in dollars at current value	**Quoted in gold pounds sterling
<b>PIG IRON</b>				
Foundry, 2.50-3.00 Silicon	\$15.69	3 2 6*	\$13.86	1 15 0
Basic bessemer.....	15.69	3 2 6*	11.89	1 10 0
Hematite, Phos. .03-.05..	17.82	3 11 0	.....	.....
<b>SEMIFINISHED STEEL</b>				
Billets.....	\$29.49	5 17 6	\$18.61	2 7 0
Wire rods, No. 5 gage....	44.93	8 19 0	35.65	4 10 0
<b>FINISHED STEEL</b>				
Standard rails.....	\$41.42	8 5 0	\$43.57	5 10 0
Merchant bars.....	1.74c	7 15 0	1.12c to 1.16c	3 2 6 to 3 5 0
Structural shapes.....	1.68c	7 10 0	1.11c	3 1 6
Plates, ½ in. or 5 mm....	1.81c	8 1 3	1.53c	4 5 0
Sheets, black, 24 gage or 0.5 mm.....	2.18c	9 15 0	2.08c	5 16 0††
Sheets, gal., 24 gage, corr.	2.63c	11 15 0	2.15c	6 0 0
Bands and strips.....	1.96c	8 15 0	1.43c	6 0 0
Plain wire, base.....	2.18c	9 15 0	1.89c	4 0 0
Galvanized wire, base....	2.58c	11 10 0	2.10c	5 5 0
Wire nails, base.....	2.69c	12 0 0	1.71c	5 17 6
Tin plate, box 108 lbs....	\$ 4.71	0 18 9	.....	4 15 0

British ferromanganese \$75 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d \$43.74 f.o.b.

### Domestic Prices at Works or Furnace—Last Reported

	£ s d	French France	Belgian France	Reich Marks
Fdy. pig iron, Si. 2.5.....	\$17.57	3 10 0(a)	\$17.16	260 \$13.87
Basic bessemer pig iron...	18.20	3 12 6(a)	12.54	190 11.84
Furnace coke.....	5.65	1 2 6	6.27	95 4.13
Billets.....	29.49	5 17 6	28.38	430 13.77
Standard rails.....	1.85c	8 5 0	2.30c	671 1.53c
Merchant bars.....	2.03c	9 1 0	1.67c	560 .99c
Structural shapes.....	1.96c	8 15 0	1.64c	550 .99c
Plates, ½ in. or 5 mm....	2.03c	9 1 3	2.09c	700 1.22c
Sheets, black.....	2.58c	11 10 0	1.78c	600† 1.35c
Sheets, galv., corr., 24 ga. or 0.5 mm.....	3.02c	13 10 0	2.84c	950 2.30c
Plain wire.....	2.18c	9 15 0	2.84c	950 1.76c
Bands and strips.....	2.20c	9 16 0	1.98c	650 1.22c

\*Basic. †British ship-plates. Continental, bridge plates, \$24 ga. †1 to 3 mm. basic price. ††Close annealed. †††Middlebrough. b hematite. †††Close annealed. \*\*Gold pound sterling carries a premium of 62.75 per cent over paper sterling.

Baltimore*....	3.30c	<b>BANDS</b>	
Boston† .....	3.40c	Baltimore*....	3.30c
Buffalo .....	3.42c	Boston† .....	3.40c
Chattanooga..	3.61c	Buffalo .....	3.42c
Chicago .....	3.40c	Chattanooga..	3.61c
Cincinnati .....	3.57c	Chicago .....	3.40c
Cleveland .....	3.36c	Cincinnati .....	3.57c
Detroit, ¾-in. and lighter	3.49c	Cleveland .....	3.36c
Houston .....	3.25c	Detroit, ¾-in. and lighter	3.49c
Los Angeles..	4.10c	Houston .....	3.25c
Milwaukee .....	3.51c	Los Angeles..	4.10c
New Orleans ..	3.95c	Milwaukee .....	3.51c
New York†(d)	3.56c	New Orleans ..	3.95c
Philadelphia*	3.30c	New York†(d)	3.56c
Pittsburgh (h)	3.30c	Philadelphia*	3.30c
Portland .....	4.26c	Pittsburgh (h)	3.30c
San Francisco	4.10c	Portland .....	4.26c
Seattle .....	4.25c	San Francisco	4.10c
St. Louis.....	3.55c	Seattle .....	4.25c
St. Paul .....	3.65c	St. Louis.....	3.55c
Tulsa .....	3.45c	St. Paul .....	3.65c
		Tulsa .....	3.45c
<b>HOOPS</b>		<b>HOOPS</b>	
Baltimore .....	2.30c	Baltimore .....	2.30c
Boston† .....	4.40c	Boston† .....	4.40c
Buffalo .....	3.42c	Buffalo .....	3.42c
Chicago .....	3.40c	Chicago .....	3.40c
Cincinnati .....	3.57c	Cincinnati .....	3.57c
Det., No. 14 and lighter	3.49c	Det., No. 14 and lighter	3.49c
Los Angeles..	5.85c	Los Angeles..	5.85c
Milwaukee .....	3.51c	Milwaukee .....	3.51c
New York†(d)	3.56c	New York†(d)	3.56c
Philadelphia*	3.55c	Philadelphia*	3.55c
Pittsburgh (h)	3.80c	Pittsburgh (h)	3.80c
Portland .....	5.60c	Portland .....	5.60c
San Francisco	6.15c	San Francisco	6.15c
Seattle .....	5.60c	Seattle .....	5.60c

(Applying on or east of Mississippi river; west of Mississippi 1c up) Base High speed .....57c High carbon, high chrome .....37c Oil hardening .....22c Special tool .....20c Extra tool .....17c Regular tool .....14c Uniform extras apply. **BOLTS AND NUTS** (100 pounds or over) Discount Chicago (a) .....65 Cleveland .....70 Detroit .....70 Milwaukee .....70 Pittsburgh .....65-5 (a) Under 100 pounds, 60 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, 3.25c †Domestic steel; \*Plus quan. extras; \*\*Under 25 bundles; ††50 or more bundles; ††New extras apply; ††Base 40,000 lbs. extras on less. Prices on heavier lines are subject to new quantity differentials; 399 lbs. and less, up 50 cts.; 400 to 3999 lbs., base; 4000 to 7999 lbs., 15 cts., under; 8000 to 14,999 lbs., 25 cts., under; 15,000 to 39,999 lbs., 35 cts., under; 40,000 lbs. and over, 50 cts., under base.



# Bars

Bar Prices, Page 78

**Pittsburgh**—Certain minor test has been given to the new 1.95c, Pittsburgh, market on merchant steel bars by small sales over the latter part of last week. These have affected consumers who had not placed orders prior to June 30 for shipment at the former 1.85c market. In the meantime, bar shipments are scheduled for a good showing in July, but apparently this will take care of only the normal requirements of consumers as there have been few instances of speculative stocking. The alloy bar market is now quoted 2.55c and is awaiting expected automotive participation in some tonnage for 1937 models.

**Cleveland**—Backlogs are heavy, but in most cases they will be off the books by Aug. 1. Auto part-makers and farm equipment manufacturer's purchases are expected to remain quiet for the next 30 days. June tonnage is reported by some mills to be the best since 1930. Specifications of road-making equipment, and nut and bolt manufacturers are strong. Second quarter books were closed a week in advance to permit a leeway for early shipments on orders placed at the advance prices.

**Chicago**—Bar sales have dropped sharply since the opening of the new quarter and application of higher prices. Producers will be able to continue heavy production through most of July, however. Warehouses and cold-bar finishers were active before the end of June in bar purchases, though most consumers have entered fairly liberal specifications for early shipment. Some farm implement plants have closed for inventory but average operations are at a good level for this period, while tractor builders in most cases still are running at capacity. Bars now are quoted 2.00c for billet material, 1.85c for rail steel and 1.85c, Terre Haute, Ind., and 1.90c, Chicago, for bar iron.

**New York**—Following active buying of commercial and hot alloy bars on which a \$2 advance became effective July 1, contracting has been much slower. However, mills are well booked ahead.

**Philadelphia**—Eastern bar sellers are obligated further ahead than at any time in many months, with closing days of June witnessing substantial miscellaneous buying against impending third quarter price advance of \$2 per ton on commercial and hot alloy bars and \$3 on cold-finished bars.

**Seattle**—In line with advances at eastern centers, local steel mills an-

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● 20 footcandles or more of light are recommended for the close seeing tasks performed by executives and office workers. Prolonged visual work in poor or inadequate lighting often causes eyestrain and wastes energy. Use the G-E Light Meter to guard against these dangers.

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nounce an increase in merchant bars beginning July 1 from 2.35c to 2.40c. In anticipation of this change, jobbing houses have been replenishing stocks and the movement of merchant bars has been heavy this month.

### Quicksilver

New York—Small lots of quicksilver are quoted at \$74 to \$74.50. The market is dull and easy. Round lots of 100 flasks are available at \$73.50.

## Plates

Plate Prices, Page 78

Pittsburgh—Barge shops are entering the summer with a substantial backlog, although new orders for barges have been fewer the last few weeks. Possibility of one attractive order developing before Aug. 1 is reported. Widespread scarcity of coal and general freight barges is still apparent. Dravo Contracting Co. has been awarded a contract for

rolled steel wall armor for the Chickamauga dam navigation lock near Chattanooga, Tenn., by the Tennessee Valley Authority on a bid of \$31,000. On all new business producers quote 1.90c, f.o.b. Pittsburgh, but protection against specific jobs has been granted through July at the former 1.80c.

Cleveland—June will be the best month of first half. Little speculative buying has resulted from the price advance. Most mills find difficulty meeting deliveries sought by consumers. Railroad car shop demands are heaviest and are expected to remain a big factor during the next month.

Chicago—Plate shipments are well sustained by active call from structural fabricators, railroads, freight car builders and tank fabricators. Producers have the heaviest backlogs in several years and shipments during the new quarter are expected to be heavier than those of the past three months. Recent orders include material for Chesapeake & Ohio freight cars, with steel for the Southern Pacific cars yet to be ordered.

New York—Due to a heavy influx of orders at the end of June new plate buying has declined materially the past few days. Eastern platemakers are well scheduled for this month and expect further substantial bookings as tonnage is released under the 30-day protection clause for identified work.

Philadelphia—Plate sellers experienced a heavy rush of protective business just before the \$2 advance of July 1. Some had the best business in years and as a substantial tonnage is pending for identified work on which 30-day protection is allowed the decline this month will be cushioned. Plate production in July should be fairly heavy. Purchase of 800 tons of steel, principally plates, is imminent, for conversion of a cargo ship into a tanker for National Bulk Carriers, 630 Fifth avenue, New York. The steel work will be done by Welding Engineer Inc., Lewis Tower building, Philadelphia, at a pier in Norfolk, Va.

San Francisco—Plate bookings during the first six months of the year are over four times the tonnage placed during the same period a year ago. To date 93,995 tons have been booked, compared with only 22,365 tons during the first six months of 1935.

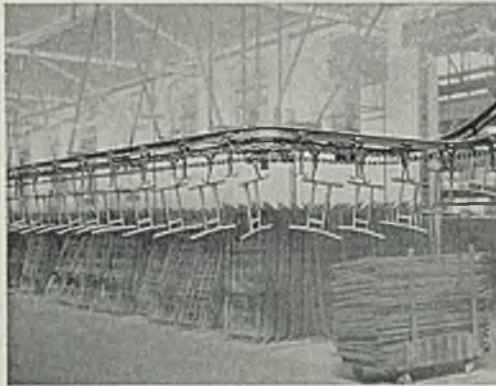
Seattle—Shops are generally busy, some to capacity. A large water pipe job at Everett, Wash., and improvements and expansions in the pulp and paper industry of Washington and Oregon give promise of heavy tonnages during third quarter. Small tank work is active while shipyards are important buyers of plates. General Petroleum Co. opened bids in

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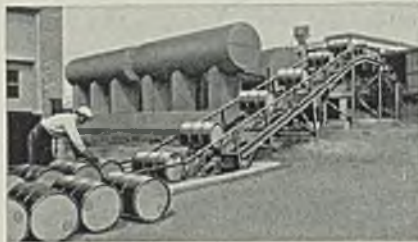
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Link-Belt Conveyor handling gilder parts from paint drying oven to packing room at Bunting Gilder Company, Philadelphia. In addition to saving them a substantial sum in handling costs, they advise that this conveyor has saved about 3,000 sq. ft. of floor space, which was required when this work was done by their old method.



Link-Belt Overhead Conveyor moves the trucks automatically between stock rooms and shipping platform at the new warehouse of the Zellerbach Paper Company, Los Angeles. This system saves valuable floor space, since the conveyor is suspended entirely from the roof trusses.



Heavy steel drums of printing ink are handled easily and efficiently on this Link-Belt conveyor, at the plant of Howard Flint Ink Company, Detroit. Conveyor operates in either direction, permitting it to handle drums to or from railroad car.



Link-Belt makes conveyors of every type for handling all materials. The illustration to left shows a Link-Belt conveyor handling molds in a foundry, and at the right, a conveyor of the belt



type as used for handling loose materials. Industry can reduce costs and increase profits by using Link-Belt conveyors.

# LINK-BELT CONVEYORS



—The Market Week—

Los Angeles this week for three large tanks for the Seattle plant, requiring about 500 tons.

### Contracts Placed

1200 tons, oil storage tanks, Green Bay, Wis., to Graver Tank & Mfg. Corp., East Chicago, Ind.  
 442 tons, siphons No. 1 and No. 2, Vasquez creek tunnels, Denver, Colo., to Thompson Mfg. Co., Denver, Colo.  
 355 tons, two 37,500 and one 15,000-barrel tanks for Valvorne Oil Co., South Portland, Me., to Chicago Bridge & Iron Works, Chicago.  
 175 tons, 110 x 30 x 11-foot tank barge for Patterson Oil Terminals Corp., Philadelphia, to Dravo Contracting Co., Neville Island, Pittsburgh.  
 115 tons, two 12,000-barrel tanks, William C. Atwater Co., Fall River, Mass., to Graver Tank & Mfg. Corp., East Chicago, Ind.  
 120 tons, 225 eight-inch tunnel ribs, Hanning, Calif., to Commercial Shearing & Stamping Co., Pittsburgh.

### Contracts Pending

43,000 tons, floating drydock, Pearl Harbor, T. H.; bids Aug. 19.  
 5000 tons, 10-foot 3-inch welded steel or precast concrete pipe, metropolitan water district, Los Angeles; bids July 30.  
 430 tons, 28 to 44-inch welded steel pipe, contract 107, San Francisco; Union Paving Co., San Francisco low on general contract.  
 100 tons, 30-inch, 10 gage welded pipe, metropolitan water district, Los Angeles; bids opened.

## Sheets

Sheet Prices, Page 78

**Pittsburgh**—In return for favorable delivery promises, some sheet buyers have already paid \$2 a ton higher which went into effect July 1. Sheet producers, however, find themselves with backlogs calculated to run them through the better part of July, made up of balances due on second-quarter orders, so that the market at present is in a transitory state. Due to the absence of opposition by most sheet users toward the \$2 a ton increase, all indications point to a favorable application of the advance.

**Cleveland**—Demand has recently decreased in contrast to the speculative buying of the last few weeks. This condition has been aided by the decline of automobile orders. Backlogs are reported strong with heavy production assured for the first week or two of July. Total tonnage placed during second quarter far outstrips that placed in the similar quarter last year and first quarter of this year.

**Chicago**—Higher prices, representing an advance of \$2 a ton over second quarter levels, now are in effect. Producers generally had closed

second quarter books several days before July 1, though some consumers attempted to place additional tonnage during the last days of June. Backlogs will support a continuation of present brisk operations through most of July. Consumption is holding well among most important users, though a further decrease in automotive requirements is scheduled for the next several weeks.

**Philadelphia**—Some good sheet tonnage has been placed since the first of the new quarter as consumers not only need sheets but are disposed to buy at least moderately at

a precaution against possible labor trouble in steel plants later.

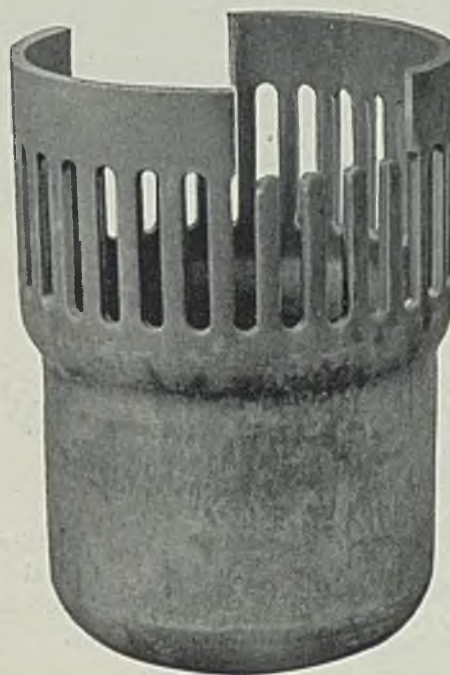
**New York**—While sheet demand is down from the level of a week ago good buying continues with new third quarter prices meeting the test well. Hot sheets are available for delivery in three weeks and cold-finished in four to five weeks, as a general thing.

**Cincinnati**—Sheet mill operations will be continued on schedules not much lower than in June for probably two or three weeks, to complete shipments at second quarter prices. Closing of books two weeks ago prevented heavier backlogs, and \$2 a

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ton higher is now quoted. A fair tonnage of third quarter business has been placed.

# Transportation

Track Material Prices, Page 70

Placing of 20,000 tons of 131-pound rails by the Chesapeake & Ohio last week was the most important factor in railroad steel buying. Carnegie-Illinois Steel Corp. will roll 8620 tons at its Chicago mill

and 2580 tons in the Pittsburgh district. Inland Steel Co. was awarded 6800 tons and Bethlehem Steel Co. 2000 tons.

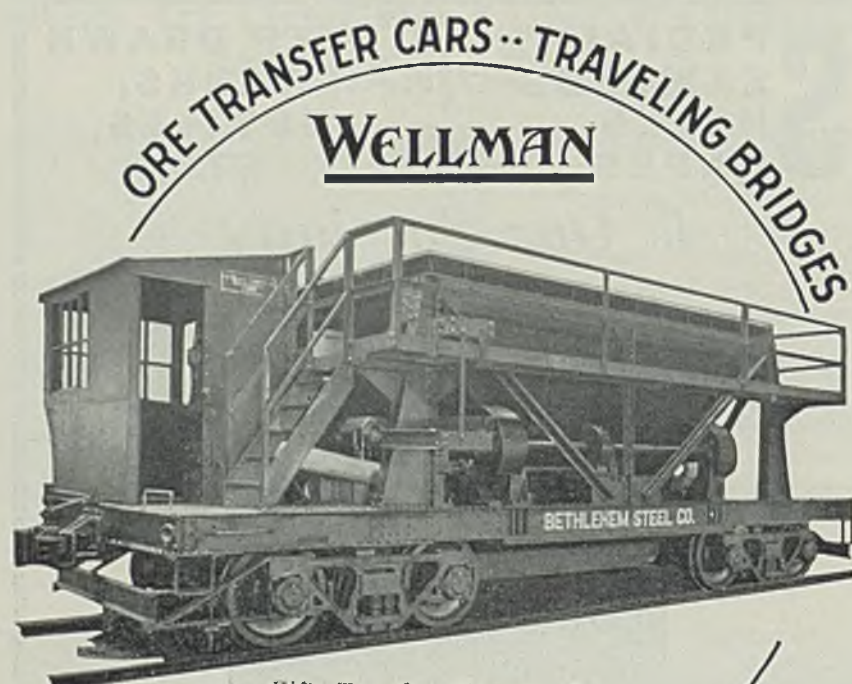
Southern Pacific has ordered 24 lightweight passenger cars from Pullman-Standard Car Mfg. Co., Chicago, for use in connection with locomotives recently placed for train service between San Francisco and Los Angeles.

Pittsburgh Railways Co. is placing orders aggregating about \$1,400,000 for 100 streamlined street cars. It is expected the contract for the body work will go to St. Louis Car Co.,

with the electrical contracts divided between Westinghouse Electric & Mfg. Co. and General Electric Co.

Domestic freight car awards in June were 5220, bringing the total for six months to 28,129 cars. This compares with first half totals of 6333 in 1935 and 23,259 in 1934. Other comparisons follow:

	1936	1935	1934	1933
Jan. ....	2,050	24	152	3
Feb. ....	6,900	806	19,725	0
March .....	632	0	30	5
April .....	4,427	350	800	50
May .....	8,900	2	717	8
June .....	5,220	5,151	1,835	500
6 mos.....	28,129	6,333	23,259	566
June .....	5,151	1,835	500	
July .....	500	19	306	
Aug. ....	200	105	202	
Sept. ....	875	7	23	
Oct. ....	1,250	75	514	
Nov. ....	100	254	533	
Dec. ....	10,050	110	316	
Total ...		19,308	23,829	2,460



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## Cars Orders Placed

Central of Georgia, 200 steel hoppers, 50-ton capacity, to Pullman-Standard Car Mfg. Co., Bessemer, Ala., shops. General Chemical Co., New York, three 50-ton, lead-lined tank cars to American Car & Foundry Co., New York.

Southern Pacific, 24 lightweight passenger cars, to Pullman-Standard Car Mfg. Co., Chicago.

Standard Oil Co. of New Jersey, five 12,000-gallon tank cars and five 8000-gallon, two-compartment tank cars, to General American Tank Car Corp., Chicago.

## Rail Orders Placed

Chesapeake & Ohio, 20,000 tons 131-pound rails, as follows: Bethlehem Steel Co., 2000 tons; Carnegie-Illinois Steel Corp., 11,200 tons; Inland Steel Co., 6800 tons.

## Car Orders Pending

Lehigh & New England, 250 hoppers, 50-ton capacity; bids asked.

Main Central, 500 box, 150 hoppers, 150 gondolas, purchase planned.

Southern Pacific, two 12-car streamlined trains; bids asked.

## Locomotives Pending

Maine Central, three mountain-type locomotives, purchase planned.

Richmond, Fredericksburg & Potomac, five locomotives; bids asked.

## Buses Booked

A.C.F. Motors Co., New York, May 21 to June 20: Thirty-seven buses, including six 42 passenger for Worcester Street Railway Co., Worcester, Mass.; five 35-passenger for Boston Elevated Railway, Boston; five 36-passenger for South-eastern Greyhound Lines, Lexington, Ky.; five 42-passenger for Eastern Massachusetts Street Railway, Boston; four 30-passenger for North Texas Traction Corp., Fort Worth, Tex.; six highway coaches with Hall-Scott horizontal engines for Santa Fe Trails of Illinois, Chicago.

Temiskaming & Northern Ontario, nine air-conditioned coaches, to



National Steel Car Co., Hamilton, Ont.  
White Motor Co., Cleveland, May 15 to June 15: 131 buses, including twenty 32-passenger for Cleveland Railway Co., Cleveland; eighteen 18-passenger for Glacier National Park, Wyoming; eleven 21-passenger for Virginia Electric & Power Co., Norfolk, Va.; eight 25-passenger for Consolidated Bus Co., Allwood, N. J.; five 36-passenger for Boston Elevated Railway, Boston.

## Pipe

Pipe Prices, Page 79

**Pittsburgh**—With no pipe price change July 1, consumers have had little incentive to buy other than their normal needs, but the latter in turn have been remarkably well sustained. Jobbers are moving pipe stocks at a good rate, which in turn is based on considerably heavier building activity of a private nature. Specifications for oil country goods show no decline, although mechanical tubing has undergone a spurt through new automotive inquiries.

**Cleveland**—General pipe market for the past month is the best of first half. One concern reports an increase in specifications of approximately 10 per cent over May. This is largely the result of many small lot orders. Contracts requiring large tonnages have been scarce, and no large orders are looked for in the near future.

**Chicago**—Chicago is taking new bids on 689 tons of 24-inch pipe, having rejected previous bids on this material. This city also is inquiring for 5904 feet of 24-inch steel water pipe. WPA inquiries for cast pipe are heavier following a lapse in such business a short time ago. Shipments against old orders are steady.

**New York**—Small orders comprise the principal business in the cast pipe market here. Orders now pending in connection with public work aggregate about 1000 tons. In addition, private interests are negotiating for lots aggregating about 2000 tons. Prices are unchanged.

**Birmingham, Ala.**—Lettings are still being received by cast iron pressure pipe makers to such an extent that assurance is seen or active production through next 60 to 90 days. Iron purchasing, however, continues in small lots, but more frequently. Shipments of pipe are in excess of production.

**San Francisco**—Improvement in demand for cast pipe has been marked during the past week or two and Los Angeles has just placed the largest order of the year, 12,810 tons of 6 to 24-inch. United States Pipe & Foundry Co. took 6700 tons, American Cast Iron Pipe Co., 3000

tons, National Cast Iron Pipe Co., 2200 tons, Pacific States Cast Iron Pipe Co., 460 tons, and 450 tons went to R. D. Wood & Co. United States Pipe & Foundry is low on 850 tons for Oakland and on 409 tons of 6 to 12-inch for Glendale, Calif. American Cast Iron Pipe is low on 400 tons for Oakland.

**Seattle**—Inquiry has not improved, sales being confined to small lots. No large projects are pending. Juneau, Alaska, opened bids July 3 for 52 tons of 8 and 12-inch cast pipe in addition to a small tonnage of wrought iron water pipe.

## Steel Pipe Pending

5904 feet, 24-inch inside diameter, ½-inch thickness, water pipe, Chicago; bids July 10.

## Cast Pipe Pending

1250 tons, 4 to 16-inch, Oakland, Calif.; United States Pipe & Foundry Co., Burlington, N. J., low on 850 tons and American Cast Iron Pipe Co., Birmingham, Ala., low on 400 tons.

689 tons, 24-inch, Chicago; previous bids rejected, new bids July 10.

409 tons, 6 to 12-inch, Glendale, Calif.; United States Pipe & Foundry Co., Burlington, N. J., low.

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110 tons, 4 to 20-inch, San't Monica, Calif.; bids opened.  
110 tons, 4 and 6-inch, Inglewood, Calif.; bids July 7.

1449 tons, 4, 8 and 12-inch, Chicago, to Glamorgan Pipe & Foundry Co., Lynchburg, Va., and United States Pipe & Foundry Co., Burlington, N. J.

## Cast Pipe Placed

12,810 tons, 6 to 24-inch, specification X-29, Los Angeles, allocated as follows: 6700 tons to United States Pipe & Foundry Co., Burlington, N. J.; 3000 tons to American Cast Iron Pipe Co., Birmingham, Ala.; 2200 tons to National Cast Iron Pipe Co., Birmingham, Ala.; 460 tons, to Pacific States Cast Iron Pipe Co., Provo, Utah, and 450 tons to R. D. Wood & Co., Emaus, Pa.

## Strip Steel

Strip Prices, Page 79

Pittsburgh — Several inquiries from automotive partsmakers and automotive plants for both hot and cold-rolled strip steel for 1937 cars

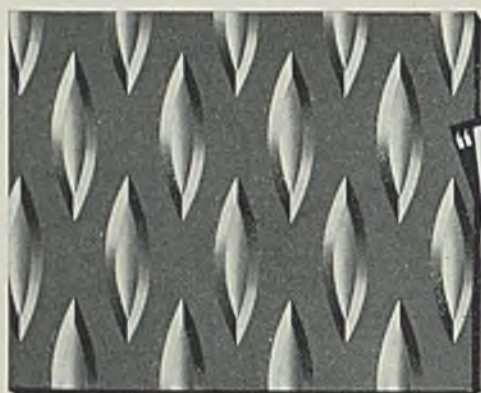
are beginning to enliven the strip market. The market's shipments this month will be as good, if not better than June's showing, although due to the price increase specifications are destined to be less. Producers are now quoting 1.95c base, Pittsburgh, on all new hot-strip business, a \$2 a ton advance from the present invoicing price on material placed before June 30. The cold-rolled strip price is unchanged at 2.60c, Pittsburgh or Cleveland, base. Hot-rolled strip mill operations advanced two points to 60 per cent of capacity last week, although cold-rolled declined two points to 45 per cent.

Cleveland—Backlogs are exceptional, insuring heavy production during July, and with some grades into the first or second week of August. In view of this strong demand, books for third quarter were opened a good week in advance by some mills. Even under these conditions considerable tonnage has been placed at the higher prices. June is the best month of the first half with May a close second. Demand for cold-rolled is holding strong.

Chicago — While new business in hot-rolled strip has been reduced lately because of previous coverage by consumers in anticipation of higher prices, backlogs will permit good schedules for a large portion of this month. On new business hot-rolled strip is quoted 2.05c, Chicago or Gary. Cold-rolled strip continues 2.60c, Pittsburgh - Cleveland. Demand for the latter is fairly well sustained, not having been influenced by recent price changes.

New York — Cold-finished strip buying continues brisk, due primarily to diversified demand from manufacturers of electrical equipment. Final days of June witnessed substantial buying also of hot strip, on which an advance of \$2 per ton became effective July 1.

Philadelphia—Narrow hot strip sellers, virtually all of whom quoted second quarter prices until the end of the quarter, experienced the best business in a long time. A lull this month is expected as a result. Cold-finished strip prices are unchanged but talk already is heard of a probable increase by the close of third quarter.

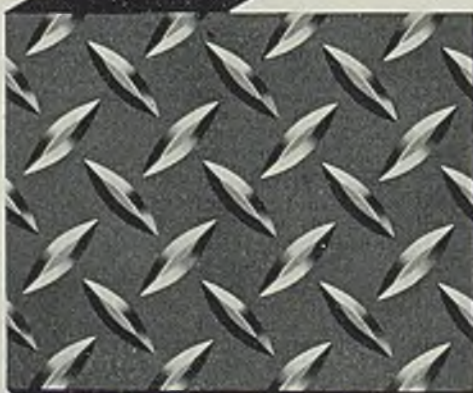


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"A. W." Diamond-dette pattern, half size. Ideal for pedestrian traffic and light trucking. Noiseless.

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## Tin Plate

Tin Plate Prices, Page 78

Pittsburgh—Most tin plate producers in scheduling 14 operating turns last week ceased operations late July 3. This recognition of the usual July 4 holiday accounted for a 25 percentage point decline in the average of operations to 75 per cent.



According to schedules for this week, a full 16-turn rate of operations will again be put into effect, so that tin plate producers' operations will again be at 100 per cent of capacity. Deliveries four weeks in arrears on hot-rolled tin plate and six to seven weeks on cold-reduced plate are still reported by producers. The market is quoted unchanged at \$5.25 per base box, with No. 24 long ternes now named at 3.50c, although tin mill sizes of black sheets are unchanged at 2.75c, Pittsburgh.

## Wire

Wire Prices, Page 79

Pittsburgh — Curtailment of activity in merchant wire has set in owing to inventory period by many jobbers, and manufacturers of farm implements. This slack has been picked up by a brisk rate of activity in manufacturers' wire where specifications for new automotive parts are getting under way. Wire product prices show a tendency to greater firmness, the official market remaining \$2.10 per keg on nails, 2.40c, Pittsburgh or Cleveland, for plain manufacturing wire, and 3.05c, same basis, on high-carbon spring wire. Bids on 355 feet of steel fence, including chain link fabric 6 feet high complete with gates, will be taken July 6 by army engineers at Pittsburgh. The fence is to be installed at locks 3 and 4, Allegheny river above Tarentum, Pa.

Cleveland—General manufacturing consumption is strong. The expected decline in automobile needs has not materialized. June tonnage exceeds May and in some cases, as in the hardware line, that of any month since 1930.

Chicago — Seasonal factors have failed to exert their usual influence on wire buying. Demand persisted during June when a decrease was looked for, but July is expected to disclose some recession. Automotive requirements will be headed downward this month, but miscellaneous users of manufacturers' wire continue to operate at a fairly steady rate. Merchant products are moving well in the country, but the influence of unfavorable weather conditions on future activity is commencing to cause some concern.

## Bolts, Nuts and Rivets

Bolt, Nut, Rivet Prices, Page 79

June was the best month of the year to date in bolt, nut and rivet demand. Higher third quarter prices exerted some stimulating effect,

though consumption has been increasing in some directions, notably in railroad equipment building and repairs. Further gains are seen in this direction during the new quarter. Tractor manufacturers are maintaining heavy requirements, but consumption by farm implement builders has declined seasonally in some instances. Third quarter contracting is proceeding slowly. Bolt and nut prices represent an advance of about 5 per cent over the previous nominal market, with structural rivets up \$3 a ton.

## Semifinished

Semifinished Prices, Page 79

Larger steel mills in the Pittsburgh district find semifinished steel supplies depleted in view of the continued heavy demands of finishing mills. Few have been able to build up their own billet and sheet bar inventories to the normal point. Furthermore, requirements of nonintegrated consumers of semifinished steel have continued heavy not only for rerolling billets and sheet bars, but especially wire rods. The mar-



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and hoops are all up \$2 a ton and cold-drawn bars, \$3.

**Cincinnati**—June sales from warehouses were heavier than in May, and current inquiries for building materials carry hope for an offset, from this demand, to the customary summer lull in industrial needs. Prices were increased July 1 \$2 a ton on steel and iron bars, shapes, plates, sheets, bands and hoops. Cold-finished steel is advanced \$3 a ton.

**Seattle** — Business improved last week, due in some measure to expected higher prices for third quarter, but the month's volume is less than in May. A few car lots have been booked. Jobbers are discussing an advance averaging \$2 a ton for the third quarter in harmony with mill increases.

five months were 52.2 per cent of normal, based on the yearly average for 1928-31, inclusive. This is the best record since 1931. Shipments in May were the largest for any month this year but have not yet reached the volume of bookings. Shipments for five months were 44.2 per cent of normal.

**Pittsburgh** — Estimating departments of fabricators have been well occupied with a heavy list of specific jobs for closing early in third quarter, driven to this stage by the \$2 increase effective July 1 on all projects not specifically identified. Jones &

Laughlin Steel Corp. has taken two Louisiana state bridges, totaling 1170 tons, and American Bridge Co. last week entered two New York state bridges totaling 1020 tons, as well as other contracts. Among inquiries is a 550-ton plant addition at Messena, N. Y., for the Aluminum Co. of America and an unstated tonnage for a new bus terminal at Pittsburgh for the Greyhound Lines Inc., on which building permit has just been issued.

Firth-Sterling Steel Co., McKeesport, Pa., has awarded contract to

## Shapes

Structural Shape Prices, Page 78

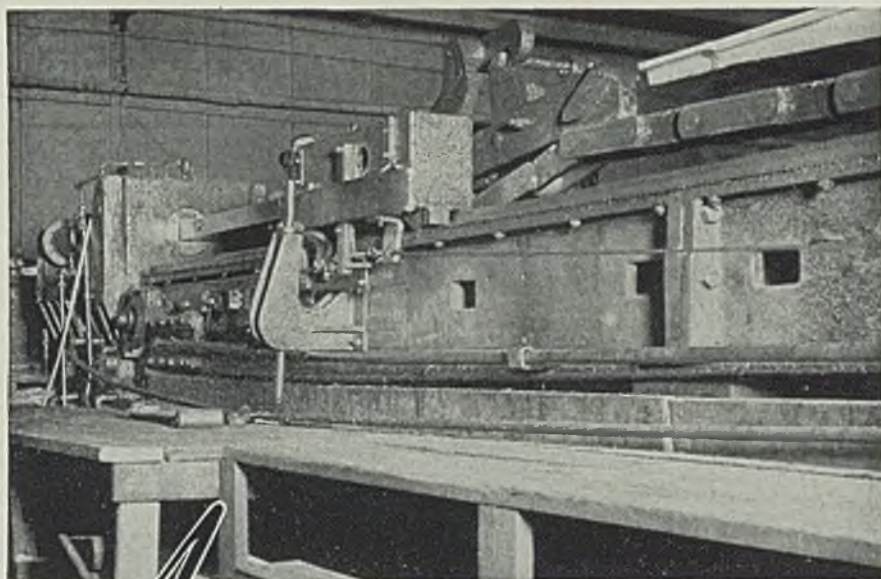
**New York**—The market is featured by two lettings, of 12,000 and 4800 tons. In addition a number of smaller tonnages have been placed, thus adding to the already heavy volume of business on books of fabricators. Much additional tonnage now pending is slated to be placed in the next few weeks. New projects which came out for bids involved around 6000 tons, with three projects accounting for 4000 tons. The price of structural shapes advanced \$2 a ton on July 1 to 2.00c base, Bethlehem, Pa., equivalent to 2.165c delivered, New York. The old price of 1.90c now is applied only on identified projects which were quoted on before the end of June and which are placed under contract during July.

Bookings of fabricated structural steel in May were 39 per cent larger than for April and 141 per cent larger than for May, 1935, according to figures by the American Institute of Steel Construction. Total bookings for

### Shape Awards Compared

	Tons
Week ended July 3 .....	46,249
*Week ended June 26 .....	38,450
Week ended June 19 .....	27,480
This week, 1935 .....	20,907
Weekly average, 1935 .....	17,081
Weekly average, 1936 .....	21,545
Weekly average, June .....	25,036
Total to date, 1935 .....	408,173
Total to date, 1936 .....	581,708

\*Revised.



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Turned and Polished Shafting    Turned and Ground Shafting



Rust Engineering Co. for construction of a two-story \$250,000 tungsten carbide plant.

Cleveland—Shape mills are entering the third quarter with strong backlogs. In some cases heavy production is assured into the second or third week of July. Because of the speculative buying among small consumers in the last two weeks, the extent of new business is expected to decline. June will prove to be the best month of the first half.

Chicago—State bridges, river locks and dams continue to provide most of the new inquiries. Shape mills

have accumulated fairly heavy orders as a result of heavier inquiries and the desire of fabricators to obtain protection at old prices. On new business plain shapes are quoted 1.95c, Chicago.

Philadelphia—District fabricators are active, the \$2.00 advance on shapes July 1 having stimulated numerous projects. Owing to a 30-day protection clause on identified work, much of this business will be converted into steel orders this month. Belmont Iron Works, Eddystone, Pa., started production at its Philadelphia plant July 6 after a fourteen month

suspension. Largest local pending job is for a vocational school involving 5200 tons of shapes and 1500 tons bars on which McCloskey & Co. is low on general contract. Shapes are now 2.11 1/2c, Philadelphia.

Detroit—Pronounced activity in the market is a feature here, Chrysler Corp. having placed 1500 tons for a new assembly plant at Marysville, Mich., and Briggs Mfg. Co. a 320-ton plant addition at Detroit. General Motors Truck Corp. is inquiring for a 500-ton plant addition at Pontiac, Mich., and Inland Mfg. Co., a subsidiary of General Motors Corp., a 550-ton plant addition at Dayton, O.

Birmingham, Ala. — No lagging is noted in sheet mills and demand is firm. Structural shapes are holding up well and fabricators have strong backlogs to work on. Virginia Bridge Co. has award of 420 tons for bridge over Sabine river, on the Louisiana-Texas line.

San Francisco—Fabricators are encouraged over the fact that inquiries for private work are becoming more numerous. Largest private project placed in many months went to Moore Drydock Co. and involved 3500 tons for a plant in Oakland, Calif., for the Owens-Illinois Glass Co. To date 103,408 tons have been booked, compared with 51,652 tons for the first six months of 1935.

Seattle—Volume of business is well maintained, with shops generally well supplied with contracts and new jobs developing.

## Behind the Scenes with STEEL

### Conditioned Canines

IT WAS a quiet morning in the offices of the air conditioning division of Gar Wood Industries Inc., Detroit. Office boys pussy-footed around with the interoffice mail. Miss McSwish, the manager's secretary, chewed audibly on the end of her pencil while carefully inspecting the red tint of her fingernails. The interoffice air was in perfect condition.

Then things began to happen. In bounced an order for a model 102-A unit from Mr. Johnson of the Minneapolis branch; it was rushed in to the attention of Frank H. Dewey, the manager. Noting the contents, he began to push buttons furiously to assemble his staff. When all were present, Mr. Dewey rose and stated in a clear, firm voice, "Gentlemen, I am proud to announce we have received our first order for equipment to air condition a dog kennel."

Following a salvo of applause, Mr. Dewey continued, "When we begin to heat and air condition dog kennels, we are really beginning to cover the air conditioning field. This order should be the forerunner of many others from dog breeders, for these breeders seem to want to raise a better crop of healthier, stronger and happier puppies."

Miss McSwish paused in her nail inspection, a new gleam in her pretty, brown eyes. She looked up and murmured, "Air conditioned puppies by Gar Wood."

### Sniffle Cure

JOE FROGGETT, senior editor of *Daily Metal Trade* (a Penton Publication), is being besieged with mail requests for more information on an item which he ran in his column the other day, describing how doctors at St. George's hospital in London are curing hay fever by electroplating sensitive tissues of the nostrils with ionized zinc. The dispatch says the new cure is claimed 98 per cent successful, and three treatments are said to give immunity for the hay fever season.

We should imagine that zinc-plated nostrils might itch like the devil, but most hay fever sufferers will submit to any proposed cure if it appears effective. Ah-choo!

### Think of That!

UMBER required for concrete forms for Bethlehem's new continuous mill at Lackawanna, we are told, would

build 150 six-room houses, with a few sticks left over for kindling; reinforcing bars used in the concrete, if laid in one line, would reach from Battery Park, New York, to LaSalle street station in Chicago, going by way of the Holland tunnel, Delaware Water Gap and U. S. 6.

Furthermore, if the concrete used in the construction had been mixed by hand, it would have taken two men 18,000 days to do the job—which, had it not been for the delay it would have caused, might have been a neat bit of boondoggling for the WPA.

Complete details of the new mill are found in this issue, page 44.

INQUISITIVE CAMERA DEPT.—VIII



J. D. "JACK" KNOX, associate editor of STEEL since 1917, member of the Open-Hearth Committee of the A.I.M.M.E., co-editor of the A.B.C. of Iron and Steel and a steel mill man of considerable experience.

### Punchline

DID you all get the kick we did from that heading on Cleveland Twist Drill's ad on the inside front cover of the June 8 issue—"Holes for Sale—Any Size."

### Hjerta Guld

CLEVELAND, in case you have not been so appraised, is now touted as the "City of Steel with a Heart of Gold." We always knew it was the city of STEEL, but thought that F. D. R. had confiscated all the gold. Anyway, that heart of gold sure pumps a lot of mud through the city's arteries.

—SHRDLU

## Shape Contracts Placed

12,000 tons, Marine Parkway lift bridge and approaches, Brooklyn, N. Y., to American Bridge Co., Pittsburgh.

7150 tons, bridge across Ohio river, Cairo, Ill., to Mt. Vernon Bridge Co., Mt. Vernon, O.

4800 tons, West side elevated highway extension, Eighty-second to Ninety-fourth streets, New York, to Bethlehem Steel Co., Bethlehem, Pa.

3200 tons, bridge, Sioux City, Iowa, to Bethlehem Steel Co., Bethlehem, Pa.

3000 tons, government hangars, Hawaii, to Bethlehem Steel Co., Bethlehem, Pa.

1500 tons, assembly plant addition, Marysville, Mich., for Chrysler Corp., Detroit, to R. C. Mahon Co., Detroit.

1260 tons, I-beam spans, Blackhawk county, Iowa, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

1075 tons, Owens-Illinois Glass Co. plant additions, Streator, Ill., to Pittsburgh Bridge & Iron Works, Rochester, Pa.

700 tons, New York, New Haven & Hartford railroad bridge, Turners Falls, Mass., to Phoenix Bridge Co., Phoenixville, Pa.

655 tons, paint works, Philadelphia, for E. I. Dupont de Nemours & Co. Inc., to Bethlehem Steel Co., Bethlehem, Pa.

625 tons, underpass, Potter county, Texas, to Mosher Steel & Machinery Co., Dallas, Tex.

600 tons, Hudson downtown tunnel ventilation building, New York, to Harris Structural Steel Co., New York, through George Colon Contracting Co., New York.

610 tons, state highway bridge, Syracuse,



—The Market Week—

N. Y., to American Bridge Co., Pittsburgh.

540 tons, bridge, Lawrence-Randolph counties, Arkansas, to Wisconsin Bridge & Iron Co., Milwaukee.

505 tons, hippodrome, Waterloo, Iowa, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

475 tons, assembly plant addition, Janesville, Wis., for Chevrolet Motor Co., Detroit, to Wisconsin Bridge & Iron Co., Milwaukee.

430 tons, sewage disposal plant, Niagara Falls, N. Y., to Belmont Iron Works, Eddystone, Pa.

430 tons, two bridges, Pennsylvania railroad, Pittsburgh area, to Bethlehem Steel Co., Bethlehem, Pa.

410 tons, state highway bridge, Shenango Forks, N. Y., to American Bridge Co., Pittsburgh.

400 tons, bridge, Bexar county, Texas, to Mosher Steel & Machinery Co., Dallas, Tex.

400 tons, bridge, Cody, Wyo., to Wisconsin Bridge & Iron Co., Milwaukee.

360 tons, underpass, De Witt county, Texas, to Mosher Steel & Machinery Co., Dallas, Tex.

340 tons, state highway bridge, Bristol, W. Va., to American Bridge Co., Pittsburgh; C. C. Dodds, general contractor.

335 tons, boiler house extension, Consumers Power Co., Battle Creek, Mich., to International Bridge Co.

320 tons, bridge, Hancock county, Illinois, to Clinton Bridge Works, Clinton, Iowa.

280 tons, underpass, Bexar county, Texas, to Virginia Bridge Co., Roanoke, Va.

260 tons, state highway bridge, Kent, O., to Bethlehem Steel Co., Bethlehem, Pa.

230 tons, flooring, bridge, Charleston, W. Va., to Carnegie-Illinois Steel Corp., Pittsburgh.

220 tons, highway bridge, Mercer county, New Jersey, to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, plant addition, Electrolux Co., Old Greenwich, Conn., to Ingalls Iron Works Co., Birmingham, Ala.

200 tons, bridge, Andover, Conn., to Harris Structural Steel Co., New York.

200 tons, Iowa state bridges, to Bethlehem Steel Co., Bethlehem, Pa.

195 tons, auxiliary furnace B3, Texas City, Tex., to Jones & Laughlin Steel Corp., Pittsburgh.

195 tons, state highway bridge, Mahoning county, Ohio, to Truscon Steel Co., Youngstown, O.

195 tons, bridge, South Holland, Cook county, Illinois, to R. C. Mahon Co., Detroit.

150 tons, Joan of Arc school, Jackson Heights, N. Y., to Belmont Iron Works, Eddystone, Pa.

150 tons, beam span, Cass-Pottawatomie counties, Iowa, to Des Moines Steel Co., Des Moines, Iowa.

145 tons, bridge, Brookfield, Cook county, Illinois, to Lakeside Bridge & Steel Co., Milwaukee.

145 tons, plant alterations and addition, Clarage Fan Co., Kalamazoo, Mich., to Kalamazoo Foundry & Machine Co., Kalamazoo.

140 tons, lighting standards, Golden Gate bridge, San Francisco, to Bethlehem Steel Co., Bethlehem, Pa.

140 tons, I-beam span, Dallas county, Iowa, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

135 tons, state highway bridge, Washington county, New York, to American Bridge Co., Pittsburgh.

130 tons bridge, Bee county, Texas, to Alamo Iron Works, San Antonio, Tex.

130 tons, bridge for diversion dam, Richmond, Va., to Richmond Structural

Steel Co., Richmond.

125 tons, Erie county bridge, Pendleton, N. Y., to Buffalo Structural Steel Co., Buffalo.

125 tons, deck plate girders, Denver & Rio Grande Western railroad, Denver, to Milwaukee Bridge Co., Milwaukee.

125 tons, underpass, Williamson county, Texas, to Mosher Steel & Machinery Co., Dallas, Tex.

115 tons, bridge, Harris county, Texas, to Mosher Steel & Machinery Co., Dallas, Tex.

115 tons, fertilizer plant, East Hartford, Conn., to Berlin Construction Co., Berlin, Conn.

100 tons, state undercrossing, Wenatchee, Wash., to Pacific Car & Foundry Co., Seattle; Butler Construction Co., Seattle, general contractor.

100 tons (including 35 tons corrugated sheets), General Petroleum Co. storage warehouse, Seattle, to Pacific Car & Foundry Co., Seattle.

## Shape Contracts Pending

5450 tons, including 5000 tons of piling, Chicago river lock and water diversion works; Warner Construction Co., Chicago, and Frazier-Davis Co., St. Louis, low on alternate bids for general contract.

5200 tons, vocational school, Lehigh avenue, Philadelphia; McCloskey & Co., Philadelphia, low on general contract; 1500 tons reinforcing bars also required.

4900 tons, including 3700 tons of piling, Illinois river lock and dam, Beard-



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**ROLLED STEEL FLOOR PLATE**

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No other pattern has quite the advantages of the "perfect Diamond." The flat top and clean-cut edges of the NEVERSLIP Diamond projections grip and hold . . . yet are so designed as to permit free passage of truck wheels.

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Working in a temperature of 110° F., a man's efficiency is only 10%. A moment's figuring will show you the difference a Coppus Heat Killer can make in labor costs alone. And when morale and comfort are considered, there is no room for doubt.

**COPPUS HEAT KILLERS** are unique in their field, because they allow no recirculation of air. Their exclusive, enclosed design takes care of this.



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is a portable cooler, directing a stream of air through a long horn-shaped diffuser. This type is easily moved by one man, can be directed from any position.

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moves a large volume of air at slower speeds. For use in a fixed position, their use lies where concentrated cooling is not essential.

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- town, Ill.; bids to United States engineer, Chicago, July 28.
- 4000 tons, naval air base, Alameda, Calif., Benton field; bids soon.
- 3200 tons, 12 state highway bridges, Nebraska.
- 2000 tons, seven buildings, Ward's island, New York, for department of sanitation and welfare, New York.
- 1750 tons, exhibit hall, Houston, Tex.
- 1650 tons, Missouri state penitentiary buildings.
- 1100 tons, subway alterations, route 108, sections 10 and 11, Long Island City, N. Y.
- 800 tons, plant for California-Hawaiian Sugar Co., Woodland, Calif.; bids soon.
- 640 tons, bridge, Little Ferry Junction, N. J., for Erie railroad, Cleveland; bids received.
- 630 tons, bridge, Milwaukee, for Chicago, Milwaukee, St. Paul & Pacific railroad.
- 575 tons, building extension, Massena, N. Y., for Aluminum Co. of America, Pittsburgh.
- 550 tons, plant addition for Inland Mfg. Co., Dayton, O.
- 525 tons, state bridges, Mississippi.
- 500 tons, addition to plant of California Corrugated Culvert Co., Berkeley, Calif.; bids soon.
- 500 tons, plant addition for General Motors Truck Corp., Pontiac, Mich.
- 400 tons, plate girder underpass, Washington county, Pennsylvania; bids July 17; included 20 tons deformed steel bars.
- 400 tons, garage for Stewart Realty Corp., Baltimore.
- 300 tons, two bridges, Colorado, for Chicago, Burlington & Quincy railroad.
- 250 tons, elementary school, Wilkes Barre, Pa.
- 250 tons, office and power house, Springdale, Pa., for West Penn Power Co., Pittsburgh; bids received.
- 200 tons, masonic home, Elizabethtown, Pa.
- 200 tons, superstructure for gold dredge, San Joaquin Mining Co., Snelling, Calif.; bids opened.
- 105 tons, state bridge, Charlotte, N. C.
- Unstated tonnage, bus terminal, Liberty avenue and Grant street, Pittsburgh, for Greyhound Lines Inc.; estimated cost, \$140,000.
- Unstated tonnage, plant alterations, including new conveyors and flues, American Zinc & Chemical Co., Langeloth, Pa.; Rust Engineering Co., Pittsburgh, general contractor.
- Unstated, 200-foot span, Puyallup river, Washington; bids at Tacoma, Wash., July 8.
- Unstated, Bureau of Roads bridges over Bitterroot river and Yellowstone trail, Montana; bids soon at Missoula, Mont.

for the distributors. It is said that the firming up of prices is holding up the placing of some current business. Altogether some 15,000 to 16,000 tons now are pending in this general territory.

**Pittsburgh**—Officially the market is quoted 2.05c, base, Pittsburgh, for carload lots of new billet bars in cut lengths, and on moderate-size jobs some stability is noted in the market. Low bidders on ten Pennsylvania state highway projects, as of the June 25 letting, have been announced.

**Cleveland**—Mills are operating close to capacity, with backlogs heavy enough to carry most of them through the greater portion of July. The proposed five story building of the Cleveland Twist Drill Co., with an area of 106,000 square feet, is due to come up for specifications sometime in August. This represents the largest industrial building job in Cleveland since the depression began.

**Chicago**—Bar inquiries continue active and bids will be taken July 21 on additional work for the Chicago outer drive improvement involving 1000 tons. Low bidders have been announced on the general contract for the Chicago river lock and water diversion works, taking 1800 tons of bars. A growth in orders is indicated by the volume of pending business. Shipments against old contracts continue heavy.

**Philadelphia**—Bar demand is less active following recent brisk business under spur of firming prices. No changes in official prices were scheduled for the third quarter but as the market steadied at official levels recently a good tonnage was driven in.

**San Francisco**—Featuring the market was the award of 18,900 tons, the largest letting of the year, to Bethlehem Steel Co. by the United States engineer office. Over 37 projects involving 100 tons or more were placed and aggregated 24,639 tons.

**Birmingham, Ala.**—Numerous contracts have been received recently. Dudley Bar Co. has an order for 700 tons for two bridges over Sabine

## Reinforcing

Reinforcing Bar Prices, Page 79

**New York**—While not tested by much actual business, the market appears much firmer as a result of the adoption by leading mills of the open price method of quoting. So far as noted, the market on new billet material is firm at 2.05c base, Pittsburgh, which becomes 2.40c delivered, New York, and 2.50c delivered at the building site. This is the price to the consumer, inasmuch as it includes the \$4 per ton differential

## Concrete Awards Compared

	Tons
Week ended July 3 .....	22,414
Week ended June 26 .....	4,345
Week ended June 19 .....	1,556
This week, 1935 .....	399
Weekly average, 1935 .....	6,862
Weekly average, 1936 .....	6,474
Weekly average, June .....	3,303
Total to date, 1935 .....	125,813
Total to date, 1936 .....	174,793



river, at Louisiana-Texas States line besides a number of less than 100 tons each for grade eliminations in Southern territory. Other companies have orders which brings the total to a substantial figure.

**Seattle**—Mills are busy with commitments but unless new work develops they will be down next month. Inquiry is not active, lack of private construction jobs being an adverse factor. No change in mill prices of reinforcing is announced for the third quarter, the former level of 2.45c being steadily maintained.

## Reinforcing Steel Awards

- 18,900 tons, proposal 741, United States engineer office, Los Angeles, to Bethlehem Steel Co., Bethlehem, Pa.
- 1200 tons, additions and remodeling public schools, Los Angeles, to Blue Diamond Corp., Consolidated Steel Corp. and unnamed interest, Los Angeles.
- 250 tons, alterations to high school, Beverly Hills, Calif., to unnamed interest.
- 248 tons, invitation A-38,253, bureau of reclamation, Odair, Wash., to Inland Steel Co., Chicago.
- 200 tons, two bridges, Ishpeming, Mich., to Fort Pitt Bridge Works, Pittsburgh.
- 175 tons, Soldiers' Memorial, St. Louis, to Laclede Steel Co., St. Louis.
- 153 tons, invitation 40,635-A, bureau of reclamation, upper Snake river project, Idaho, to Bethlehem Steel Co., Bethlehem, Pa.
- 125 tons, invitation A-45,064-A, bureau of reclamation, Uncompaghere project, Colorado, to Bethlehem Steel Co., Bethlehem, Pa.
- 115 tons, invitation A 42,026-A, bureau of reclamation, Potholes, Calif., to Republic Steel Corp., Cleveland.
- 100 tons, invitation A-33,608-A, bureau of reclamation, Yakima project, Washington, to Colorado Fuel & Iron Co., Pueblo, Colo.
- 100 tons, auditorium, Central school, Baldwin Park, Calif., to Blue Diamond Corp., Los Angeles.
- 100 tons, invitation 21,515, bureau of reclamation, Arrowrock dam, Idaho, to unnamed interest.
- 100 tons, Marina sewage plant, San Francisco, to Gunn, Carle & Co., San Francisco.
- 100 tons, auditorium, Santa Barbara avenue school, Santa Barbara, Calif., to unnamed interest.

## Reinforcing Steel Pending

- 1625 tons, lock, Clarksville, Mo.; Central Engineering Co., Davenport, Iowa, low on general contract; included, 350 tons shapes and 530 tons bars.
- 1400 tons, Hecht warehouse, Washington.
- 1000 tons, completion of outer drive improvement; bids to Chicago park district, July 21.
- 541 tons, New Jersey state highway bridges, route 6, section 7; bids July 20.
- 500 tons, Kings highway viaduct, St. Louis; Chase Construction Co., St. Louis, low on general contract.
- 500 tons, two hangars, Yerba Buena shoals, San Francisco; MacDonald & Kahn, San Francisco, low on general contract at \$736,000.
- 500 tons, second unit, Alemany boule-

- vard sewer, San Francisco; bids July 14.
- 437 tons, Illinois river lock and dam, Beardstown, Ill.; bids to United States engineer, Chicago, July 28.
- 400 tons, East Bay Terminal building, San Francisco - Oakland bridge, Oakland, Calif.; bids soon.
- 230 tons, Wabash railway grade separation, St. Louis; Fred Schmitt Contracting Co., St. Louis, low on general contract.
- 225 tons, postoffice and court house, Fort Smith, Ark.
- 140 tons, warehouse for Thompson-Diggs Co., Sacramento, Calif.; bids opened.

# Pig Iron

Pig Iron Prices, Page 80

**Pittsburgh**—Excepting conversion contracts, that is, where iron ore owned by steelworks interests who do not have blast furnaces is being converted into iron by merchant furnaces here, the market is devoid of sizable transactions. One such conversion contract for a Butler, Pa., interest was renewed on a new basis July 1. Prices are firm at \$19.50, Pittsburgh district furnace, for foundry grades, with 50 cents less for basic and 50 cents up on the bessemer base.

**Cleveland**—Auto foundry con-

sumption is definitely tapering with little possibility of a comeback, until approximately the first of August, when specifications for 1937 models will probably appear. Railroad castings are holding strong and expected to continue through July, in view of the extensive car specifications by railroads. General consumption has fallen a little behind May, there being no price advance to stimulate buying.

**Chicago**—Shipments are steady, while new business for third quarter delivery holds in fair volume. Foundries have reduced stocks materially, and are taking deliveries in fair accord with near future needs. Consumption has been maintained better than usual for this period, aided by rising production of railroad equipment castings. While a further gain is not looked for, a reasonably steady trend is in prospect. The market is steady at \$19.50, furnace, for No. 2 foundry and malleable.

**New York**—Pig iron buying is spotty and principally for immediate needs. Total volume has shown little variation over the past month. Reported sale of Russian foundry iron at \$17, delivered Philadelphia, has served to agitate domestic sellers further. Russia, which last year sold 200,000 tons of iron to Japan and

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LESS  
COST



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LESS  
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has since withdrawn from the Japanese market, has within recent weeks sold a similar tonnage to Welsh tin plate makers.

**Philadelphia**—Pig iron buying is being sustained, but largely on a hand-to-mouth basis. The reported 2500 tons of iron noted recently as arriving from England in two lots is low phos for distribution to several points. Russian foundry iron is reported being sold at \$17, delivered Philadelphia.

**Cincinnati**—Shipments tend moderately lighter, but the foundry melt is showing strong resistance to customary seasonal effects. Some contracting for third quarter needs, through regular suppliers, is being done although many consumers prefer to continue spot purchasing. Prices are firm and, in this district, unaffected by freight surcharge reductions.

**Birmingham, Ala.**—Last days of June saw a little impetus in delivery. While no great tonnage has been booked for third quarter, indications point to an active market. Eleven blast furnaces are in operation, and June production was very good, estimates showing more iron being made during first half of the year

than during entire year of 1932 and also 1933, and about as much as in 1935.

**St. Louis**—Demand for pig iron holds steady, and shipments are well maintained. Spot buying continues the rule. Farm implement interests have shown some recession in recent weeks, but tractor business continues at an increased rate of activity. For the first five months of 1936, however, tractor and farm implement interests report volume of orders to be the largest since the 1929 peak.

**Toronto, Ont.**—Merchant iron sales declined last week, largely due to the holiday. There also has been some slump recently as a result of the minor tapering in general business. Sales the past week totaled around 700 tons. Demand so far has been strictly for spot delivery. While a few inquiries have appeared for third quarter, bookings have been slow. Prices are firm.

## Metallurgical Coke

Coke Prices, Page 79

Steady demand for metallurgical coke is met by producers, beehive makers finding increased demand as

by-product sources reach capacity. Prices have been continued for third quarter without change. Shipments are steady at a high rate in all districts.

## Scrap

Scrap Prices, Page 81

**Pittsburgh**—For the first time in two months the No. 1 melting steel market here showed an advance last week, partly through renewed buying activity by consuming mills and partly through eagerness of brokers to cover contracts. No. 1 steel is now quoted \$13.75 to \$14.25 in consideration of the purchases of at least two district mills the past week at \$14. Secondary scrap supplies are scarce and many industrial plants and small dealers are withholding supplies from the market in view of a local sentiment that the market is headed higher. A consumer's purchase at \$17.75 on billet crop ends has caused a 50-cent rise in this market. Machine shop turnings are up 25 cents a ton to \$9.50 to \$10, and strength has also affected No. 2 steel, hydraulic compressed and hand bundled sheet.

**Cleveland**—Receipts of large scrap tonnages by water from upper lake ports complicates the situation here, with dealers unable to obtain supplies at current prices. Some melters have large tonnages of scrap which came in by lake, one mill having about 75,000 tons on stock piles. Prices are unchanged.

**Chicago**—Heavy melting steel has advanced 50 cents a ton on a sale to a local mill at \$13.50. This reflects the stronger situation which has been apparent here recently. Sellers still are covering higher priced orders and encounter difficulty in buying heavy melting steel in large lots at less than \$13.50. Railroad steel specialties are stronger, following better demand from steel foundries.

**New York**—An improvement in iron and steel scrap purchases by domestic consumers has caused brokers here to advance buying prices on heavy breakable cast, steel shafting and specification pipe. Steel scrap continues to be loaded on a considerable scale for shipment to Japan and England. Brokers continue to pay \$10 delivered on New York or Brooklyn docks for No. 1 heavy melting steel for export and \$9 for No. 2 or auto steel.

**Philadelphia**—Eastern Pennsylvania scrap prices are turning up following some recent substantial buying of No. 2 steel at \$11.50, delivered. Edward G. Budd Mfg. Co. has disposed of its June accumulation of

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about 3000 tons at prices higher than a month ago.

**Detroit**—A firmer undertone became apparent in the steel scrap market here last week. Apparently some brokers with short orders are trying to clean up coverages in anticipation of higher prices to be paid by consumers. For the time being, however, quotations are unchanged.

**Cincinnati**—The stalemate in iron and steel scrap is unbroken, brokers and mills failing to reach price agreement for tonnage commitments. Interest centered on an offer, subject to withdrawal, of 1000 cars by the Louisville & Nashville railroad, estimated to yield 15,000 tons of scrap. Quotations remain unchanged.

**St. Louis**—Earlier in the week an East side mill bought several thousand tons of railroad and special grades for castings, but since then quiet prevails. Although prices are unchanged as compared with the preceding week, the tendency of the market is upward.

**Birmingham, Ala.**—Little old material is moving and the greater part of contracts booked during the last few weeks has been delivered. Some tonnage remains due melters who do not appear anxious for early delivery. Quotations are weak in addition to being low.

**Seattle**—The market assumed a healthier tone this week in the face of renewed interest by Japanese buyers. Inquiries have been more numerous and while no large sales are reported local prices have advanced 25 to 50 cents. Domestic demand continues steady as mills are buying in sufficient volume to offset consumption. Exporting houses are covering desirable tonnages in anticipation of revival of Oriental trade.

**Toronto, Ont.**—While business is holding steady in iron and steel scrap, no large orders have been placed recently and demand is spotty. There was a minor decline in shipments during the week, but dealers said this was temporary.

## Iron Ore

### Iron Ore Prices, Page 81

**Cleveland**—An increase of 2,366,684 tons of iron ore brought down from the upper lakes during June over June a year ago, is shown in figures of the Lake Superior Iron Ore association. Tonnage during June was 6,608,320 tons against 4,241,636 tons in June, 1935, and 5,049,744 tons in May of this year. The amount carried this season to the end of June was 11,677,510 tons against 8,145,493 tons in 1935. While the increase in the number of boats in the ore trade this season is about 45 per cent over a year ago, the in-

crease in ore this season is little over 43 per cent.

## Ferroalloys

### Ferroalloy Prices, Page 80

**New York**—Ferromanganese shipments in June were the heaviest of the year. Coincident with arrival at Philadelphia of 500 tons of ferromanganese from Holland it became known that the leading Dutch producer of pig iron now has one furnace on ferromanganese. A couple of small arrivals from Holland a few weeks ago at Baltimore led to considerable confusion as to the exact source. Dutch material, it is authoritatively stated, is being offered at only a small discount under the domestic market.

## Coke By-Products

### Coke By-Product Prices, Page 79

**New York**—Demand for coal tar distillates continues active, particularly for toluol and industrial xylo. The continued needs of the automotive industry are a large factor in this demand. It is difficult for shippers to keep all consumers supplied. Scarcity of naphthalene has been re-

lieved by termination of the season for moth preventatives. Phenol continues in heavy demand. Demand for sulphate of ammonia is good and is expected to become more active toward the end of July because of requirements in connection with the summer mixing season in the fertilizer industry. All prices are unchanged.

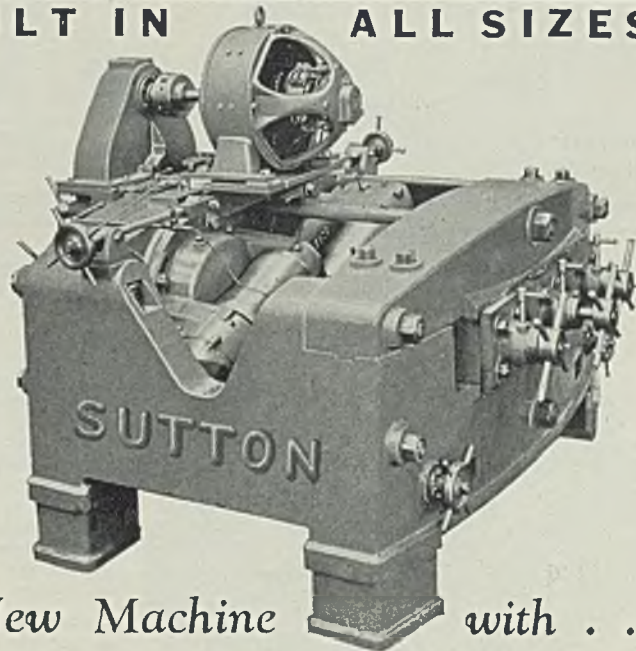
## Steel in Europe

### Foreign Steel Prices, Page 82

**London** — (By Cable) — Production of pig iron in Great Britain is increasing, two additional furnaces having been blown in and supplies are easier. Coke production is insufficient but the new battery of ovens by Dorman, Long & Co. Ltd. relieves the situation somewhat. Shortage of semifinished steel has been renewed, partially due to the strikes at Antwerp. Domestic producers of semifinished and finished steel are fully occupied, some with bookings to last until the end of the year. Export inquiries are more active but available production is strictly limited.

The Continent reports export

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trade is reviving after strikes have subsided and markets are quiet.

## Nonferrous Metals

Nonferrous Metal Prices, Page 80

**New York**—Demand for lead by consumers for July needs continued to increase last week but prices held unchanged. Tin and antimony quotations eased while copper and zinc held steady in quiet markets. Consumption of all major nonferrous metals is holding up well.

**Copper**—No pickup in copper buy-

ing is expected before August. Sellers appear satisfied with the current light rate and are holding prices steady at 9.50c, Connecticut, for electrolytic. Casting copper was firmer on moderate sales at 9.15c, f.o.b. refinery.

**Lead**—Consumers' requirements for the current month are only about one-third covered so substantial business is expected over the next few weeks. All first hands quoted on the basis of 4.45c, East St. Louis.

**Zinc**—The industry continues to maintain a favorable statistical position with deliveries holding up

fairly well. Unfilled orders on sellers' books have declined to comparatively low levels so more active buying interest is expected. Sellers quoted prime western unchanged at 4.85c, East St. Louis.

**Tin**—Straits tin reacted to the favorable statistical report showing a drop of 1932 tons in world visible supplies and carryovers and spot dropped to around 40.50c. Supplies of metal for prompt delivery are tight, however.

**Antimony**—Interest in antimony at the lower levels established last week was light. Chinese spot was nominally unchanged at 13.00c, duty paid, but futures declined to 9.00c to 9.25c, c.i.f. in bond, while American antimony declined to 11.00c on spot and 10.75c on futures.

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## Convention Calendar

Sept. 7-11—American Chemical society. Semiannual meeting in Pittsburgh. Charles L. Parsons, 728 Mills building, Washington, is secretary.

Sept. 7-12—Third World Power Conference and Second Congress on Large Dams. To be held in Washington with headquarters at Mayflower hotel. O. C. Merrill, Interior building, Washington, is director.

Sept. 21-26—Iron and Steel institute (British). Autumn meeting in Dusseldorf, Germany. K. Headlam-Morley, 28 Victoria street, London S.W.1, is secretary.

Sept. 22-25—Association of Iron and Steel Electrical Engineers. Thirty-second annual convention at Hotel Statler and iron and steel exposition at Convention Hall, Detroit. Brent Wiley, Empire building, Pittsburgh, is managing director.

Sept. 30—Oct. 2—National Industrial Advertisers association. Annual conference at Benjamin Franklin hotel, Philadelphia. M. R. Webster, 100 East Ohio street, Chicago, is secretary.

Oct. 5-9—National Safety council. Twenty-fifth annual safety congress in Atlantic City, N. J. William H. Cameron, 20 North Wacker drive, Chicago, is managing director.

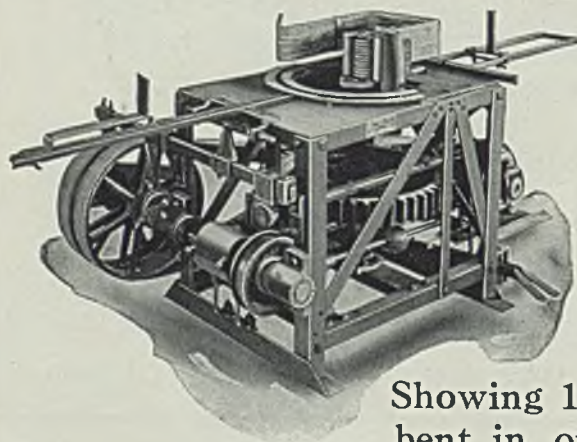
Oct. 5-10—Fourth Annual Industrial Materials exhibit. At Hotel Roosevelt, New York. S. S. Kahn, Parker-Kalon Corp., 200 Varick street, New York, is secretary.

Oct. 19-22—National Wholesale Hardware association. Forty-second annual convention at Marlborough-Blenheim hotel, Atlantic City, N. J. George A. Fernley, 505 Arch street, Philadelphia, is secretary.

Oct. 19-23—American Society for Metals. Eighteenth annual national metal congress and exposition in Public Auditorium, Cleveland. W. H. Eisenman, 7016 Euclid avenue, Cleveland, is secretary.

Oct. 19-23—American Welding Society. Annual meeting in Cleveland.

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M. M. Kelly, 33 West Thirty-ninth street, New York, is secretary.

**Oct. 19-23—American Gas association.** Annual meeting and exhibition at Auditorium, Atlantic City, N. J. Kurwin R. Boyes, 420 Lexington avenue, New York, is secretary.

**Oct. 19-23—Wire association.** Annual meeting in Cleveland. Richard E. Brown, 17 East Forty-second street, New York, is secretary.

**Oct. 19-23—American Institute of Mining and Metallurgical Engineers.** Fall meetings of institute of metals and iron and steel divisions in Cleveland. Louis Jordan, 29 West Thirty-ninth street, New York, is assistant secretary.

**Oct. 10-23—American Society of Mechanical Engineers.** Fall meeting of machine shop practice and iron and steel divisions in Cleveland. P. T. Wetter, 29 West Thirty-ninth street, New York, is assistant secretary.

**Oct. 21-23—American Institute of Steel Construction.** Fourteenth annual meeting at Greenbrier, White Sulphur Springs, W. Va. V. G. Iden, 200 Madison avenue, New York, is secretary.

**Nov. 18-20—National Foreign Trade council.** Twenty-third annual convention in Chicago. Lindsay Crawford, 26 Beaver street, New York, is secretary.

**Nov. 30-Dec. 4 — American Society of Mechanical Engineers.** Fifty-seventh annual meeting at Engineering Societies building, New York. C. E. Davies, 29 West Thirty-ninth street, New York, is secretary.

**Nov. 30-Dec. 5—National Exposition of Power and Mechanical Engineering.** Thirteenth national exposition at Grand Central Palace, New York. Charles F. Roth, Grand Central Palace, New York, is manager.

## Michigan Issues Iron Ore Cost, Production Figures

Statistics of iron ore production in Michigan for 1935 have been issued by the department of conservation, geological survey division. Ore mined totaled 5,173,143 gross tons in 1935 and shipments were 7,241,544 tons; taxes totaled \$1,467,592.86, equal to \$0.2837 per ton; average number of days worked were 196; average daily wage \$4.62; average yearly earnings \$905.95, and average tons produced per man per day \$5.40.

Figures for state underground mines show the following average per ton costs: Cost of mining, \$0.1582; taxes, \$0.3271; general overhead, \$0.309; transportation, \$1.6245; marketing, \$0.0664; total ore cost, \$4.0525. Lake Erie value was \$4.781 and gross ore profit \$0.7285. This figure does not represent the true profit as much ore was sold at discount. Other ore costs included \$0.2744 for royalties, and \$0.0293 for interest on borrowed money.

Patterson Foundry & Machine Co., East Liverpool, O., manufacturer of grinding and mixing machinery, has purchased the ball or mushroom grind-

er and mixer business of the A. & F. Brown Co., New York. The complete line of ball grinders and mixers will be manufactured at the main factory of the Patterson company at East Liverpool.

## Ice Cream Cans Simplified

Division of simplified practice of the national bureau of standards has announced that simplified practice recommendation R164-36, tinned steel ice cream cans, has been accorded the required degree of acceptance by the in-

dustry and is to become effective July 1.

This recommendation, which was proposed by the International Association of Ice Cream Manufacturers, contains a simplified list of sizes and varieties of tinned steel ice cream cans, which will care for more than 90 per cent of the normal demand for this commodity.

Globe Steel Tubes Co., Milwaukee, has appointed the Bissett Steel Co., Cleveland, district representative for its products. The Bissett company will carry stocks of Globe Steel mechanical and boiler tubing.



# Whitey Sez:

The administration has nothing on the welding industry—it is also cluttered up with a lot of alphabetical organizations.

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Pittsburgh, Pa.



# Renewed Activity of Machinery Makers Declared Sound Evidence of Upturn

**C**ONFIDENCE among machinery builders in the United States is justified by present trends, according to a survey of machinery industries by the bureau of foreign and domestic commerce, department of commerce.

Certain underlying factors, such as the delayed purchases of machinery and equipment and the existence of vast reserves of credit, point to definite expansion in the various machinery industries, it was stated.

The significance of the machinery industries in the national economy of this country is indicated by the fact that in 1933, the latest period for which complete statistics are available, the industries, as a group, employed approximately 500,000 wage earners, paid more than \$500,000,000 in wages, and produced commodities valued at approximately \$2,000,000,000.

Although the industries as a group have lost considerable ground since 1929, according to the review, this group was ranked officially in 1933 as fifth in the number of establishments in the manufacturing field of the United States, fourth as to number of wage earners employed, and fifth as to the value of products.

Since 1933, "the machinery business has improved vastly, employment is greater, payrolls are larger, and the value of commodities produced is higher."

The review was prepared in response

to requests from members of the machinery industry by R. E. W. Harrison, former chief of the machinery division, and Charles O. Thompson, marketing research division, bureau of foreign and domestic commerce.

It deals with the manufacture and distribution of machinery and equipment and considers the extent to which purchases and replacements of machinery and equipment have been deferred and the relative importance of the machinery industries in comparisons with other industrial groups.

Figures are included concerning the significance of machinery to American economic life.

## U. S. Leads in Value of British Machine Tool Orders

Domestic demand for machine tools is taxing the capacity of English producers to such an extent that the value of British orders sent to the United States increased 45 per cent during the first four months of 1936, compared with the same period last year.

The United States, with machine tool orders from January to April valued at 535,160 pounds sterling, nearly one-half of the 936,729 pounds sterling worth imported by England during this period, leads all other nations in obtaining this over-

flow of orders, according to the department of commerce. Germany is second, receiving orders valued at 285,981 pounds, compared with 150,275 pounds in 1935.

The rush of English orders has caused doubts to arise as to the ability of English producers to fill possible orders on comparatively short notice for the manufacture of armaments for Great Britain.

## German Sheets Imported

Iron and steel importations at Philadelphia during the week ended June 27 included 1500 tons from England and 1250 tons from British India. Approximately 1000 tons of ferromanganese came in also, including 500 tons from the Netherlands, 395 tons from France and four tons from Japan.

One of the largest sheet arrivals at this port in some time involved 440 tons from Germany. Other importations included 91 tons of structural shapes and five tons of steel hoops from Belgium and 17 tons of steel tubes and 13 tons of charcoal bar iron, from Sweden.

## Tin Consumption Grows

International Tin Research and Development council, 149 Broadway, New York, in its bulletin for May gives world apparent consumption of tin in the year ending March 31, 1936 at 147,877 gross tons, an increase of 25,529 tons compared with the previous 12 months. World production for 12 months ending with March, 1936, was 145,164 tons.

Total tin consumption in March, 1936, was 13,424 tons, the highest since September, 1935, when it was 13,693 tons. For the year ending in March, 1936, the United States showed a gain of 37.2 per cent over the previous year.

## Canadian Steel Output Up

Production of Canadian steel ingots and castings in April totaled 107,220 tons, compared with 101,092 tons in March, and was 57 per cent more than that in April last year. Pig iron output at 54,045 tons was approximately the same as the March total of 54,009 tons, but 24.6 per cent above the April, 1935, total of 43,388 tons. Production included 48,634 tons of basic iron and 5411 tons of foundry grade. Output of ferroalloys declined from 5455 tons in March to 4437 tons in April.

For the four months ending with April production of steel ingots and castings amounted to 401,902 tons, compared with 241,902 tons in the like period of 1935; pig iron totaled 225,141 tons, against 169,790 tons, and ferroalloys output for the period rose from 13,369 tons to 19,072 tons.

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## Canadian Steel Imports Up

Canada's steel imports for April had a total value of \$11,183,000, against \$9,192,000 for the corresponding month of last year. Value of imports from the United States rose from \$7,936,000 to \$9,310,000. The principal item, automobile parts, had a value of \$2,197,000. Other imports from the United States included machinery, \$1,775,000; farm implements, \$1,034,000; engines and boilers, \$816,000; automobiles, \$778,000; plates and sheets, \$689,000; rolling mill products (miscellaneous), \$391,000; castings and forgings, \$193,000; tubes and pipes, \$105,000; hardware and cutlery, \$103,000; tools, \$88,000; stamped and coated products, \$82,000. The month's exports showed a heavy decline, totaling \$2,885,000, compared with \$4,362,000 in April, 1935. Exports to the United States increased from \$318,000 to \$468,000, the largest item being farm implements, \$230,000.

## X-Ray Symposium Feature Of A. S. T. M. Meeting

(Concluded from Page 66)

& Wilcox Co., Barberton, O. Results of a survey, to which 35 companies contributed information, indicate that at least 48 X-ray equipments are used in this country to examine welded joints. One notable job was hydraulic power penstocks of the Boulder dam project which required 270,000 feet of X-ray film for the examination of welded joints. Radiographic examination has been used considerably for the examination of welded joints made in the field on structures erected and welded in place. The speaker stated that without exception the survey shows radiographic examination is considered superior to other nondestructive testing methods for weld testing. In certain cases a magnetic testing method is considered a valuable supplementary test for detecting minute surface cracks not disclosed by the X-ray.

Butt welds of uniform thickness, such as employed for the main points of pressure vessels, are more readily adaptable to X-ray inspection and the bulk of production X-ray examination of welded joints is limited to that type of weld. Other types of joints, such as fillet joints, occasionally are examined to determine the weld quality. Experience indicates that the radiographic method will disclose the presence of major defects in welds, such as entrapped slag, porosity and cracks, provided the defect exceeds in section by 2 per cent or more the thickness of the weld examined. Cracks of any magnitude un-

doubtedly are detected on weld thicknesses below approximately 2 inches in thickness.

There is some question as to the detection of minor cracks on thick plate where scattered radiation tends to obscure the image. Mr. Hodge stated that it generally is conceded that the application of the radiographic method of nondestructive testing to the production examination of welded joints in the pressure vessel field and to the examination of experimental welds has added confidence to welded construction and materially improved the general quality of fusion welds.

## Equipment

New York—Bookings of machine tools and allied equipment all through the East during June were at the highest rate so far this year and exceeded those of any month since 1930. A 10 per cent price advance on milling machines went into effect June 27, manufacturers giving customers the usual 10 days in which to close orders at the old prices. With this advance on milling machines, practically all machine tool prices now have been advanced from the former level.

English manufacturers continue to

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buy actively in the American market. Increased production of munitions in England has resulted in the application of a priority system to machine tool purchases in that country; unable to buy tools at home, because of this military control, many English manufacturers are buying in the United States. A feature of this British buying is the extent to which it involves used tools; at the same time many new tools are being ordered for shipment to England.

**Chicago**—June maintained the active pace set during May in most equipment markets. Machine tool sales lately have been steady, with good business continuing in small tools. Some seasonal letdown in de-

mand for the latter ordinarily would be expected in the near future. Machinery sellers look for a continuation of favorable activity this quarter in view of the manner in which inquiries are appearing. Chicago, Rock Island & Pacific railroad has issued inquiries for three lathes for delivery at Dalhart, Tex. These include one 90-inch wheel lathe, one 36-inch and one 18-inch motor driven lathes.

**Seattle**—Dealers in both new and used machinery and equipment report maintained interest among buyers. Highway machinery is moving well, while mining, logging, lumbering and miscellaneous items are in good demand. Alaskan seasonal requirements are larger than a year ago.

ipal light and power plant. Shover & Loftus, Oliver building, Pittsburgh, is consulting engineer.

**MAUMEE, O.**—Board of public affairs, Alvin Hauland clerk, rejected bids received June 20 and will open new bids July 11 for furnishing and constructing a pumping station at a cost of \$2000. George Champe & associates, 1025 Nicholas building, Toledo, O., is engineer.

**SANDUSKY, O.**—Albert J. Lauber, city manager, will advertise a \$1,400,000 bond issue soon for a generating station and distribution system. Preliminary survey for project, which has received loan and grant of \$1,515,000 from PWA, has been made by Burns & McDonnell, Dixie Terminal building, Cincinnati.

## New York

**BROOKLYN, N. Y.**—Empire Iron & Steel Corp. has been incorporated. Messinger & Brown, 79 Wall street, is correspondent.

**BROOKLYN, N. Y.**—New York Water service, 90 Broad street, proposes to construct a 1-story water storage tank at 3402 Foster avenue. D. Salvati, address of owner, is engineer.

**BUFFALO**—Trico Products Co., 817 West Washington street, maker of automobile parts and accessories, was damaged by an explosion June 24.

**HARMON, N. Y.**—New York Central Railroad Co., 466 Lexington avenue, New York, plans to purchase 1 60 cycle, 3000 kilowatt mercury arc rectifier for installation in a substation here. J. W. Pfaur is chief engineer.

**NEW YORK**—H. K. Metal Craft Mfg. Corp., metal supplier, Howard K. Rothenberg, 545 Fifth avenue, has been incorporated.

**NEW YORK**—Plymouth Steel & Iron Works Inc. has been incorporated. Wolf, Jacobi & Pascal, 32 Broadway, is correspondent.

**NEW YORK**—Department of hospitals, 125 Worth street, will install motors and controls and other electrical equipment in a group of five buildings to be erected on Welfare island at a cost of \$6,000,000. Butler & Kohn, 56 West Forty-fifth street; and York & Sawyer, 100 East Forty-second street, are architects.

**ROCHESTER, N. Y.**—Rochester Gas & Electric Corp., 89 East avenue, E. B. Robinson purchasing agent, is in the market for motors, coal conveyors, a boiler feed pump, and auxiliaries for installation in a new power house.

**TONAWANDA, N. Y.**—Linde Air Products Co., 30 East Forty-second street, New York, subsidiary of Union Carbide & Carbon Corp., has acquired a 40-acre tract and plans to spend more than \$1,500,000 for a new welding apparatus manufacturing works, including purchase of hoists, conveyors and motors.

## Pennsylvania

**BRIDGEPORT, PA.**—Summerill Tubing Co., 343 West Fourth street, plans to construct additions to the plant. Henry F. Friend is engineer for the improvement.

**PHILADELPHIA**—Frankford arsenal is asking bids until July 7 for motorized speed reducers, inventory 314-36-567.

**PHILADELPHIA**—Frankford ar-

# Construction and Enterprise

## Ohio

**CINCINNATI**—H. F. Wagner, city purchasing agent, Room 143 City hall, asks bids until noon, July 7 for furnishing a rotary air compressor to department of public works, and a motor lift.

**CLEVELAND**—City division of water and heat, 105 City hall, is considering purchase of 2 feed water heaters, 1 sump pump, 3 complete lathes, and 1 milling machine.

**CLEVELAND**—Amerlean Coach & Body Co., Clark avenue, Neil P. Larsen sales manager, has acquired part of a 3-story building and 6½ acres of land from Peerless Motor Co., and plans to build.

**CLEVELAND**—City council has

passed an ordinance directing Frank O. Wallene, director of public utilities, City hall, to investigate the advisability of establishing a power plant on the west side.

**CLEVELAND**—Cleveland Twist Drill Co., Lakeside avenue, Northeast, and East Forty-ninth street, will spend \$400,000 for new building construction, and \$100,000 for new equipment. J. D. Cox Jr. is president. George S. Rider Co., Marshall building, has building contract.

**COLUMBUS, O.**—Columbus Railway Power & Light Co. may spend \$200,000 for a new power substation on North High street.

**EAST LIVERPOOL, O.**—O. Earl Greenawalt, mayor, has a PWA grant of \$675,000 toward a \$1,500,000 munic-

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senal asks bids until July 28 for one floor type, motor driven, wire forming automatic machine with 4 slides, circular 541; and one 6-spindle drill press, circular 562.

**PITTSBURGH** — Mechanite Metal Corp. has received a state charter. Oliver Smalley, 323 Fourth avenue, is president.

**Michigan**

**JACKSON, MICH.** — Reynolds Spring Co. is building an addition to its spring plant here to increase production 50 per cent.

**Illinois**

**ANNA, ILL.**—City has engaged Warren & Van Praag, Decatur, Ill., engineer, to consult on plans for a proposed water supply system.

**CHICAGO**—Republic Steel Corp., Cleveland, plans to install electric hoists, regulators, conveyors, heavy duty motors, and other equipment in a new 1-story addition at the South Chicago plant.

**PEORIA, ILL.**—Shovan Brass Corp. has been incorporated and will take over the foundry of Kinsey-Mahler Co., 400 South Adams street. Jacob Olwin, Carl M. Seipt, Philip Z. Horton and Edward T. Van Arsdel are incorporators.

**Indiana**

**FORT WAYNE, IND.** — Wayne Pump Co. plans to install two 300-horsepower boilers, automatic stokers and other equipment in a new heating plant. C. G. Guild is secretary.

**Alabama**

**BIRMINGHAM, ALA.**—W. M. Smith & Co., First avenue, North, is in the market for a small bulldozer equal to a No. 2 or 3 Ajax; and a ¾-yard drag line bucket.

**Delaware**

**LEWES, DEL.**—Indian River Electric Cooperative, Roland J. S. Marsh chairman, is arranging for federal aid for financing construction of \$160,000 worth of transmission and distribution lines in Sussex county.

**Maryland**

**CUMBERLAND, MD.**—Thomas W. Koon, mayor, has applied to PWA for funds with which to install two water tanks.

**PRINCE FREDERICK, MD.**—Consumers Cooperative Co. plans to construct 68 miles of lines to serve 422 families on a loan of \$90,000 approved by the rural electrification administration, Washington.

**WILLIAMSPORT, MD.**—Potomac-Edison Co., 55 East Washington street, Hagerstown, Md., will install an additional boiler in a \$175,000 improvement program at the local plant; and will install a 10,000 kilowatt generating plant outside Cumberland, Md., in a \$330,000 program.

**District of Columbia**

**WASHINGTON**—Procurement division, branch of supply, federal warehouse, treasury department, asks bids until July 7 for a ½-yard power

shovel, inventory 4880; and an air compressor, inventory 4927-A-7-7.

**WASHINGTON**—General purchasing officer, Panama Canal, asks bids until July 7 for 2 metalworking lathes, 1 metalworking column shaper, 2 motor driven, dry floor, metal grinding machines, 1 motor driven metalworking punch and shear machine, 1 motor driven radial drilling machine, and 1 power hacksaw, schedule 3159.

**Kentucky**

**FRANKFORT, KY.**—Ben Johnson chairman, Kentucky state highway commission, asks bids until July 9 for a pavement testing core drill unit. Drill, engine and frame are to be included.

**Florida**

**JACKSONVILLE, FLA.** — United States engineer, P. O. box 4970, Jacksonville, is in the market until July 7 for a cradle type boat hoist, inventory 436-36-357.

**JACKSONVILLE, FLA.**—Ernest E. Anders, city utilities commissioner, has applied to PWA for a grant of \$900,000 with which to make further improvements in the municipal light plant. Work will be carried on over a five-year period and will cost approximately \$2,000,000.

**Louisiana**

**NEW ORLEANS**—United States engineer, Second district, Prytania street, asks bids until July 7 for steam pumps, inventory 1096-36-669.

**Mississippi**

**HOLLY SPRINGS, MISS.**—George M. Buchanan, mayor, has applied to rural electrification administration, Washington, for a loan of \$50,000 with which to build 50 miles of distribution lines.

**JACKSON, MISS.**—United States

property and disbursing officer will accept bids until July 24 for furnishing and installing a turbine pump at Camp Shelby, Hattiesburg, Miss.

**North Carolina**

**BATTLEBORO, N. C.**—Town is considering making an application for a federal grant and loan to construct a \$59,000 waterworks and sewage system.

**BEAUVILLE, N. C.**—Town authorities are awaiting action on an application for PWA loan and grant for construction of a \$32,000 waterworks.

**EVERETT, N. C.**—C. B. Riddle, mayor, is awaiting action of an application for a PWA loan and grant for construction of a \$35,000 sewage system and waterworks.

**GARNER, N. C.**—A. Jones, mayor, has filed with PWA an application for a loan and grant to construct a \$34,000 water system.

**GOLDSBORO, N. C.**—State hospital for insane, Graham Woodward chairman of board of trustees, asks bids until July 8 for furnishing pumps, valves and connections for present mains. Atwood & Weeks Inc., 203 Trust building, Durham, N. C., is architect.

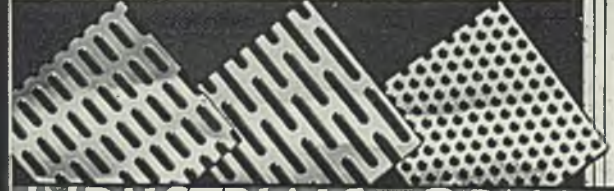
**NASHVILLE, N. C.**—D. W. Perry, Mayor, is awaiting action on an application filed with PWA for a loan and grant to construct a \$58,000 waterworks and sewage system.

**South Carolina**

**LYMAN, S. C.**—Pacific mills may spend \$100,000 for purchase of conveyors, motors and controls, and other electrical equipment in a new textile mill building program.

**Tennessee**

**COLUMBIA, TENN.**—F. E. Kan-  
(Please turn to Page 105)



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- National Bearing Metals Corp.,  
928 Shore Ave., Pittsburgh, Pa.  
Timken Roller Bearing Co., The,  
Canton, O.
- BEARINGS (Oilless)**  
Richardson Co., The,  
Lockland, Cincinnati, O.  
Rhoades, R. W., Metaline Co.,  
50-3rd St., Long Island City,  
N. Y.
- BEARINGS (Radial)**  
Bantam Ball Bearing Co.,  
South Bend, Ind.  
Fafnir Bearing Co.,  
New Britain, Conn.  
Hyatt Roller Bearing Co.,  
P. O. Box 476, Newark, N. J.  
New Departure Mfg. Co.,  
Bristol, Conn.  
Timken Roller Bearing Co.,  
Canton, O.  
Bearings (Roll Neck)  
Bantam Ball Bearing Co., The,  
South Bend, Ind.  
Fafnir Bearing Co.,  
New Britain, Conn.  
Hyatt Roller Bearing Co.,  
P. O. Box 476, Newark, N. J.  
National Bearing Metals Corp.,  
928 Shore Ave., Pittsburgh, Pa.  
Ryerson, Jos. T., & Son, Inc., 16th  
and Rockwell Sts., Chicago, Ill.  
Timken Roller Bearing Co.,  
Canton, O.
- BEARINGS (Roller)**  
Bantam Ball Bearing Co., The,  
South Bend, Ind.  
Fafnir Bearing Co.,  
New Britain, Conn.  
Hyatt Roller Bearing Co.,  
P. O. Box 476, Newark, N. J.  
Norma Hoffmann Bearings Corp.,  
Stamford, Conn.  
S K F Industries, Inc.,  
Front St. & Erie Ave.,  
Philadelphia, Pa.  
Timken Roller Bearing Co., The,  
Canton, O.
- BEARINGS (Roller Tapered)**  
Bantam Ball Bearing Co.,  
South Bend, Ind.  
Timken Roller Bearing Co.,  
Canton, O.
- BEARINGS (Rolling Mill)**  
Bantam Ball Bearing Co.,  
South Bend, Ind.  
Cramp Brass & Iron Foundries Co.,  
Paschall Sta., Philadelphia, Pa.  
Hyatt Roller Bearing Co.,  
P. O. Box 476, Newark, N. J.  
Lawrenceville Bronze Co.,  
Bessemer Bldg., Pittsburgh, Pa.  
Norma Hoffmann Bearings Corp.,  
Stamford, Conn.  
Shoop Bronze Co., The,  
344-360 W. Sixth St.,  
Tarentum, Pa.  
Timken Roller Bearing Co.,  
Canton, O.
- BEARINGS (Rolling Mill)**  
Bantam Ball Bearing Co.,  
South Bend, Ind.
- BEARINGS (Thrust)**  
Bantam Ball Bearing Co., The,  
South Bend, Ind.  
Fafnir Bearing Co.,  
New Britain, Conn.  
Norma Hoffmann Bearings Corp.,  
Stamford, Conn.  
Timken Roller Bearing Co., The,  
Canton, O.
- BELTING (Rubber)**  
Goodrich, B. F., Co., The,  
Akron, O.  
U. S. Rubber Products, Inc.,  
1790 Broadway, New York City.



(Concluded from Page 103)

non, city recorder, may vote on bonds to finance construction of a power distribution system.

**KNOXVILLE, TENN.**—George R. Dempster, city manager, has been authorized to call for bids for constructing a \$3,225,000 power distribution system to resell TVA power.

**NASHVILLE, TENN.**—Tennessee Electric Power Co., J. P. W. Brown vice president, will start work immediately on improving underground power distribution system to cost \$1,000,000, and to be carried on over a period of three years. N. T. Kinzly is superintendent of power distribution.

**SOMERVILLE, TENN.**—J. B. Summers, mayor, will accept bids until July 7 for furnishing electrical equipment and material for a pole line. J. B. McCrary Engineering Corp., Atlanta, Ga., is consulting.

### West Virginia

**WHEELING, W. VA.**—Continental Roll & Steel Foundry Co., 144th and Railroad avenue, East Chicago, Ind., plans to spend \$100,000 to improve the machine shop of Wheeling Mold & Foundry Co.

### Virginia

**HARRISONBURG, VA.**—Shenandoah Valley Electric Cooperative Co. plans to erect 125 miles of lines on a rural electrification administration allotment of \$125,000.

**MANASSAS, VA.**—Bull Run Power Co. plans to build 22 miles of rural lines in Prince William and Fairfax counties with the \$30,000 obtained from rural electrification administration, Washington.

**ORISKANY, VA.**—Craig Cooperative Electric Co. has received \$90,000 from rural electrification administration, Washington, for diesel generating plant, in addition to constructing distribution lines.

### Missouri

**PALMYRA, MO.**—Missouri Rural Electric Cooperative association has been incorporated by R. D. Pennewell and H. L. Foster.

**ST. LOUIS**—St. Louis Spring Co., 3135 Washington street, has purchased old St. Louis Frog & Switch Co. plant at 6650 Easton avenue, Wellston, local suburb, and will equip plant for the manufacture of automobile springs.

### Oklahoma

**STILLWATER, OKLA.**—City has sold \$80,000 worth of bonds with which to improve the local light plant.

### Texas

**HOUSTON, TEX.**—American Can Co. of Louisiana, subsidiary of American Can Co. of New York, 230 Park avenue, New York, plans to spend more than \$1,000,000 for a new plant here.

**HOUSTON, TEX.**—Rheen Mfg. Co., Richmond, Calif., proposes to erect a plant here for the manufacture of steel drums and other containers for the oil industry. Cost may be \$100,000.

**MINGUS, TEX.**—Laurence Santi,

mayor, will receive bids until July 15 for a complete waterworks distributing system. (Note advanced bid date). Hawley, Foose & Nichols, 407 Capps building, Fort Worth, Tex., is consulting engineer. (Noted **STEEL**, June 29).

**PLEASANTON, TEX.**—William Housewright, mayor, has applied for federal aid, and city will vote on bonds July 11, with which to finance construction of a \$45,000 water system, including pumping equipment, a tank and tower. A. A. Ririe, 655 East Woodlawn avenue, San Antonio, Tex., is engineer.

**WICHITA FALLS, TEX.**—State board of control may make improvements in the boiler at the state hospital.

### Minnesota

**PELICAN RAPIDS, MINN.**—Lake Region Cooperative Electric association. A. R. Knutson president, expects to secure federal aid for proposed construction of \$500,000 worth of lines and a power substation.

**TRIUMPH, MINN.**—South Central Cooperative Electric association. A. Edman president, has applied to federal government for a loan to finance construction of distribution lines in four counties at a cost of \$150,000.

**VIRGINIA, MINN.**—Northern Electric Cooperative association has applied for aid to finance construction of \$312,000 worth of rural lines. A. Newbauer is secretary.

### Kansas

**FORT SCOTT, KANS.**—American Service Co., Fairfax building, Kansas City, Mo., plans to install either a diesel or a gas engine for power purposes in a new plant here. F. O'Conner is general manager.

**LENEXA, KANS.**—R. J. Sims, clerk, is awaiting favorable action on PWA application before calling for bids for a waterworks, including 2 tanks and towers, pumping equipment, and mains. City has voted \$37,000 worth of bonds toward this \$67,000 project. Shockley Engineering Co., Graphic Arts building, Kansas City, Mo., is consulting.

**TOPEKA, KANS.**—Benjamin Franklin, state business manager, Kansas State college, Manhattan, Kans., asks bids until noon, July 9 for one 75-horsepower kilovolt ampere single phase transformer.

**TOPEKA, KANS.**—Ira E. Taylor, maintenance engineer, state highway commission, Masonic building, asks bids until July 11 for two light type crawler tractors for Garden City, Kans.

### North Dakota

**BEULAH, N. DAK.**—Knife River Mining Co. expects to rebuild burned mine tippie at a cost of \$50,000. M. C. Blackstone, Bismarck, N. D., is manager.

### Iowa

**FORT DODGE, IOWA**—Iowa Public Service Co. has applied for permission to erect distribution lines in Sac, Calhoun, Black Hawk, and Plymouth counties.

### Colorado

**DENVER**—H. L. Townsend, 1101 United States National Bank building,

is seeking a preliminary permit to construct a power project on the Lakefork of the Gunnison river in Hinsdale county.

**DENVER**—Bureau of reclamation will accept bids until July 17 for furnishing and delivering free on board at shipping point, or at Casper, Wyo., one 69,000-volt, 600 ampere oil circuit breaker; six 69,000-disconnecting switches; two 69,000-potential transformers, and one 69,000-volt current transformer, on specification \$11-D.

### Montana

**BUTTE, MONT.**—Montana Power Co. may apply for a license to construct transmission lines in Blaine county.

### Utah

**PARK CITY, UTAH**—Silver King Coalition Mines Co., Kearns building, Salt Lake City, Utah, proposes to install a new 400 horsepower electric hoist at its property here. M. G. Hertzman is engineer.

### Pacific Coast

**EUREKA, CALIF.**—A. W. Kildale, city clerk, is in the market for a caterpillar type tractor with a maximum of 30 or a minimum of 20 horsepower.

**FRESNO, CALIF.**—H. S. Foster, city clerk, is asking for bids for furnishing a motor grader, power controlled, having a 12-inch scarifier.

**MOJAVE, CALIF.**—Marguerita Mining Co. has engaged Ralph Wyman to install a 5-stamp mill and a 240 cubic inch Worthington compressor at the Mountain Springs Canyon plant. Bruce Minard, Mojave, is one of the owners.

**NORTH SAC, CALIF.**—City may join with Hagginwood for the construction of a water supply system to cost more than \$22,000. Chamber of commerce is investigating feasibility of project.

**SACRAMENTO, CALIF.**—United States army air corps, Washington, through construction quartermaster, chamber of commerce, Sacramento, will spend \$4,000,000 for several industrial buildings, including a power house. Motors and controls are to be installed in industrial buildings.

**WALNUT CREEK, CALIF.**—G. Oliver, city engineer, is awaiting outcome of a vote on bonds to finance construction of a water supply system, including a 300,000 gallon storage tank, and pumps. City will furnish \$42,000 worth of materials and WPA will grant \$40,000.

**DETROIT, OREG.**—G. W. Moore and R. D. Morris are seeking a license to construct a power project in Marion county on the Tumble river.

**SALEM, OREG.**—Stevens & Koon, engineers, Spaulding building, Portland, Oreg., soon will take bids for a steel elevated tank and other equipment for a \$100,000 water supply system.

### Canada

**CARMAN, MAN.**—Pace Oil Refiners Ltd., through W. R. Milton, general manager, is considering plans for constructing an oil refinery at a cost of \$75,000.

**RIDGEWAY, ONT.**—M. Gray, Fort Erie, Ont., is engineer for a proposed \$35,000 improvement in the water supply system.



# WHERE-TO-BUY

# WHERE-TO-BUY

## BENDING AND STRAIGHTENING MACHINES

Buffalo Forge Co.,  
490 Broadway, Buffalo, N. Y.  
Kardong Bros., 346 Buchanan St.,  
Minneapolis, Minn.  
Morgan Engineering Co., The,  
Alliance, O.  
Thomas Spacing Machine Co.,  
Pittsburgh, Pa.

## BENZOL AND TOLUOL RECOVERY PLANTS

Koppers Construction Co.,  
1438 Koppers Bldg., Pittsburgh.  
Youngtown Sheet & Tube Co.,  
Youngtown, O.

## BILLETS (Alloy and Carbon Steel)

Alan Wood Steel Co.,  
Conshohocken, Pa.  
Andrews Steel Co.,  
Newport, Ky.  
Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.  
Firth-Sterling Steel Co.,  
McKeesport, Pa.  
Republic Steel Corp.,  
Dept. ST, Cleveland, O.  
The Stanley Works,  
New Britain, Conn.  
Bridgeport, Conn.  
Tennessee Coal, Iron & Railroad  
Co., Brown Marx Bldg., Birming-  
ham, Ala.  
Timken Steel & Tube Co.,  
Canton, O.  
Washburn Wire Co.,  
Phillipsdale, R. I.

## BILLETS (Forging)

Alan Wood Steel Co.,  
Conshohocken, Pa.  
Andrews Steel Co.,  
Newport, Ky.  
Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.  
Central Iron & Steel Co.,  
Harrisburg, Pa.  
Keppensall Co.,  
47th & Hatfield Sts.,  
Pittsburgh, Pa.  
Jones & Laughlin Steel Corp.,  
Jones & Laughlin Bldg.,  
Pittsburgh, Pa.  
Midvale Co., The, Nicetown,  
Philadelphia, Pa.  
Republic Steel Corp.,  
Dept. ST, Cleveland, O.  
Standard Steel Works Co.,  
Burnham, Pa.  
The Stanley Works,  
New Britain, Conn.  
Bridgeport, Conn.  
Tennessee Coal, Iron & Railroad  
Co., Brown Marx Bldg., Birming-  
ham, Ala.  
Timken Steel & Tube Co.,  
Canton, O.

## BILLETS AND BLOOMS

(\*Also Stainless)  
Alan Wood Steel Co.,  
Conshohocken, Pa.  
Andrews Steel Co.,  
Newport, Ky.  
Bethlehem Steel Co., Bethlehem, Pa.  
Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.  
Central Iron & Steel Co.,  
Harrisburg, Pa.  
Firth-Sterling Steel Co.,  
McKeesport, Pa.  
Inland Steel Co.,  
38 So. Dearborn St., Chicago, Ill.  
Jones & Laughlin Steel Corp.,  
Jones & Laughlin Bldg.,  
Pittsburgh, Pa.  
\*Ludlum Steel Co.,  
Watervliet, N. Y.  
\*Republic Steel Corp.,  
Dept. ST, Cleveland, O.  
Standard Steel Works Co.,  
Burnham, Pa.  
The Stanley Works,  
New Britain, Conn.  
Bridgeport, Conn.  
Tennessee Coal, Iron & Railroad  
Co., Brown Marx Bldg., Birming-  
ham, Ala.  
Timken Steel & Tube Co.,  
Canton, O.  
Youngtown Sheet & Tube Co.,  
Youngtown, O.

## RINS (Storage)

Petroleum Iron Works Co.,  
Sharon, Pa.

## BLAST FURNACE FITTINGS

Pollock, The Wm. B., Co.,  
Youngstown, O.  
BLAST FURNACE SPECIALTIES  
Bailey, Wm. M., Co.,  
702 Magee Bldg., Pittsburgh, Pa.  
Brosius, Edgar E., Inc.,  
Sharpsburg, Pa.  
Leeds & Northrup Co.,  
4901 Stenton Ave.,  
Philadelphia, Pa.  
Pollock, The Wm. B., Co.,  
Youngstown, O.  
Shoop Bronze Co., The,  
344-360 W. Sixth St.,  
Tarentum, Pa.  
Steel Industries Engineering Corp.,  
Empire Bldg., Pittsburgh, Pa.

## BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)  
Ford Chain & Block Co.,  
York, Pa.  
Yale & Towne Mfg. Co.,  
4530 Tacony St., Philadelphia, Pa.

## BLOWERS

Buffalo Forge Co.,  
490 Broadway, Buffalo, N. Y.  
Coppus Engineering Co.,  
359 Park Ave., Worcester, Mass.  
General Electric Co.,  
Schenectady, N. Y.  
Ingersoll-Rand Co.,  
Phillipsburg, N. J.  
Strong, Carlisle & Hammond Co.,  
The, 1400 W. 3rd St., Cleve-  
land, O.

## BLOWPIPES (Oxy-Acetylene)

Linde Air Products Co.,  
30 E. 42nd St., New York City.

## BLUE PRINTING EQUIPMENT AND SUPPLIES

Bruning, Chas., Co., Inc.,  
445 Plymouth Ave., Chicago, Ill.

## BOILER HEADS

Bethlehem Steel Co., Bethlehem, Pa.

## BOILER TUBES—See TUBES (Boiler)

## BOILERS

Murray Iron Works Co.,  
Burlington, Iowa.  
Oil Well Supply Co., Dallas, Texas  
BOLT AND NUT MACHINERY  
Landis Machine Co.,  
Waynesboro, Pa.

## BOLTS

(\*Also Stainless)  
Bethlehem Steel Co., Bethlehem, Pa.  
Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.  
Columbia Steel Co.,  
San Francisco, Calif.  
Jones & Laughlin Steel Co.,  
Jones & Laughlin Bldg.,  
Pittsburgh, Pa.  
Oliver Iron & Steel Corp.,  
S. 10th & Muriel Sts.,  
Pittsburgh, Pa.

\*Republic Steel Corp., Upson Nut  
Div., Dept. ST, 1912 Scranton Rd.,  
Cleveland, O.

Russell, Burdsall & Ward Bolt &  
Nut Co., Port Chester, N. Y.  
Ryerson, Jos. T., & Son, Inc., 16th  
and Rockwell Sts., Chicago, Ill.  
Tennessee Coal, Iron & Railroad  
Co., Brown Marx Bldg., Birming-  
ham, Ala.

## BORING MACHINES (Horizontal)

Landis Tool Co.,  
Waynesboro, Pa.

## BOSH PLATES (Copper)

Lawrenceville Bronze Co.,  
Bessemer Bldg., Pittsburgh, Pa.

## BOXES (Annealing)

Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.  
Petroleum Iron Works Co.,  
Sharon, Pa.

Pollock, The Wm. B., Co.,  
Youngstown, O.  
United Engineering & Foundry Co.,  
First National Bank Bldg.,  
Pittsburgh, Pa.

Wilson, Lee, Engineering Co.,  
1370 Blount St., Cleveland, O.

BOXES (Case Hardening)  
Driver-Harris Co.,  
Harrison, N. J.  
Strong, Carlisle & Hammond Co.,  
The, 1400 W. 3rd St., Cleve-  
land, O.

## BOXES (Open Hearth Charging)

Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.  
Morgan Engineering Co., The,  
Alliance, O.  
Petroleum Iron Works Co.,  
Sharon, Pa.  
Pollock, The Wm. B., Co.,  
Youngstown, O.  
Wellman Engineering Co.,  
7000 Central Ave., Cleveland, O.

## BRAKES (Electric)

Clark, The, Controller Co.,  
1146 E. 152nd St., Cleveland, O.  
Electric Controller & Mfg. Co.,  
2698 E. 79th St., Cleveland, O.

## BRAKES (Press)

Cincinnati Shaper Co.,  
Elam and Garrard Sts.,  
Cincinnati, O.

## BRICK—(Insulating)—See INSULATING BRICK

## BRICK (Refractory)—See REFRACTORIES, CEMENT, etc.

## BRICK (Silicon Carbide)

Carborundum Co., The,  
Perth Amboy, N. J.  
Norton Co., Worcester, Mass.

## BRIDGE CRANES (Ore and Coal Handling) See CRANES (Bridge)

## BRIDGES, BUILDINGS, VIADUCTS, STACKS

American Bridge Co.,  
Frick Bldg., Pittsburgh, Pa.  
Belmont Iron Works,  
22nd and Washington Ave.,  
Philadelphia, Pa.

Bethlehem Steel Co., Bethlehem, Pa.  
Columbia Steel Co.,  
San Francisco, Calif.

Ohio Structural Steel Co., The,  
Newton Falls, O.  
Petroleum Iron Works Co.,  
Sharon, Pa.

Truscon Steel Co.,  
Youngstown, O.

## BRUSHES (Industrial)

Pittsburgh Plate Glass Co.,  
Rennous-Kleinle Div.,  
3221 Frederick Rd., Baltimore, Md.

## BUCKETS (Clam Shell, Dragline, Grab, Single Line)

Atlas Car & Mfg. Co., The,  
1140 Ivanhoe Rd., Cleveland, O.  
Harnischfeger Corp., 4411 W. Na-  
tional Ave., Milwaukee, Wis.

Industrial Brownhoist Corp.,  
Bay City, Mich.  
Link-Belt Co., 300 W. Pershing Rd.,  
Chicago, Ill.

Wellman Engineering Co.,  
7000 Central Ave., Cleveland, O.

## BUCKETS (Elevator)

Link-Belt Co.,  
307 No. Michigan Ave.,  
Chicago, Ill.

## BUILDINGS (Industrial)

Austin Company, The,  
16112 Euclid Ave., Cleveland, O.

## BUILDINGS (Steel)—See BRIDGES, ETC.

## BURNERS (Acetylene)—See TORCHES AND BURNERS

## BURNERS (Automatic)

Kemp, C. M., Mfg. Co.,  
405 E. Oliver St., Baltimore, Md.  
Surface Combustion Co.,  
2375 Dorr St., Toledo, O.  
Wean Engineering Co.,  
Warren, O.

Wilson, Lee, Engineering Co.,  
1370 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Com-  
bination)  
Best, W. N., Engineering Co.,  
75 West St., New York City.  
Hagan, Geo. J., Co.,  
2400 E. Carson St., Pittsburgh, Pa.  
Surface Combustion Co.,  
2375 Dorr St., Toledo, O.  
Wean Engineering Co.,  
Warren, O.

Wilson, Lee, Engineering Co.,  
1370 Blount St., Cleveland, O.

## Shenango-Penn Mold Co., Dover, O.

Shoop Bronze Co.,  
344-360 W. 6th Ave.,  
Tarentum, Pa.

## BUSHINGS (Oilless)

Rhodes, R. W., Metaline Co.,  
50-3rd St., Long Island City,  
N. Y.

## BUSINESS CARDS (Engraved)

Modern Card Co.,  
1153 Fullerton Ave., Chicago, Ill.

## BY-PRODUCT PLANTS

Koppers Construction Co.,  
1438 Koppers Bldg.,  
Pittsburgh, Pa.

## CABLE GRIPS

Smith Devices  
2245 No. 12th St.,  
Philadelphia, Pa.

## CADMIUM

The Udylyte Co., 1615 E. Grand  
Blvd., Detroit, Mich.

## CADMIUM PLATING PROCESS

The Udylyte Co., 1615 E. Grand  
Blvd., Detroit, Mich.

## CALCIUM ALLOYS

Electro Metallurgical Sales Corp.,  
30 E. 42nd St., New York City.

## CAR DUMPERS

Industrial Brownhoist Corp.,  
Bay City, Mich.  
Link-Belt Co., 300 W. Pershing Rd.,  
Chicago, Ill.

Wellman Engineering Co.,  
7000 Central Ave., Cleveland, O.

## CAR PULLERS and SPOTTERS

Link-Belt Co.,  
300 W. Pershing Rd., Chicago, Ill.

## CARBIDE

Linde Air Products Co.,  
30 E. 42nd St., New York City.

## CARBURIZERS

Houghton, E. F. & Co.,  
240 W. Somerset Ave.,  
Philadelphia, Pa.

## CARS (Charging)

Atlas Car & Mfg. Co., The,  
1140 Ivanhoe Rd., Cleveland, O.  
Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.

Morgan Engineering Co., The,  
Alliance, O.  
Pollock, The Wm. B., Co.,  
Youngstown, O.

Wellman Engineering Co.,  
7000 Central Ave., Cleveland, O.

## CARS (Industrial and Mining)

Atlas Car & Mfg. Co.,  
1140 Ivanhoe Rd., Cleveland.  
Bethlehem Steel Co., Bethlehem, Pa.  
Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.

Petroleum Iron Works Co.,  
Sharon, Pa.

Pollock, The Wm. B., Co.,  
Youngstown, O.

## CARS (Scale)

Atlas Car & Mfg. Co., The,  
1140 Ivanhoe Rd., Cleveland, O.

CASTINGS (Acid Resisting)  
Cadman, A. W., Mfg. Co.,  
2815 Smallman St.,  
Pittsburgh, Pa.  
Chain Belt Co., 1660 W. Bruce St.,  
Milwaukee, Wis.  
Farrel-Birmingham Co., Inc.,  
110 Main St., Ansonia, Conn.  
344 Vulcan St., Buffalo, N. Y.  
International Nickel Co., Inc.,  
67 Wall St., New York City.  
Link-Belt Co., 300 W. Pershing Rd.,  
Chicago, Ill.  
National Bearing Metals Corp.,  
928 Shore Ave., Pittsburgh, Pa.  
Shenango-Penn Mold Co.,  
Dover, O.

Shoop Bronze Co., The,  
344-360 W. Sixth St.,  
Tarentum, Pa.  
Wellman Bronze & Aluminum Co.,  
6017 Superior Ave., Cleveland, O.

CASTINGS (Alloy Steel)  
Bethlehem Steel Co., Bethlehem, Pa.  
Carnegie-Illinois Steel Corp.,  
Pittsburgh-Chicago.  
Damascus Steel Casting Co., The,  
New Brighton, Pa.  
Forging & Casting Corp., The,  
Ferndale, Mich.